Estimation specifications for the US Advanced Monthly Retail Trade Survey

Abstract

This document contains specifications for the estimation of levels (sales totals), ratios, and coefficients of variation for all detail kind-of-business (KB) recodes and aggregate levels defined for the 2003 sample of the United States Bureau of the Census Advance Monthly Retail Trade Survey (MARTS), which is based on a sub-sample of approximately 5,000 businesses from the full Monthly Retail Trade Survey (MRTS) sample of 12,000 businesses.

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I. Introduction

This memorandum contains specifications for computing the following MARTS estimates:

- monthly level (total sales)
- month-to-month ratio
- current month to same-month-one-year-ago ratio
- current quarter level
- current quarter to previous quarter ratio
- current quarter to same-quarter-one-year-ago ratio

These estimates will be computed for all detail KB recodes and aggregate levels shown in Attachment 1.

The MARTS uses a link-relative estimator. A link relative estimator consists of a ratio multiplied by a benchmarked total. Thus, the ratio is being used to carry forward previously published benchmarked totals. This type of estimator is commonly used when poor levels of response and limited ability to impute make the use of a simple weighted (Horvitz-Thompson) estimator impractical.

For each detail KB recode defined for the MARTS, a ratio is formed by dividing the sum of the weighted current month sales by the sum of the weighted previous month sales for all units that reported sales data in both the current and previous months. The ratio is then multiplied by the previous month Monthly Retail Trade Survey (MRTS) estimate of total sales at the appropriate KB level to arrive at total sales estimates for each of the detail MARTS KB recode levels.

With the BSR-2K MARTS sample, we are introducing a new variance estimation method. The BSR-97 MARTS sample used two methods: 1) historical CVs calculated

from prior MARTS data, and 2) estimates of the mean-square error based on the incoming MARTS data. The publications published medians of the historical CVs as the median CVs of the MARTS estimates. The CVs (for monthly estimates) from the new MARTS sample will be 12-month medians of the random group CV estimates. Similar remarks apply to standard errors. This new methodology is described in Sections V and VI.

II. Inputs

Data will be "accepted" from the MARTS Integrated Surveys Processing Network (ISPN) database only when both current month and previous month sales data are adjusted[1] and the current month tab code is blank (neither 2 nor 3). Data for the current month should be taken from the "CM TAB" field in the MARTS ISPN database. Data for the previous month should be taken from the "PM TAB" field.

A split procedure is applied to the MARTS data. This procedure first computes the split percent, the percent of segment A MRTS weighted sales in the previous data month in the ID/PART that is from a 6-digit NAICS code. Then the estimated MARTS sales of this ID/PART that is from this 6-digit NAICS code is the MARTS sales multiplied by the split percent.

The following inputs are used when computing the MARTS estimates for any given month t. In the following, j denotes a detail KB recode, S, an aggregate KB recode, and k = 0, 1, ..., 16, denotes a (MARTS or MRTS) random group.

1. $M_{t,j}$, $M_{t-1,j}$= MARTS weighted[2], adjusted[1] sales totals for detail KB recode j and months t and t-1 respectively, using only cases that responded in both months.

   $M_{t,j}(k)$, $M_{t-1,j}(k)$= weighted[2], adjusted sales totals for MARTS random group k, detail KB recode j, and months t and t-1 respectively, using only cases that responded in both months.

2. $P_{t-1,j}$, $P_{t-1,S}$ = benchmarked[3] preliminary estimates for month t-1 for detail KB recode j and aggregate KB recode S, respectively.

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[1] The term *adjusted* means that period-reported data have been adjusted to a calendar month basis.

[2] All MARTS data used in the computation of levels, ratios, and CVs are to be weighted by the MARTS weight indicated on the database.

[3] A benchmarked estimate means an estimate that has been adjusted to an annual survey total, but not adjusted for seasonality.

$P_{t-1,\,j,}(k)$, $P_{t-1,\,S}(k)$ = weighted, adjusted sales totals for month t-1 and MRTS random group k, for detail KB recode j and aggregate KB recode S, respectively.

3. $F_{t-2,\,j}$, $F_{t-2,\,S,}$ $F_{t-12,\,j}$, $F_{t-12,\,S}$ = benchmarked[3] final estimates for months t-2 and t-12 for detail KB recode j and aggregate KB recode S, respectively.

$F_{t-2,\,j}(k)$, $F_{t-2,\,S}(k)$, $F_{t-12,\,j}(k)$, $F_{t-12,\,S}(k)$ = weighted, adjusted sales totals for months t-2 and t-12 and MRTS random group k, for detail KB recode j and aggregate KB recode S, respectively.

