Current Challenges with Quality Assurance of Seasonal Adjustment

Presented to 2nd Seasonal Adjustment Practitioners Workshop

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Overview

Background and Context

Quality Assurance Process for Seasonal Adjustment

Managing Expectations of Seasonal Adjustment

Communicating Quality of Seasonal Adjustment

Future Work

Background

Historically, Seasonally Adjusted estimates only produced when a certain level of quality is assured

- Required series-by-series manual review of options for each series

Recently, top-down review based on priorities and key diagnostics

- Validate and hard-code automatic options for lower priority series

Background

- Increasing demand for seasonally adjusted estimates
  - More detailed domains
    - More difficult series (volatile, less seasonal)
    - Higher volume of series
  - Data with shorter historical span
  - High-Frequency

Context

Short Term:

- Manage Expectations and Communicate quality with users

Long Term:

- Make more effective use of time in analysis
- Develop methods to suit new types of data

Quality Assurance Process for Seasonal Adjustment

Time Series specialists support seasonally adjusted results

Regularly scheduled review of options in place for monthly production (e.g. annual)

- initial setup and updates generally timed with historical revisions

Periodic review of diagnostics to monitor quality (e.g. quarterly)

- assure that key diagnostics are within acceptable ranges
- identify areas where updates are required (immediately, or in near future)

Ongoing support during monthly production processes (e.g. monthly)

- evaluate if interventions are needed between planned updates
- assist subject matter experts with explanation and interpretation

Quality Assurance Process for Seasonal Adjustment: Practical Aspects

Input from Subject Matter Experts is an important component

- Proper validation and interpretation of results
- Input / Judgement on technical options (e.g. outliers)

- Requires communication of seasonal adjustment concepts and tools
  - formal courses
  - video on seasonal adjustment (https://www.youtube.com/watch?v=ccgmdVsrVAw)
  - frequently asked questions (http://www.statcan.gc.ca/eng/dai/btd/sad-faq)
  - seasonal adjustment dashboard

Managing Expectations of Seasonal Adjustment

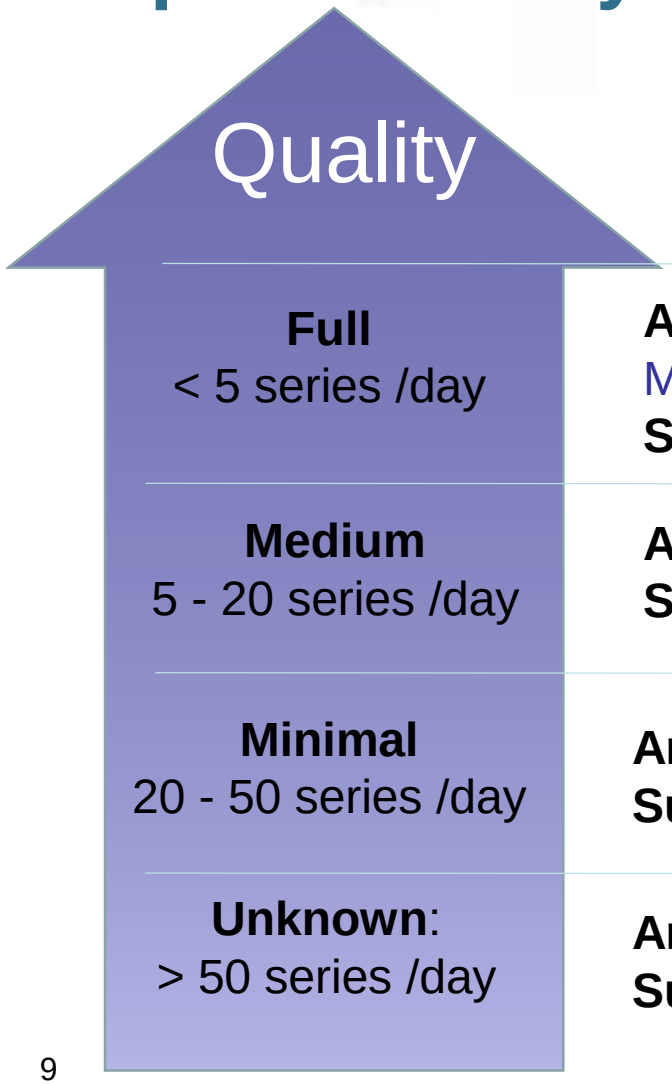
In practice, technical review limited by resources and timing

- More time and resources = higher quality
- Prioritized aspects and diagnostics into critical, recommended and optional
- Deeper validation applied for higher priority series

Visual aid used to detail depth of validation according to resources:

- link between resources, support offered and underlying analysis

Managing Expectations of Seasonal Adjustment – Resource Requirements by Level of Analysis



Full
< 5 series /day

Analysis: Adjustability, presence of residual seasonality, Customization of outliers, *Measures for evolving seasonal patterns, Minimize revisions*
Support: Full explanation and analysis (including dashboard), support for briefings

Medium
5 - 20 series /day

Analysis: Adjustability, Presence of residual seasonality, *Customization of outliers*
Support: Summary analysis (including dashboard)

Minimal
20 - 50 series /day

Analysis: *Adjustability*, *Presence of residual seasonality*
Support: Dashboard

Unknown:
> 50 series /day

Analysis: None
Support: Generic Documentation on method

Managing Expectations of Seasonal Adjustment

Increasingly common request to seasonally adjust short series (new survey, new phenomenon, etc.)

