

Premier journées sur la correction de la saisonnalité

INSEE-ENSAE

ESS GUIDELINES ON SEASONAL ADJUSTMENT

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Introduction (1)

- Crucial role in the production process of infra-annual statistics
 - Reliability
 - Comparability
- Seasonally adjusted data: reference key indicators for analysis and forecasting exercises
- Several aspects:
 - Treatment of calendar effects
 - Outliers
 - Temporal and sectoral reconciliation
 - Revisions policy
 - Etc.



Introduction (2)

- Well known tools:
 - TRAMO-SEATS
 - Census II X-12 ARIMA
 - Unobserved components based decomposition
- Same seasonal adjustment tool can produce quite different seasonally adjusted results



Need for harmonisation

ESS specificities (1)

- More than 27 members plus Eurostat
 - Different characteristics of national statistical systems
 - Different level of expertise
 - Different internal organisations
- Legal acts as the major instrument for harmonisation of statistical production
 - Rarely giving clear rules for seasonal adjustment
- Seasonal adjustment performed on the basis of sectoral and national practices
 - Lack of comparability

ESS specificities (2)

- European aggregates derived from national data
 - Aggregation
 - Estimation
 - Aggregation/estimation
- Crucial role of harmonisation for the quality of European aggregates
- Harmonisation of seasonal adjustment needed
 - Relevant discrepancies in:
 - calendar adjustment
 - seasonal adjustment
 - revisions policies

ESS specificities (3)

- Several recommendations for the harmonisation of seasonal adjustment practices
 - ECOFIN Council
 - Economic and Financial Committee (EFC)
 - Committee for Monetary, Finance and Balance of payments statistics (CMFB)
- Key points:
 - High degree of harmonisation of seasonal and calendar adjustment practices for Principal European Economic Indicators (PEEIs) needed
 - Convergence of revisions policy for seasonally adjusted data
 - Improvements on the communication on seasonally and calendar adjusted data

ESS specificities (4)

- Some already existing guidelines on seasonal adjustment
 - U. S. Census Bureau
 - Statcan
 - ONS
- Synthetic versus detailed guidelines
 - Complexity of the harmonisation problem
 - Sectoral level
 - Geographical level
- Privileging detailed guidelines
 - Eurostat guidelines 2006 starting point

General Scheme

0. Seasonal Adjustment: benefits and costs
1. Pre-Treatment
2. Seasonal Adjustment
3. Revision Policies
4. Quality of Seasonal Adjustment
5. Specific issues on Seasonal Adjustment
6. Data presentation issues

Chapters' structure

- Chapters subdivided into specific items describing different steps of the seasonal adjustment process
- Items presented in a standard structure providing:
 - Description of the issue
 - List of options which could be followed to perform the concerned step
 - Prioritized list of three alternatives from the most recommended one to the one to be avoided (A,B, and C)
 - A synthetic list of main references
- Added value:
 - Conceptual framework and practical implementation steps
 - Both for experienced users and beginners

0 - Seasonal Adjustment: advantages and costs

Advantages:

- Provide more smoothed and understandable series for analysts
- Facilitate comparisons of long/short term movements
- Supply users with necessary input for BC analysis, TC decomposition and turning points detection

Cautions:

- SA depends on 'a priori' hypothesis
- Quality of SA depends on quality of raw data
- Lower degree of comparability of data among countries and across statistical domains if clear policies are not defined
- Usefulness of SA data for econometric modelling to be carefully considered

Costs:

- Time consuming, significant computer/human resources required
- Common and well defined IT structure is needed
- Inappropriate or low quality SA can give misleading results

1 Pre-Treatment

- 1.1 - Objectives of the pre-treatment of the series
- 1.2 - Graphical analysis of the series
- 1.3 - Calendar adjustment
 - 1.3.1 - Methods for trading/working day adjustment
 - 1.3.2 - Correction for moving holidays
 - 1.3.3 - National and EU/Euro-area calendars
- 1.4 - Outlier detection and correction
- 1.5 - Model selection
- 1.6 - Decomposition scheme

1.1 Objectives of the pre-treatment

Options:

- Running detailed pre-treatment
- Running an automatic pre-treatment
- No pre-treatment

Evaluation of alternatives:

- A. Detailed pre-treatment for at least more important indicators
- B. Pure automatic pre-treatment
- C. No pre-treatment

