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FOREWORD

The definition of shared rules for seasonal adjustment (SA) within the ESS is an essential step towards a better harmonisation and comparability of infra annual statistics, especially Principal European Economic Indicators (PEEIs).

The ESS guidelines on seasonal adjustment aim to answer to the need of harmonisation expressed at several occasions by many users and political instances such as the ECB, the EFC Sub Committee on Statistic and the ECOFIN Council.

The issue of the definition of best practices in the field of seasonal adjustment has been debated since a long time at Eurostat and European level. Since 2007 the Steering Group on SA co-chaired by Eurostat and the ECB has given a new and crucial input to the compilation of the guidelines which have been finalised in 2008 with the endorsement of the CMFB (on 31 January – 1 February 2008) and of the SPC (14 February 2008).

The ESS guidelines on seasonal adjustment present the theoretical aspects and practical implementation issues in a friendly and easy to read framework and are addressed both to non-experts and experts of seasonal adjustment. They meet the requirement of principle 7 (Sound Methodology) of the European Statistics Code of Practice and their implementation will also be in line with principles 14 (Coherence and Comparability) and 15 (Accessibility and Clarity).

They also foster the transparency of seasonal adjustment practices encouraging the documentation of all seasonal adjustment steps and the dissemination of seasonal adjustment practices by means of the metadata template for seasonal adjustment, which is annexed to the guidelines. Finally they have a pedagogical content as they allow for expertise development and capacity building,

The adoption of the guidelines is the start of a new challenging phase where Eurostat and Member States have to seek for their implementation in different areas of infra-annual statistics.

Eurostat is very proud of this achievement which has been possible thanks to the commitment of a wide range of well-known experts on seasonal adjustment. Eurostat also welcomes very much the interest into the guidelines expressed by several countries outside the EU which further confirms the importance of this achievement.

Pedro Díaz Muñoz
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Introduction

In an effort to promote the idea of best practices in seasonal adjustment, the European Statistical System (ESS) and Central Banks with significant statistical departments have produced a set of guidelines to assist all levels of seasonal adjustment practitioners from novices to experts.

These guidelines focus the technical framework on two approaches: TRAMO-SEATS (supported by Banco de España) and X-12-ARIMA (supported by the Bureau of Census in the US) which are the most commonly used within the ESS. This document does not discuss their relative merits as both can be considered equally valuable (as is reflected in their widespread use).

The guidelines are not just restricted to the seasonal adjustment alone, they also cover the pre-treatment of series, revision policies, quality, documentation and specific issues related to limitations of seasonal adjustment, e.g. short time series.

Throughout this document, the reader will be presented with a step by step process with explanations and reasons as to which options to take either when analysing individual series or when adjusting a large number of series for production purposes.

Each item describes 3 sets of alternatives, the first (A) representing the best approach to be aimed at; the second (B) is acceptable and may be a viable option in particular if the first alternative is overly resource-intensive for the adjustment of mass volumes of data or to deal with specific data characteristics; the third alternative (C) shows practices that are to be avoided.

The first objective of the guidelines is to move all production domains, both in Eurostat and Member states, from practices listed under (C) to those recommended under (B) and possibly (A). The implementation of alternative (A) could require a medium or long term process in order to adapt current practices to recommended ones.

If the reader is interested in more details of the approaches put forward as well as the tools, references to selected articles and papers are provided.

Background

Sub-annual macro-economic statistics nowadays represent a key tool for economic policy-making; business cycle analysis/modelling and forecasting. However, these statistics are often influenced by seasonal fluctuations and other calendar/trading-day effects, which can mask relevant short and long-term movements of the series and impede a clear understanding of economic phenomena.

Consequently, many statistics are subjected to seasonal adjustment. The main aim of seasonal adjustment is to filter out usual seasonal fluctuations and typical calendar effects within the movements of the time series under review. Usual seasonal fluctuations mean those movements which recur with similar intensity in the same season each year and which, on the basis of the past movements of the time series in question, can under normal circumstances be expected to recur.

Fluctuations due to exceptionally strong or weak seasonal influences (for example, extreme weather conditions or atypical holiday constellations) will continue to be visible in the seasonally adjusted series to the extent that they exceed, or fall short of, the normal seasonal average. In general, other random disruptions and unusual movements that are readily understandable in economic terms (for example the consequences of economic policy, large scale orders or strikes) will also continue to be visible.

Seasonal adjustment also includes the elimination of calendar effects insofar as influences deriving from differences in the number of working or trading days or the dates of particular days which can be statistically proven and quantified (e.g. public holidays, weekday on the last day of the month in the case of stock series).