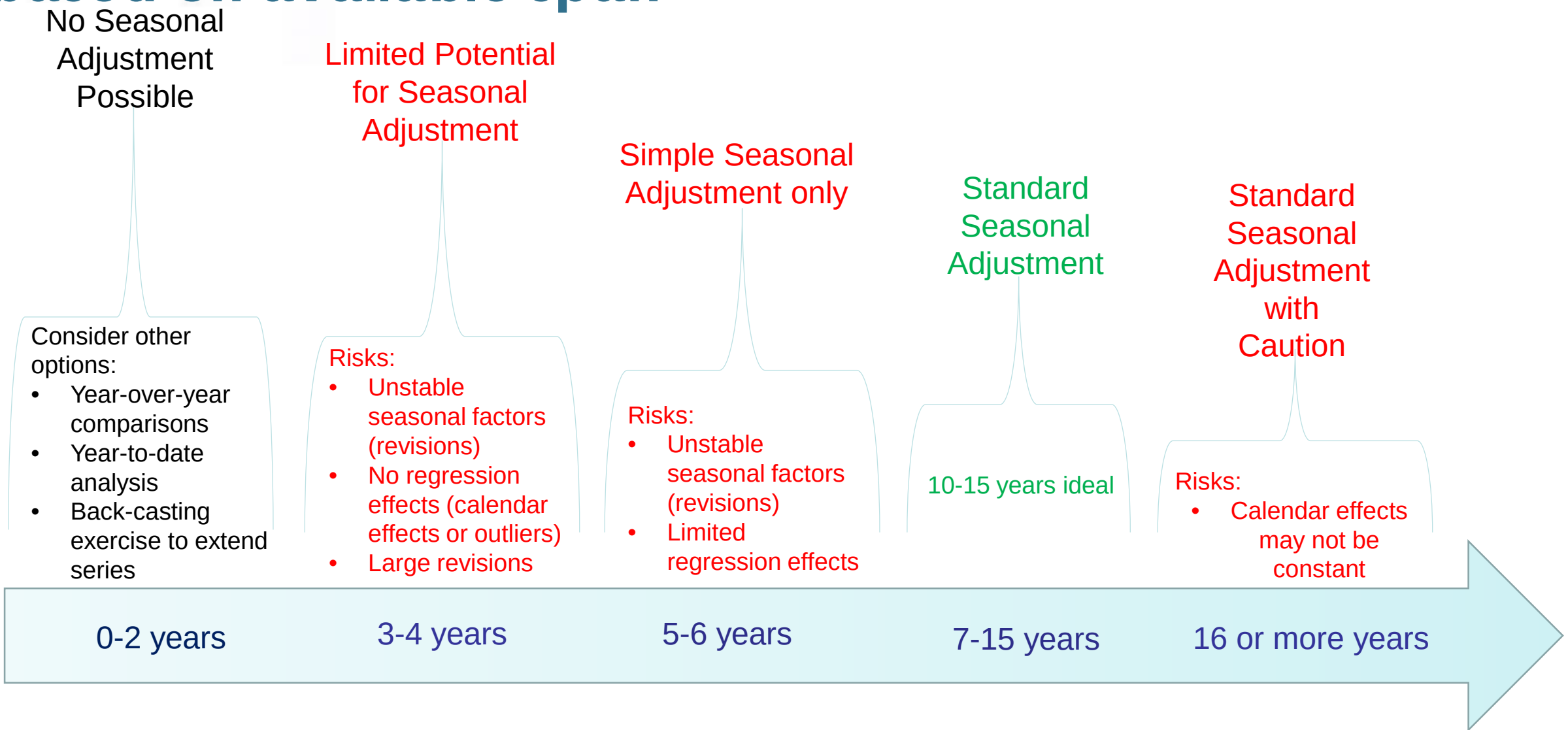
Statistics Canada Quality Guidelines outline requirements and recommended techniques:

- use of X-12ARIMA and 10-15 years of data
- Shorter or longer series can be adjusted but available methods may not be suitable

Visual aid divides span lengths into ranges with:

- recommended methods to use for seasonal adjustment
- associate risks that need to be managed

Managing Expectations of Seasonal Adjustment – Options based on available span



Communicating Quality of Seasonal Adjustment

Tools are designed to communicate with program managers

- Guide on decisions related to methods, budget
- May not be the ultimate user of the data
- Need to communicate to data users with varying understanding of seasonal adjustment

Statistics Canada has never published quality indicators specifically for seasonally adjusted estimates

- Ideally, every published Seasonally Adjusted estimate would have an indicator that allows user to assess fitness for their use.