1.2 Graphical analysis of the series

- Options:
 - Use of basic graph in the time domain
 - Use of sophisticated graphs (spectrum, autocorrelograms)
 - Use default run of the SA software

- Evaluation of alternatives:
 - A. Detailed graphical analysis based on basic graphs, autocorrelograms, spectra. The analysis could be complemented with a first explanatory run of the SA software on complete set of series
 - B. First graphical analysis of the most important series (with explanatory first run of the SA software) on most important series
 - C. No first explanatory analysis of important series

1.3 Calendar adjustment

- Options
 - CA on all series showing significant and plausible calendar effect within a robust statistical approach (RegARIMA)
 - CA with non standard statistical approach
 - Proportional adjustments
 - Do not perform any kind of CA

- Evaluation of alternatives
 - A. RegARIMA approach with check for significance and plausibility of effects
 - B. Regression approach based on the provisional irregular component
 - C. Proportional methods; other adjustments; no adjustment; CA on all series without any checking for significance and plausibility of effects

1.3.1 Methods for trading/working day adjustment

- Options
 - Proportional methods
 - Regression methods in a multivariate regression framework (with or without correction for the length of the month or Leap Year)
 - RegArima correction (as before but with ARIMA residuals)
 - No correction
- Evaluation of alternatives
 - A. RegArima approach (in case of economic rationale for the existence of calendar effect)
 - All pre-test for number of regressors, length and composition of month
 - Check for plausibility of effects
 - B. Regression approach based on provisional irregular component
 - C. Proportional methods, other adjustments or no adjustment

1.3.2 Correction for moving holidays

- Options
 - Proportional adjustment
 - Automatic correction
 - Correction based on an estimation of the duration of the moving holidays effects
 - No correction
- Evaluation of alternatives
 - A. RegArima approach
 - Pre-test for Easter and other moving holidays effects
 - Definition of the length of moving holiday effect on the basis of pre-tests
 - Check of plausibility of effects
 - B. Regression approach based on the provisional irregular component
 - C. No tests/correction despite diagnostic evidence of such effects, proportional adjustment

1.3.3 National and EU/Euro area calendars

■ **Options:**

- Use of default calendars
- Use of national calendars or the EU/Euro-area one as appropriate
- Definition of series for which calendar adjustment is not required

■ **Evaluation of alternatives:**

A.	European aggregates (Direct approach)	EU/Euro-area calendars
	MS or EU aggregate (Indirect approach)	National calendars

Calendar information used to be available to the public

- B. Use of default calendars complemented by historical list of national public holiday to be corrected for
- C. Use of default calendars (without any reference to national and European public holidays), no calendar correction despite evidence

1.4 Outlier detection and correction

■ **Options**

- Types of outliers to be considered for pre-testing
- Removal of outliers before seasonal adjustment
- Including most important outliers in the regression model as intervention variables

■ **Evaluation of alternatives**

- A. The series should be checked for different outliers
 - Outliers due to data errors to be corrected before treatment
 - Outliers should be explained/modelled using all available information
 - Outliers with a clear interpretation (severe strikes, changes in government policy, territory changes ..) included as regressors
 - Particular attention at the end of the series
- B. As A), but complete automatic procedure according to available tools
- C. No preliminary treatment of outliers

1.5 Model selection

■ Options

- Automatic model selection
- Model selection based on a set of predefined models
- Manual model selection

■ Evaluation of alternatives

- A. Automatic selection within a large number of models according to tools:
 - Check for model adequacy using standard statistical tests (normality, heteroskedasticity, serial correlation, ...) and spectrum diagnostics
 - Manual model selection for most important/problematic series
- B. As before, but complete automatic procedure
- C. Selection based on a restricted number of pre-defined models not tested for adequacy with the set of series being adjusted

1.6 Decomposition scheme

■ Options

- Automatic decomposition scheme selection
- Manual decomposition scheme selection after graphical inspection
- For series with zero or negative values adding a constant and select the most appropriate scheme
- For stationary series: additive decomposition

■ Evaluation of alternatives

- A. Automatic decomposition scheme selection using appropriate criteria after graphical inspection of the series;
Special investigation for non positive series (adding a constant and checking the impact on the seasonally adjusted series);
Manual selection for more problematic series
- B. Fully automatic decomposition scheme using information criteria
- C. Use of a fixed decomposition scheme (multiplicative for positive series, additive for non positive series)