4. $Q_{P,j,}$ $Q_{P,\,S}$ = benchmarked estimates for the previous quarter[4] for detail KB recode j and aggregate KB recode S, respectively.

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[4] Quarters are redetermined each month. That is, the current quarter for the August 2001 data month is June-August 2001 (not July - September 2001 as it would be for a fixed 4-quarter system). The previous quarter is March - May 2001 and the previous-year quarter is March - May 2000.

$Q_{P,j}$ (k), $Q_{P,S}$ (k) = weighted, adjusted sales totals for the previous quarter[4] and MRTS random group k, for detail KB recode j and aggregate KB recode S, respectively.

5. $Q_{PY,j}$, $Q_{PY,S}$= benchmarked estimates for the previous-year quarter[4] for detail KB recode j and aggregate KB recode S, respectively.

$Q_{PY,j}$ (k), $Q_{PY,S}$ (k)= weighted, adjusted sales totals for the previous-year quarter[4] and MRTS random group k, for detail KB recode j and aggregate KB recode S, respectively.

These inputs are used in the computations specified in Sections IV - VII.

The inputs $M_{t,j}$, $M_{t-1,j}$ and their random group totals are computed from the current month MARTS microdata. The estimates $P_{t-1,j}$, $P_{t-1,S}$, $F_{t-2,j}$, $F_{t-2,S}$, $F_{t-12,j}$, $F_{t-12,S}$, $Q_{P,j}$, $Q_{P,S}$, $Q_{PY,j}$, $Q_{PY,S}$ are obtained from the Monthly Retail Trade Survey (MRTS) and are read from a file whose format is shown in Attachment 3.

The random group totals for $P_{t-1,j}$, $P_{t-1,S}$, $F_{t-2,j}$, $F_{t-2,S}$, $F_{t-12,j}$, $F_{t-12,S}$, $Q_{P,j}$, $Q_{P,S}$, $Q_{PY,j}$, $Q_{PY,S}$ are read from the segment A portion of the SAS data set RDSARCH located in

bsr2k_retispn:[ispn.prod.dat]

on EPBA22. They are determined by the following SAS variable names and subsetting conditions in RDSARCH. In this, e.g., "MMYY=t-1" means the value of the SAS date field that references the month t-1.

Random group total	Variable name and subsetting condition
$P_{t-1,j}$ (k), $P_{t-1,S}$ (k)	SCM with RG = k; SIC = j, S; and MMYY = t-1
$F_{t-2,j}$ (k), $F_{t-2,S}$ (k)	SPM with RG = k; SIC = j, S; and MMYY = t-1
$F_{t-12,j}$ (k), $F_{t-12,S}$ (k)	SPM with RG = k; SIC = j, S; and MMYY = t-11
$Q_{PY,j}$ (k), $Q_{PY,S}$ (k)	SPQ with RG = k; SIC = j, S; and MMYY = t-9

For $Q_{P,j}$ (k), $Q_{P,S}$ (k), determine these as follows.

$Q_{P,j}$ (k), $Q_{P,S}$ (k) = A - B + C

where

A := SCQ with RG = k; SIC = j, S; and MMYY = t-3
B := SCM with RG = k; SIC = j, S; and MMYY = t-3
C := SPM with RG = k; SIC = j, S; and MMYY = t-2

III. Outputs

For the current month t, and for each detail KB recode j, aggregate level S, and additional tab level j defined in Attachment 1, compute the following estimates along with their estimated coefficients of variation, as specified in Sections IV - VIII.

Since BSR-2K uses a new classification system (NAICS), each estimate only makes sense starting a certain number of months into the BSR-2K MARTS sample. For example, since the first month for which 2003 MARTS sample data was collected is August 2001, the first MARTS level estimates $L_{t,j}$, $L_{t,S}$ will be computed with the September data month. The column "First data month" specifies the first data month for which the estimates are to be computed.

Estimates to compute

Estimate	Description	First data month
$L_{t,j}$, $L_{t,S}$	current month level	September 2003
$MM_{t,j}$, $MM_{t,S}$	month-to-month ratio	September 2003
$YY_{t,j}$, $YY_{t,S}$	current month to same month one year ago ratio	August 2004
$Q_{C,j}$, $Q_{C,S}$	current quarter level	October 2003
$QQ_{C,j}$, $QQ_{C,S}$	current quarter to previous quarter ratio	January 2004
$QY_{C,j}$, $QY_{C,S}$	current quarter to same quarter one year ago ratio	October 2004

Variable Name	Description
$L_{t,j}$, $L_{t,S}$	current month level
$MM_{t,j}$, $MM_{t,S}$	month-to-month ratio
$YY_{t,j}$, $YY_{t,S}$	current month to same-month-one- year-ago ratio
$Q_{t,j}$, $Q_{t,S}$	current quarter level
$QQ_{t,j}$, $QQ_{t,S}$	current quarter to previous quarter ratio
$QY_{t,j}$, $QY_{t,S}$	current quarter to same quarter one year ago ratio

Printed copies of the information specified in Attachment 2 should be given to the Program Research and Development Branch and the Retail and Wholesale Indicators Branch for each month of the sample. An ASCII file of the same information should also be made available to both branches.

