Annual Seasonal Adjustment Process for the Value of Construction Put in Place Survey

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November 4, 2016
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Overview

• Background of Value of Construction Put in Place (VIP) Survey
• Brief History of VIP Seasonal Adjustment Process
• VIP Seasonal Adjustment Process
  – Review Preparation
  – Preliminary Review
  – Final Review
  – Review Wrap Up
Background of VIP Survey

- Began collecting data in 1960’s
- Monthly estimates of dollar value spent on new construction and improvements
- Estimates provided by ownership
  - Federal construction
  - State & Local construction
  - Private construction
- Underwent classification change in 1993
- Further classified by type of construction (TC)
Brief History of VIP Seasonal Adjustment Process

• 1993: Reclassification of construction categories
  – Prior to reclassification: manageable amount of series for staff review
  – After reclassification: 1000+ disaggregate series
• 2004: Seasonal Control System (SCS) developed to facilitate review of series
  – Series of SAS/AF® screens
  – Reads, processes, and organizes files
• Present-day:
  – Files are processed through SCS (stage 1 review)
  – Staff review spec files for eligible series (stage 2 review)
VIP Seasonal Adjustment Process: Review Preparation

• Organize SCS and staff review folders
• Pull not seasonally adjusted (NSA) datasets from repository
• Pull specification files from repository
  – Production specification files that were finalized during previous year’s review
• Ensure all reviewers are using the latest version and build of X-13ARIMA-SEATS
VIP Seasonal Adjustment Process: Preliminary Review

• Begin on the first business day of April
• 7 groups of series to review
  – Private: 4-digit, 3-digit, 2-digit
  – State & Local: 4-digit, 3-digit, 2-digit
  – Federal: 2-digit
• 1 week for each group’s review
VIP Seasonal Adjustment Process: Preliminary Review - SCS

- Process all files through SCS

- Converts SAS datasets to .dat files

- Reads and converts spec files into format for use by SCS
VIP Seasonal Adjustment Process: Preliminary Review - SCS

- Begin individual ownership processing
  - Order of ownership does not matter
  - Order of digit level within ownership type matters

Begin the review by selecting one of the ownership buttons.
VIP Seasonal Adjustment Process: Preliminary Review - SCS

- Private 4-digit review in SCS

Type in the current review year

Populates with series names
VIP Seasonal Adjustment Process: Preliminary Review - SCS

- Private 4-digit review in SCS

Runs spec files with X-13A-S
VIP Seasonal Adjustment Process: Preliminary Review - SCS

- Private 4-digit review in SCS

Series not adjusted last year are split into 2 categories
VIP Seasonal Adjustment Process: Preliminary Review - SCS

- Private 4-digit review

Series that were adjusted last year are listed here
VIP Seasonal Adjustment Process: Preliminary Review - SCS

- Private 4-digit review

All series that will be reviewed by staff are listed here.
VIP Seasonal Adjustment Process: Preliminary Review – Staff Review

- Staff members receive spec files with last year’s finalized settings and corresponding data files

- Before running the spec files:
  - Add an end date to the span (e.g. span=(2002.1,YYYY.12), where YYYY = previous calendar year
  - Uncomment sliding spans and history specs
  - Change file directory to reflect where reviewer is storing their data files
VIP Seasonal Adjustment Process: Preliminary Review – Staff Review

- During the review:
  - Try running the spec file with the current production settings
  - Refer to notes from previous years for help with model settings
  - Do not hard code end of series outliers
  - Avoid using mixed models
  - Avoid high number of AR (≤3) and MA (≤4) terms
  - Do not skip more than 2 lags in MA; do not skip any lags in AR
VIP Seasonal Adjustment Process: Preliminary Review – Staff Review

• After finalizing spec file settings:
  – Ensure that your diagnostics reflect most, if not all, of the following:
    • No seasonal spectrum peaks
    • No first frequency TD spectrum peaks
    • Few to no “bad” LBQs (i.e. LBQs at low lags or at lag 12)
    • Sliding spans diagnostics are good
  – Update the VIP spec file documentation with the new spec settings and notes
  – Return the following files to the lead reviewer:
    • D11 (seasonally adjusted data file)
    • OUT (output file)
    • SPC (spec file)
    • UDG (united diagnostics file)
VIP Seasonal Adjustment Process: Preliminary Review – Staff Review

<table>
<thead>
<tr>
<th>Series</th>
<th>Reviewer</th>
<th>Model type</th>
<th>Regression type</th>
<th>ARMA type</th>
<th>Forecast type</th>
<th>X11 type</th>
<th>CSUMB Comments – Preliminary Data</th>
<th>CSUMB Comments – Final Data</th>
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United States Census Bureau

U.S. Department of Commerce
Economics and Statistics Administration
U.S. CENSUS BUREAU
VIP Seasonal Adjustment Process: Preliminary Review - SCS

- Private 4-digit transition to Private 3-digit
VIP Seasonal Adjustment Process: Preliminary Review - SCS