2 Seasonal Adjustment

2.1 Choice of SA approach

2.2 Consistency between raw and SA data

2.3 Direct versus indirect approach

2.3.1 – Direct vs indirect: dealing with data from different agencies

2.1 Choice of seasonal adjustment approach

- Options
 - X12ARIMA
 - Tramo-Seats
 - Structural time series models
- Evaluation of alternatives
 - A. Tramo-Seats and X12ARIMA (plus well documented interfaces)
 - Choice on the basis of past experiences, subjective appreciation, characteristics of the series
 - Production tools updated on a regular basis after satisfactory testing
 - Methods (and versions) used in data production to be clearly communicated to users
 - B. Structural time series models within software that can estimate calendar and outliers effects with diagnostics for all components and effects.
 - C. Other production tools

2.2 Consistency between raw and SA data

- Options
 - Do not apply any constraint
 - Apply default constraining techniques
 - Constrain equality over the year of SA data to original data
 - Constrain equality over the year of SA data to calendar only adjusted data
- Evaluation of alternatives
 - A. Do not impose equality over the year to the raw and seasonally adjusted or calendar adjusted data (e.g. sum or average)
 - B. Forcing the equality over the year between the calendar adjusted and the seasonally and calendar adjusted data or between original and the only seasonally adjusted data under particular circumstances (i.e. requirements from users). Recognised benchmarking methods should be used
 - C. Always impose consistency (seasonally/calendar adjusted data and raw data) or use benchmarking technique that leaves seasonality

2.3 Direct versus indirect approach

- Options
 - Direct approach: raw data are aggregated and the aggregates and components directly seasonally adjusted. Discrepancies across the aggregation structure not removed
 - Direct approach with distribution of discrepancies across the aggregation structure
 - Indirect approach: SA of components using the same approach and software, totals are derived by aggregation of SA components
 - Mixed indirect approach: SA of components using different approaches and software, totals derived by aggregation of SA components without info on options/parameters used
- Evaluation of alternatives
 - A. Application direct versus indirect carefully considered
Direct approach preferred for transparency and accuracy, especially when component series have similar patterns;
indirect approach preferred when component series show different patterns. Residual seasonality should always be checked in all indirectly seasonally adjusted aggregates
 - B. Either direct approach with benchmarking techniques or indirect approach in case of strong users requirements for consistency between lower and higher level aggregates. Residual seasonality should always be checked in all indirectly seasonally adjusted aggregates
 - C. Other alternative approaches not consistent or transparent for all individual time series

2.3.1 Dealing with data from different agencies

Relevant for EU aggregates (horizontal aggregation)

■ Options

- SA performed either by local or central statistical institution on disaggregated series with same method and software; totals derived by their aggregation (decentralised or centralised indirect approach)
- All time series including geographical aggregates seasonally adjusted on an individual basis
- As before but aggregation constraints imposed ex-post (multivariate benchmarking techniques)
- mixed indirect approach

■ Evaluation of alternatives

- A. Direct approach is preferred for transparency if component series show similar patterns and in case of lack of harmonisation in the national approaches; Centralised indirect approach when delegated to centralised agency. Decentralised indirect approach also to be considered in presence of satisfactory degree of harmonisation in national practices and if series show different seasonal patterns
- B. Decentralised indirect approach accepted in case of strong users requirements for consistency and in presence of a satisfactory degree of harmonisation in national practices. Indirectly adjusted EU aggregates should be checked for the presence of residual seasonality
- C. Mixed indirect approach (each geographical components adjusted with different methods and software)

3 Revision Policies

- 3.1 General revision policy
- 3.2 Concurrent versus current adjustment
- 3.3 Horizon for published revisions

3.1 General revision policy

■ Options

- Revise SA data according to a defined, publically available revisions policy and release calendar
- Revise both raw and SA data between 2 consecutive official releases
- Revise SA data once a year independently of any revision of past raw data
- Revise SA data once a year when past raw data don't change when a new observation is added or revise SA data whenever past raw data are revised
- Do not use official release calendar, perform revision on irregular basis, do not revise

■ Evaluation of alternatives

- Revisions to SA data in accordance with a coherent, transparent and officially published revision policy and release calendar (aligned with revision policy of raw data). Revisions to SA data not be released more often than raw data releases. Public to be informed on average revisions of important SA macroeconomic variables observed in the past
- Revision to SA data published according independent revision policies that apply to particular data releases
- No revision of SA data, absence of a clear and public revision policy, policies leading to the publication of misleading information for the current period

3.2 Concurrent versus current adjustment

■ Current adjustment

Model/filters/outliers/regression parameters re-identified and respective parameters and factors re-estimated at appropriately set review periods.