Communicating Quality of Seasonal Adjustment

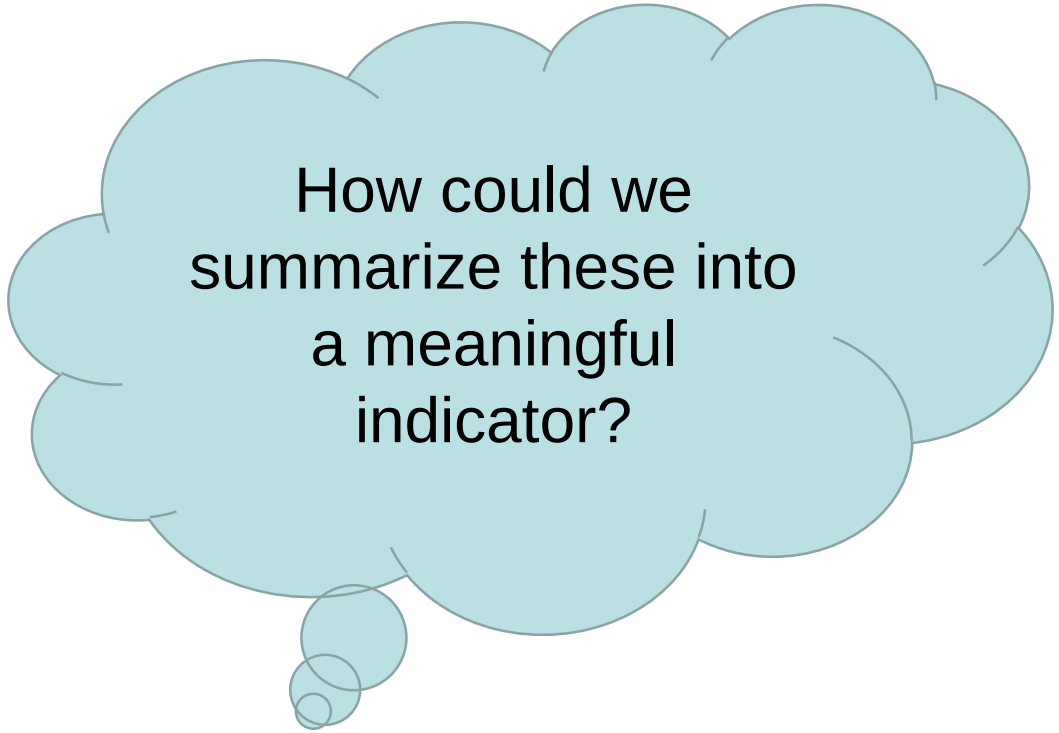
Conceptually, what affects the quality of seasonal adjustment?

Data / Population Characteristics

- **Precision of unadjusted estimates**
- Length of Series
- **Stability of Seasonal Pattern**
- **Stability of Calendar Effects**
- **Presence of Outliers**
- …

Seasonal Adjustment Process

- Familiarity with Method Used
- **Expected size of revisions**
- **Residual seasonality or calendar effects**
- Depth of Validation
- …



Communicating Quality of Seasonal Adjustment

Measure of Uncertainty (Quantitative):

Variance estimates are often used as a primary quality indicator for unadjusted data (expressed as a CV)

- Variance of unadjusted estimates often used as a proxy for seasonally adjusted estimates