In this way, the seasonally adjusted results do not show “normal” and repeating events, they provide an estimate for what is new in the series (change in the trend, the business cycle or the irregular component). Therefore, seasonally adjusted data help to reveal the “news” contained in a time series, which is the ultimate goal of seasonal adjustment.

Statistical agencies, central banks and other institutions around the globe are engaged daily in seasonal adjustment and many resources are dedicated to filtering raw data. Indeed, seasonal adjustment is a subject of perpetual debate in many respects, with many seasonal adjustment methods and tools still under development.

The debate is continuously evolving, with new directions and frontiers that are still under study. One subject of debate focuses on advantages and disadvantages of seasonal adjustment, and the associated risks of 'manipulation' of the original and observed data.

Purpose of the guidelines

The guidelines aim to assist every level of seasonal adjustment practitioners:

- Experts and academics who want to identify and adjust for all effects not relevant for economic analysis, decomposing individual series for advancing the area of seasonal and non-economic adjustment of time series;
- Experts who due to time pressures want to adjust core set of series required to meet policy makers' demands;
- Producers who are required to adjust thousands of series within a mass production of related time series (datasets) and require a comprehensive set of instructions to follow.

Whatever the level of the practitioner, there are commonalities in the process which should be followed to provide a consistent framework for the process, facilitating communication between practitioners whether it be in the academic community, within the same institution or amongst colleagues in the same team. Moreover, and most importantly for the ESS, the best practices promoted by the guidelines should lead to a harmonisation of national practices and thus, in the end to more robust European aggregates. Finally, having a common language when discussing seasonal adjustment, will also improve, as a matter of fact, the quality of the documentation.

Furthermore, there is a need to understand the effect of revisions on series, whether it is just the revision frequency or if a revision to raw data impacts on an established seasonal model. The guidelines will also aid the design of a clear and transparent revision policy for seasonal adjustment.

Finally, users want to know precisely how the seasonal adjustment has been performed, the adjustment reliability and transparency, documented not only by the output but also by the full specification of the seasonal adjustment process. Adequate documentation provides users and practitioners alike with the facility to properly compare seasonally adjusted series.

Advantages, cautions, costs and risks of seasonal adjustment

Advantages

- Provide more understandable series for analysts revealing the “news” contained in the time series of interest;
- Facilitate the comparison of long-term and short-term movements among sectors and countries;
- Supply users with the necessary input for business cycle analysis (i.e. output gap estimation), trend-cycle decomposition and turning points detection;
- Apply quality control through both the input and output orientations, which will allow for better comparability with other series and methods.

Cautions

- As seasonality is not precisely defined, seasonal adjustment often depends on the 'a priori' hypotheses underlying the model chosen and the hypothesized data generation process (subjectivity of seasonal adjustment). In particular, the seasonal and the seasonally adjusted component may vary from one software to another and upon options chosen within the software;
- Quality of seasonal adjustment strongly depends on quality of raw data;
- Lower degree of comparability of data among countries and across statistical domains if clear rules and policies are not defined/followed;
- Many institutions have a requirement to produce mass volumes of seasonally adjusted data and therefore it is wise that the practitioner decides on the relative importance of the series to the users before deciding on the amount of time that they should dedicate to each series;

- Users of seasonally adjusted data should be aware that their usefulness for econometric modelling purposes needs to be carefully considered.

Costs and risks of SA

- Seasonal adjustment is time consuming, significant computer/human resources must be dedicated to this task;
- A common and well defined IT structure for seasonal adjustment is a strong requirement;
- Inappropriate or low-quality seasonal adjustment can generate misleading results and increase the probability of false signals (credibility effects);
- The presence of residual seasonality, as well as over-smoothing, is concrete risks which could negatively affect the interpretation of seasonally adjusted data.

Recommendations

Seasonal adjustment is proven as to be a useful tool for economic analysis; however data producers should consider all the advantages and disadvantages of seasonal adjustment and define a clear production strategy before starting a large scale seasonal adjustment process. Seasonal adjustment must be performed only when there is a clear statistical evidence and economic interpretation of the seasonal/calendar effects.

They should be well aware that making any seasonal and/or calendar adjustment on series which do not show any evidence of such effects is an inappropriate statistical treatment. It must be clearly stated that some series can be only characterized by calendar effects without seasonal ones. In this case only the calendar adjustment will be appropriate. Furthermore other series can be characterized only by seasonal effects without significant calendar ones; in this case only the seasonal adjustment filtering must be applied.