Seasonal and calendar factors used to adjust the new data in-between review periods are those estimated in the previous review period and forecasted up to the next review period

■ Concurrent adjustment

Model, filters, outliers and regression parameters are re-identified and the respective parameters and factors re-estimated every time new or revised data become available

Extreme strategies → in practice balanced alternatives in-between are followed:

■ Partial Concurrent Adjustment (PCA)

Models/filters/outliers/calendar regressors identified once a year; the respective parameters and factors newly estimated every time a new or revised data becomes available

■ Controlled Current Adjustment (CCA)

Forecasted seasonal and calendar factors used to seasonally adjust new or revised raw data. Whenever new or revised raw data become available, an internal check is performed against the results of a new estimation of parameter and seasonal factors. Results obtained by the new estimation are preferred if a perceptible difference exists

3.2 Concurrent versus current adjustment

■ Options

- Current adjustment with regular annual review
- Current adjustment with review less frequent than one year
- Concurrent adjustment
- Partial concurrent adjustment
- Controlled current adjustment

■ Alternatives

- A. Data revised for less than two years and/or new observations are available:
PCA is preferred (new information, minimisation of the size of revisions)

If seasonal component is stable enough:

CCA could be considered (minimisation of frequency of revisions). Full review of all SA parameters at least once a year.

Revisions covering two or more years: model, filters, outliers and regression parameters to be re-identified and re-estimated

- B. Current adjustment with a full review every year
C. Current adjustment without annual review, concurrent adjustment

3.3 Horizon for published revisions

■ Options

- Define the extent of revisions according to series specificities (TS and X12Arima information)
- Limit the revision period to 3-4 years before revision period raw data freezing older data
- Revise the entire time series in the event of re-estimation of the seasonal factors
- Revise the whole series for major revisions on raw data
- Do not perform any revision

■ Evaluation of alternatives

- A. Revision period for SA data must cover extent of raw data revision.
Acceptable to revise SA data from a point 3-4 years before the beginning of the revision period of raw data (earlier data frozen)
- B. Revise the whole series
- C. Do not revise, revise only the last year data, revise for a shorter period than the revision period of the raw data

4 Quality of Seasonal Adjustment

- 4.1 Validation of seasonal adjustment
- 4.2 Quality measures for seasonal adjustment
- 4.3 Comparing alternative approaches and strategies
- 4.4 Metadata template for seasonal adjustment

4.1 Validation of seasonal adjustment

- Options
 - Set of graphical, descriptive, non parametric/parametric criteria to check the suitable characteristics of SA data;
 - Restrict validation to the use of standard measures proposed by SA tools;
 - Use only graphical inspection and descriptive statistics
- Evaluation of alternatives
 - A. Use detailed set of graphical, descriptive, non parametric and parametric criteria to validate the seasonal adjustment and run again the SA with a different set of options in case of non acceptance of results.
Particular attention to:
 - absence residual seasonality/calendar effects
 - absence over-smoothing
 - absence autocorrelation of the irregular component
 - stability of the seasonal component
 - B. Use default criteria defined within different tools and run again the seasonal adjustment as in alternative A) if validation fails;
 - C. No validation, use of only basic graphical and descriptive statistics

4.2 Quality measures for seasonal adjustment

■ Options

- To use full set diagnostics and graphical facilities to assess the whole process (appropriate for individual series)
- To use selected set of diagnostics/graphics (massive treatment)
- Complement available diagnostics by additional tests (more robust quality assessment)
- Do not use any quality measures for the SA assessment

■ Evaluation of alternatives

- A. Use of all available quality measures complemented with measures not yet included in the tool. Appropriate selection of diagnostics for treatment large numbers of series (at least: significance and plausibility CA coefficients, presence/number outliers by type, model fit, absence of residual calendar effects/seasonality or over smoothing)
- B. Use only quality measures provided by the tool or a subset of them
- C. No quality measures to evaluate seasonal adjustment