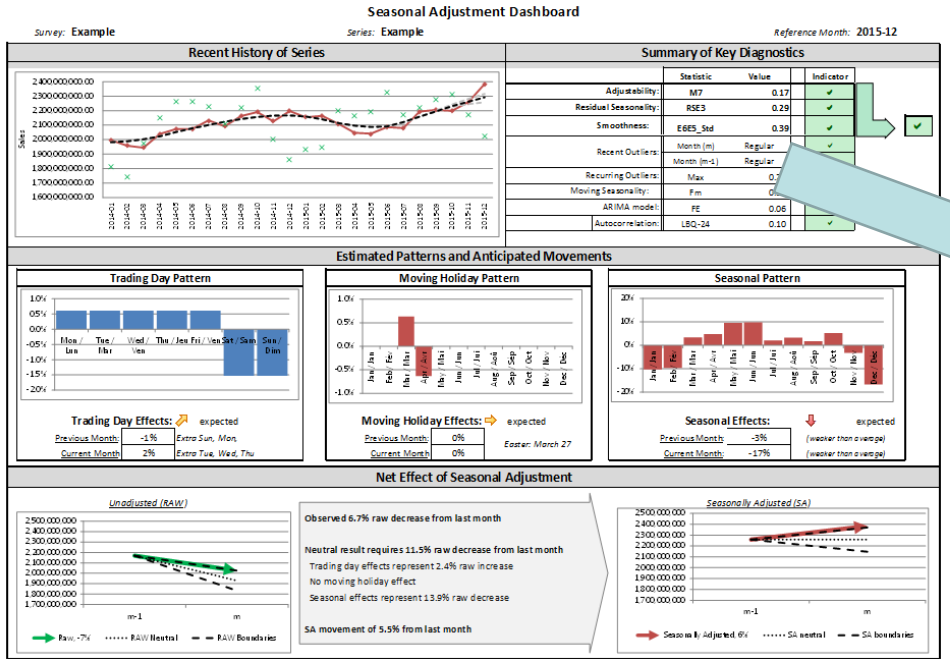
Currently working on estimation of variance of seasonally adjusted estimates

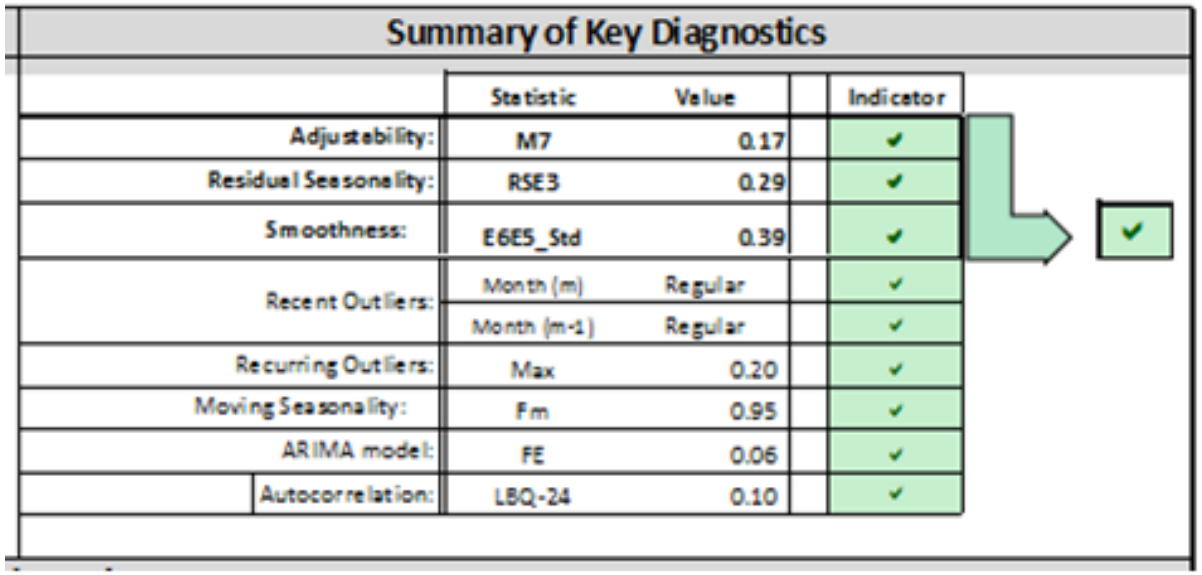
- Decisions on which components to include (sampling variance of input, variance from estimation of regression effects, variance from use of moving averages, variance from revision)
- Leaning towards a resampling approach (bootstrap)

Communicating Quality of Seasonal Adjustment

Summary of Diagnostics from Seasonal Adjustment (Qualitative):

- Diagnostics each reflect specific aspects of quality
- Select diagnostics and set pass/fail based on thresholds





Communicating Quality of Seasonal Adjustment

Rating (Letter Grade):

Could be based on variance estimate with adjustments for other aspects of quality

Could evolve similarly to variance estimation for survey estimates:

- Started with rating based on variance considering moving averages
- Adjust for size of revisions
- Estimate variance including revision variance
- Move on to variance from regression effect, etc.

Future Work

Explore automation of existing methods

- Machine Learning / AI techniques to set initial options or prioritize series for analysis
- Define objective function and select options through optimization

Explore methods for short series

- Apply very simple methods, with quality indicator
- Backcast using Time Series models with auxiliary variables to extend series

Variance estimation for seasonally adjusted estimates

- Implemented gradually - program-by-program
- Consider quality indicator and penalties based on other aspects

Thank you!

- For more information, please contact:

- Pour plus d’information, veuillez contacter :

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