1 - PRE-TREATMENT

1.1 – Objectives of the pre-treatment of the series

Description

Most of seasonal adjustment methods and software estimate the seasonal component using linear procedures and filters: ARIMA models, moving averages, regression analysis, state-space models, etc. These linear tools are optimal under precise hypothesis but have also some weaknesses:

- They are not resistant, i.e. they are sensitive to the presence of atypical values (outliers);
- They are not robust, i.e. they are sensitive to any misspecification of the underlying model.

The main objective of the pre-treatment of the series is to ensure a reliable estimation of the seasonal component. This is done in particular by detecting and correcting the series for data and/or components, sometimes called "non-linearities" that could hamper the estimation of the seasonality.

Outliers are a clear example of data that could strongly affect the quality of the seasonality estimate. TRAMO-SEATS and X-12-ARIMA have built-in procedures to detect and correct the series for various kinds of outliers: impulse outliers, transitory changes, level shifts etc.

Economic time series are usually recorded each month (or each quarter) but months (or quarters) are not equivalent. In particular, they have neither the same length nor the same composition in number of days. These specificities, strictly linked to the calendar, may affect the raw data. For example, one more Saturday in a month can explain an increase in the retail trade turnover. TRAMO-SEATS, X-12-ARIMA, as well as some other software, have built-in procedures to detect and correct the series from these calendar effects (trading-day and Easter effect). They can also take into account national specificities (religious and civil holidays) through specific regressors.

It should be noted that a part of the calendar effect is seasonal (the length of most months repeats itself every year, the catholic Easter falls more often in April than in March, etc.) and that the correction expressed in the calendar component should only concern the non-seasonal part of the effect, whereas the seasonal part of the calendar influences should be assigned to the seasonal component. It is also important to note that the analyst has very few doubts about the future of the calendar which is periodical of a period of 2800 years. Therefore, a good estimation of the trading-day effect will lead to better forecasts of the raw data and more stable seasonal estimates.

Other effects, such as temperature, school holidays, bridge holidays etc. may explain the short-term behaviour of a series but series should not normally be corrected for these effects. The decision has to be made case by case. The impact of these effects could be analysed for special needs. In particular the temperature effect is in large part seasonal and the future of the non-seasonal part is very uncertain. In these conditions, taking into account such an effect in the modelling of the series could result into large revisions in the recent values of the seasonally adjusted series.

Most of the statistical tools used in seasonal adjustment procedures rely, in one step at least of the adjustment, on the stationarity of the series. The stationarity in mean can usually be achieved by differencing. The stationarity in variance may require a transformation of the series. TRAMO-SEATS and X-12-ARIMA provide the user with an automatic test for log-transformation. The result of this test will also guide the choice of the decomposition scheme.

Options

- Running a detailed pre-treatment;
- Running a pure automatic pre-treatment;
- Not to do a pre-treatment of the series.

Alternatives *

A) A detailed pre-treatment for at least the most important macroeconomic indicators.

B) Pure automatic pre-treatment.

C) No pre-treatment.

* A) Best alternative; B) Acceptable; C) To be avoided

1 - PRE-TREATMENT

1.2 – Graphical analysis of the series

Description

A first graphical analysis of the series provides the analyst with some useful information on how to perform the seasonal adjustment, how to choose the parameters and reveals possible problems in the data. This analysis could be performed using basic graphs or a very first run of the seasonal adjustment software using default parameters.

The analyst could then collect information on:

- The length of the series (series shorter than 3 years cannot be adjusted with the recommended seasonal adjustment packages);
- The presence of strange values (zeros or outliers for examples) or problems in the data;
- The structure of the series: presence of a trend-cycle, of a seasonal component, volatility etc.;
- The presence of possible breaks in the seasonal behaviour;
- The decomposition scheme (additive, multiplicative).

More sophisticated graphs, like the spectrum or the autocorrelograms, could provide information on the presence of a seasonal component and/or a trading-day effect.

This first analysis could be time consuming when a very large number of series must be analyzed, but it is relevant at least for the most important series.

Options

- Use of basic graphs in the time domain;
- Use of more sophisticated graphs, including the spectrum and the autocorrelograms, after a suitable transformation of the series;
- Use of an automatic run of the seasonal adjustment software.

Alternatives *

A) A detailed graphical analysis, based on basic graphs, autocorrelograms and spectra, is recommended at least for the most important series to be adjusted. This analysis should be complemented with a first exploratory run of the seasonal adjustment software on the complete set of series.