- Private 4-digit transition to Private 3-digit

Click to move staff reviewed spec files to final location
VIP Seasonal Adjustment Process: Preliminary Review - SCS

- Private 3-digit review

Click “No” if this is the first time in this section, click “Yes” if returning
VIP Seasonal Adjustment Process: Preliminary Review - SCS

• Private 3-digit review screens proceed in similar fashion
  – Process spec files screen
  – Series that were not seasonally adjusted
  – Series that were directly adjusted last year

• One major difference between 4-digit screens and 3-digit screens
VIP Seasonal Adjustment Process: Preliminary Review - SCS

- Private 3-digit review
VIP Seasonal Adjustment Process: Preliminary Review - SCS

- Private 3-digit review
VIP Seasonal Adjustment Process: Preliminary Review – Staff Review

• Private 3-digit review
  – Directly adjusted series are disseminated to reviewers
    • Same review process as the 4-digit series
    • Update spec file settings spreadsheet
    • Return D11, OUT, SPC, and UDG files to lead reviewer
  – Indirectly adjusted series are run using metafiles
    • Consists of spec files from the 4-digit review and for non-adjusted 4-digit series
    • If no seasonal or TD1 spectrum peaks in the INDSA or INDIRR then indirect series is OK
    • Keep OUT, SPC, UDG, D11, and ISA files (indirectly seasonally adjusted data) for all associated series
VIP Seasonal Adjustment Process: Preliminary Review - SCS

- Private 2-digit review
  - SCS screens are the same as for the 3-digit
    - Process data screen to separate series with no zeros
    - Process spec files screen to perform batch run through X-13A-S
    - Not adjusted last year screen to assess whether or not currently unadjusted series should be adjusted
    - Indirectly adjusted screen to assess whether or not there are issues with the 2-digit indirect series
    - Directly adjusted last year screen to assess whether changes to spec files are necessary
    - Stop sign screen at which point series are sent out for staff review
VIP Seasonal Adjustment Process: Preliminary Review – Staff Review

• Private 2-digit review
  – Directly adjusted series are disseminated to reviewers
    • Same review process as the 4 and 3-digit series
    • Update spec file settings spreadsheet
    • Return D11, OUT, SPC, and UDG files to lead reviewer
  – Indirectly adjusted series are run using metafiles
    • Consists of spec files from the 4-digit and 3-digit review and spec files for non-adjusted 4-digit and 3-digit series
    • If no seasonal or TD1 spectrum peaks in the INDSA or INDIRR then indirect series is OK
    • Keep OUT, SPC, UDG, D11, and ISA files for all associated series
VIP Seasonal Adjustment Process: Preliminary Review – State & Local

- The State & Local SCS review process is the same as the Private SCS review
VIP Seasonal Adjustment Process: Preliminary Review - Federal

- Federal SCS review slightly different – only have 2-digit directly adjusted series
VIP Seasonal Adjustment Process: Preliminary Review - Federal

- Same “Process Spec Files”, “Not Adjusted Last Year”, and “Directly Adjusted Last Year” SCS screens
- Continue through to stop sign screen where staff reviewed spec files are exported

Only need to click “Export spec files”
VIP Seasonal Adjustment Process: Preliminary Review

- Staff review for other ownership categories are the same as Private
- Separate spec file settings spreadsheets for State & Local and Federal
- Return/Keep all D11, ISA, OUT, SPC, UDG files
- Allow 1 week for each group of series to be reviewed
- For 2016 we reviewed 120 directly adjusted series
VIP Seasonal Adjustment Process: Preliminary Review – Wrap Up

• Documentation and Reports
  – Update VIP “cheat sheet” to send to Construction Expenditures Branch (CEB)
  – Create revisions spreadsheet
    • Store D11 & ISA files from preliminary review in `\YYYY\Revision` folder where `YYYY` is the current year
    • Run all of last year’s finalized spec files on current year’s data and store the D11 & ISA files in `\YYYY\Revision` folder where `YYYY` is the previous year
VIP Seasonal Adjustment Process: Preliminary Review – Wrap Up

– Create revisions spreadsheet
  • Open SCS and click on “Proceed to End”
VIP Seasonal Adjustment Process: Preliminary Review – Wrap Up

– Create revisions spreadsheet
  • Click on “Create Revision Table”
VIP Seasonal Adjustment Process: Preliminary Review – Wrap Up

– Create revisions spreadsheet
  • SCS outputs a SAS® dataset consisting of the percent difference between last year’s spec files and the spec files finalized during preliminary review
  • After formatting, the spreadsheet is sent to CEB

• Final Review Preparation
  – Move finalized spec files from preliminary review to SCS spec file folder
VIP Seasonal Adjustment Process: Final Review

- Usually conducted during the 2nd week of June
- Email notification from programmer about the availability of data
- Approximately one week to conduct entire review
- Process is the same as the preliminary review
VIP Seasonal Adjustment Process: Final Review