IV. Computation of Estimates

A. Estimates for Detail KB Recodes and Additional Tab Levels

For each detail KB recode j and additional tab level j, calculate the following estimates.

1. Month-to-Month Ratio

$$MM_{t,j} = \frac{M_{t,j}}{M_{t-1,j}}$$

(This is sometimes referred to as the *ratio of identicals*.)

2. Monthly Level Estimate Prior to Seasonal Adjustment

$$L_{t,j} = P_{t-1,j} \times MM_{t,j} \qquad (1)$$

3. Current Month to Same-Month-One-Year-Ago Ratio

$$YY_{t,j} = \frac{L_{t,j}}{F_{t-12,j}}$$

4. Current Quarter Level

$$Q_{C,j} = L_{t,j} + P_{t-1,j} + F_{t-2,j} \qquad (2)$$

5. Current Quarter to Previous Quarter Ratio

$$QQ_j = \frac{Q_{C,j}}{Q_{P,j}}$$

where $Q_{C,j}$ is computed in equation (2) and

$$Q_{P,j} = F_{t-3,j} + F_{t-4,j} + F_{t-5,j}$$

is read from the input file of benchmarked estimates described in Attachment 3.

6. Current Quarter to Same-Quarter-One-Year-Ago Ratio

$$QY_j = \frac{Q_{C,j}}{Q_{PY,j}}$$

where $Q_{C,j}$ is computed in equation (2) and

$$Q_{PY,j} = F_{t-12,j} + F_{t-13,j} + F_{t-14,j}$$

is read from the input file from Attachment 3.

B. Estimates for Aggregate KB Recodes

For each aggregate level S, calculate the following estimates.

1. Monthly Level Estimate

$$L_{t,S} = \sum_j L_{t,j}$$

where the sum is taken over all detail recodes j within the aggregate recode S, and $L_{t,j}$ is computed using equation (1) in Section IV.A.

Remark: Sometimes in MARTS we publish an aggregate estimate $L_{t,S}$ and just one of its constituent detail $L_{t,j}$. In this case, there is no additivity issue in publication, but we compute link-relative estimates for the detail and balance and sum to obtain L_{tS}. The reason we do this instead of computing a link-relative estimate of $L_{t,S}$, is to ensure that aggregate estimates are at least as large as each of their published detail estimates. (For example, if an aggregate A = B+C, with preliminary estimates 120 = 100 + 20, MARTS PM tabbed values 30 = 20 + 10 and MARTS CM tabbed values 27 = 24 + 3, then the link-relative estimates of A,B,C would be 108, 120, 6, respectively, so the aggregate is smaller than the detail. This is caused by the very different month-to-month ratios 0.9, 1.2, 0.3 of A,B,C.) This is the reason for the "balance" terms in Attachment 1. These are nonpublished levels whose tabulation is done to ensure that detail estimates don't exceed their aggregates.

2. Month-to-Month Ratio

$$MM_{t,S} = \frac{L_{t,S}}{P_{t-1,S}}$$

3. Current Month to Same-Month-One-Year-Ago Ratio

$$YY_{t,S} = \frac{L_{t,S}}{F_{t-12,S}}$$

4. Current Quarter Level

$$Q_{C,S} = L_{t,S} + P_{t-1,S} + F_{t-2,S} \qquad (3)$$

5. Current Quarter to Previous Quarter Ratio

$$QQ_S = \frac{Q_{C,S}}{Q_{P,S}}$$

where $Q_{C,S}$ is computed from equation (3) and

$$Q_{P,S} = F_{t-3,S} + F_{t-4,S} + F_{t-5,S}$$

is read from the input file from Attachment 3.

6. Current Quarter to Same-Quarter-One-Year-Ago Ratio

$$QY_S = \frac{Q_{C,S}}{Q_{PY,S}}$$

where $Q_{C,S}$ is computed from equation (3) and

$$Q_{PY,S} = F_{t-12,S} + F_{t-13,S} + F_{t-14,S}$$

is read from the input file from Attachment 3.