4.3 Comparing alternative approaches and strategies

■ Options

- Use a common set of quality measures complemented by quality measures specific to each approach
- Use common diagnostics for both approaches
- Use specific quality measures for each approach

■ Evaluation of alternatives

- A. Use of common and specific measures/diagnostics for assessing/comparing quality of alternative SA methods and strategies
- B. Use of a subset of common quality diagnostics
- C. Use specific diagnostics to each software, no quality measures/diagnostics to compare the quality of alternative SA methods and strategies

4.4 Metadata template for seasonal adjustment

- Options
 - Use of the standard metadata template for SA as presented in the Annex of the guidelines
 - Include SA information into the existing standard metadata templates

- Evaluation of alternatives
 - A. Use of the metadata template for SA as presented in the Annex for all groups of series or most relevant ones. Information included to be regularly updated to reflect changes in the SA process
 - B. Include SA information into the existing reference metadata files
 - C. No methodological information supplied for SA

5 Specific issues on seasonal Adjustment

5.1 Seasonal adjustment of short time series

5.2 Treatment of problematic series

5.1 Seasonal adjustment of short time series

■ Options

- No adjustment of series shorter than the minimum requirement for T-S and X12
- Use of alternative procedures to SA of short time series
- Re-specify all parameters of pre-treatment and SA more often
- Comparative studies on relative performance of T-S and X12 for series 3-7 years long
- Inform users on instability problems for series shorter than 7 years

■ Evaluation of alternatives

- A. Series shorter than 3 years not SA; series 3-7 years long std tools whenever possible:
 - Extension of the sample and stabilisation of SA with back-recalculated time series
 - Simulations on relative performances of the existing standard tools for short series SA
 - Inform users on the greater instability of SA data and on used methods
 - Clear publication policy
 - Settings and parameters to be checked more than once per year
- B. Do not performed any SA on quite short series (3-7 years)
- C. Use of non standard tools for short time series

5.2 Treatment of problematic series

■ Options

- Seasonally adjust only recent years of the series (if this makes possible to find reasonable adjustment)
- Perform ad hoc SA on all problematic series
- Perform ad hoc SA only on relevant problematic series
- No ad hoc SA

■ Evaluation of alternatives

- A. SA is performed for problematic series
 - Prefer a case by case approach to a standard one
 - Consult literature/manual/experts
 - Inform users on the adopted strategy
- B. Perform SA only on relevant problematic series (when failure to adjust these series leads to residual seasonality in important higher level aggregates) and treat other problematic series in a standard way
- C. Automatic SA for all series

6 Data presentation issues

6.1 Data availability in data bases

6.2 Press releases

6.1 Data availability in data bases

■ Options

- Storage and availability of raw and SA data
- Storage and availability of additional time series
- Storage of associated metadata info relating to individual time series
- Storage of data vintages to enable revision analysis

■ Evaluation of alternatives

- A. Systematic storage raw, SA and other time series metadata, ideally data vintages. Metadata standard to be followed. Database secure and able to be extracted or accessed on request. Transparency and replicability of the SA process assured
- B. Systematic storage of raw and SA data with associated metadata identifiers. Information available on request for replicating SA figures
- C. No database solution or systematic storage of time series estimates

6.2 Data presentation issues

■ Options

- Include only raw data in press releases
- Extend the informative content of press releases with SA series, SA plus CA series, T-C series
- Present only levels or different kinds of growth rates
- Include empirical revisions errors for the seasonally adjusted and/or trend-cycle series

■ Evaluation of alternatives

- SA data to be presented. Users should have access to full historical raw/SA/CA/TC times series on request, by reference or by internet download; Most recent values of TC not shown; analysis of real time revision error of at least SA series to be included
Period on period growth rates / changes in level computed on SA data and used with caution
Year on year comparison computed on CA data or in raw data
- Present SA data; T-C in graphical way with the current end of the series (end-point problem made clear). Annualised growth rate could be used for justified reasons. Particular attention to volatile series. User informed on characteristic of annualised growth rates
- Present raw or T-C data only; yearly period to period growth rates on raw or T-C data

Thank you for the attention!