- Proceed through each ownership’s SCS review and staff review in the same manner as the preliminary review
- Staff have 1 business day to complete review
- During staff review:
  - Do NOT include end date in span statement
  - Run the spec file as it is delivered (may need to recode outliers from preliminary review)
  - If diagnostics are OK, leave the settings as they are and move on
  - Note any changes to spec files in the spreadsheet
VIP Seasonal Adjustment Process: Final Review

- Once spec files are finalized, update the settings spreadsheet and return the D11, SPC, OUT, and UDG files.
- For 2016, we seasonally adjusted 117 series.
- Next step is to prepare files for programmers to put into production.
VIP Seasonal Adjustment Process: Final Review – End of Review

• Open SCS and click on “Proceed to End”
VIP Seasonal Adjustment Process: Final Review – End of Review

- Create seasonal adjustment aggregation file for each ownership
- Create the production spec files for all directly adjusted series

All files created here are sent to our programmer and the CEB branch & section chiefs
VIP Seasonal Adjustment Process: Final Review – End of Review

- Update “cheat sheet”, if necessary, and submit to Construction Expenditures Branch
- Summary measures for the VIP website are submitted approximately 1 week after the aggregation files and production spec files
  - Created by a SAS® software program outside of SCS
  - Pulls diagnostic information from the UDG files
# VIP Seasonal Adjustment Process: Final Review – End of Review

<table>
<thead>
<tr>
<th>Name</th>
<th>Header</th>
<th>X-13 table</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Original Series</td>
<td>O</td>
<td>Table F2.A Span 1</td>
<td>The average month-to-month (quarter-to-quarter) percentage change, without regard to sign, of the original (not seasonally adjusted) series.</td>
</tr>
<tr>
<td>Seasonally adjusted series</td>
<td>CI</td>
<td>Table F2.A Span 1</td>
<td>The average month-to-month (quarter-to-quarter) percentage change, without regard to sign, of the seasonally adjusted series.</td>
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<tr>
<td>Irregular component</td>
<td></td>
<td>Table F2.A Span 1</td>
<td>The average month-to-month (quarter-to-quarter) percentage change of the irregular component. This component is obtained by dividing the trend-cycle component into the seasonally adjusted series.</td>
</tr>
<tr>
<td>Trend-cycle component</td>
<td>C</td>
<td>Table F2.A Span 1</td>
<td>The average month-to-month (quarter-to-quarter) percentage change of the trend-cycle component. This component is a smoothed version of the seasonally adjusted series obtained by means of a moving average.</td>
</tr>
<tr>
<td>Ratio of irregular to trend-cycle component</td>
<td>I/C</td>
<td>Table F2.A Span 1</td>
<td>The average month-to-month (quarter-to-quarter) percentage change of the trend-cycle component. This component is a smoothed version of the seasonally adjusted series obtained by means of a moving average.</td>
</tr>
<tr>
<td>Moving seasonality present relative to stable seasonality</td>
<td>M7</td>
<td>Table F3</td>
<td>A function of the F-test assessing the significance of stable seasonality and the F-test assessing the significance of moving seasonality. It is one of the 11 quality monitoring statistics that X-13ARIMA-SEATS produces. M7 may range from 0 to 3 with an acceptance range from 0 to 1.</td>
</tr>
<tr>
<td>Overall quality assessment statistic</td>
<td>Q</td>
<td>Table F3</td>
<td>A weighted average of M1-M11 (quality monitoring statistics from X-13ARIMA-SEATS). An indicator of the overall quality of the adjustment. Q has an acceptance range of 0 to 1. Values from 1.0 to 1.2 may be accepted if other diagnostics indicate suitable adjustment quality.</td>
</tr>
<tr>
<td>F-test statistic for stable seasonality</td>
<td>F</td>
<td>Table D8</td>
<td>An F-test measure of the presence of stable seasonality. It is the quotient of two variances: (1) the between-months (between-quarters) variance and (2) the residual variance.</td>
</tr>
</tbody>
</table>

**Summary Measures from the VIP Website**
VIP Seasonal Adjustment Process: Review Wrap Up

- The following tasks are completed 1 week or more after the July press release of May VIP data:
  - Update documentation for external federal agencies (if requested)
  - Create versions of spec files suitable for release outside of Census
  - Clean up the SCS folders:
    - Move final output, spec, and data files to the appropriate subfolders within the current year YYYY folder
    - Delete unneeded files from the SCS active use folders
  - Update internal documentation with notes about specific VIP series (e.g. newly adjusted, dropped from adjustment, difficult)
VIP Seasonal Adjustment Process: Review Wrap Up
VIP Seasonal Adjustment Process: Contact Information

- Courtney Harris, Mathematical Statistician – Construction Surveys Statistical Methods Branch (CSSMB): courtney.harris@census.gov
- Bonnie Kegan, Chief – CSSMB: bonnie.e.kegan@census.gov
THANK YOU!