B) A first graphical analysis, possibly using an exploratory first run of the seasonal adjustment software, is performed on most important series and, whenever possible, on all of them.

C) No first exploratory analysis of the important series is done. In this case, the quality of the seasonal adjustment strongly relies on the accuracy and relevance of automatic procedures and tests to detect and correct for problems in the data.

* A) Best alternative; B) Acceptable; C) To be avoided

1 – PRE-TREATMENT

1.3 – Calendar adjustment

Description

The structure and compositions of calendars can affect economic activities in different ways. These effects, if not properly corrected for, can cause a misspecification of the ARIMA model and compromise the overall quality of the seasonal adjustment. Calendar effects typically include:

- the different number of working days in a specific month or period
- the composition of working days
- the leap year effect
- moving holidays such as some national holidays, Easter, Ramadan, etc.

The first three effects will be treated in 1.3.1 while the last one is treated in 1.3.2. It is important to note that part of calendar effects is seasonal so that it is removed by the standard seasonal adjustment filters. Calendar adjustments within the pre-treatment of seasonal adjustment have then to deal only with the non-seasonal part of effects mentioned above.

Options

- Perform calendar adjustment on all series showing significant and plausible calendar effects within a statistical robust approach, such as regression or RegARIMA, available in the most recent seasonal adjustment tools;
- Perform calendar adjustment with non-standard statistical approaches, different from those mentioned above;
- Use proportional adjustment;
- Do not perform any kind of calendar adjustment.

Alternatives *

A) RegARIMA approach, with all checks of significance and plausibility of effects.

B) Regression approach based on the (provisional) irregular component (e.g. X-11Regression included in X-12-ARIMA).

C) Proportional adjustment, other adjustment or no adjustment at all (when this leaves evidence of calendar effects) as well as calendar adjustment of all series without any checking for the significance and plausibility of effects.

* A) Best alternative; B) Acceptable; C) To be avoided

1 - PRE-TREATMENT

1.3.1 – Methods for trading/working day adjustment

Description

Trading/working day adjustment aims at obtaining a seasonally adjusted series whose values are independent of the length and the composition in days (number of Mondays, Tuesdays, etc/number of working days and weekend days) of the month/quarter.

It should be noted that the length and day-of-week composition of the month/quarter is partly seasonal: March has always 31 days and has, on average, more Mondays than February. Since the seasonal part is already captured by the seasonal adjustment filters, it should not be removed during calendar adjustment. Working- or trading-day effects - in the narrow sense - should therefore be associated to the non-seasonal part of the effect.

The leap-year effect is the non-seasonal part of the length of month/quarter effect. The non-seasonal part of the day-of-week composition of the month/quarter can be estimated by the deviation of the number of working or trading days from their long-term monthly/quarterly average. Quite accurate estimates of these long-term averages can be computed on a calendar whose length is a multiple of 28 years.

Working or trading-day adjustment is recommended for series in which such effects can be detected, are plausible and are statistically significant. Provided that an accepted method of adjustment (usually one based on an estimated model) is used, this should greatly reduce or eliminate the effects in the more recent years. The method should not result in frequent large revisions when additional data become available, if it does, it is an indication that the method's estimates are not reliable.

Options

- Correction within proportional working day adjustment - in this case, the effects of trading days are estimated by counting the proportion of them in the month/quarter;
- Regression correction - in this case, the effect of trading days is estimated in a regression framework. Within the regression approach, the effect of trading days can be estimated by using a correction for the length of the month or leap year, regressing the series on the number of working days, etc.;
- RegARIMA correction, same as before but with an ARIMA structure for the residuals;
- No correction.

Alternatives *

A) RegARIMA approach, with all pre-tests for number of regressors, length and composition of month, check of plausibility of effects (sign and size of estimated coefficients), etc. The working/trading day adjustment should be done for those time series for which there is statistical evidence and an economic rationale for the existence of calendar effects.

B) Regression approach based on the (provisional) irregular component (e.g. X-11Regression included in X-12-ARIMA).

C) Proportional adjustment, other adjustment or no adjustment at all (when this leaves evidence of trading days effects in the adjusted series). In this case, it is likely that the ARIMA modelling of the series will be affected.

* A) Best alternative; B) Acceptable; C) To be avoided

1 - PRE-TREATMENT

1.3.2 – Correction for moving holidays

Description

Adjustment for moving holidays aims at obtaining a seasonally adjusted series whose single-point values are independent of particular calendar effects which follow a complex pattern across years. Catholic and Orthodox Easter, for example, may have differing effects on neighbouring months or quarters, and can then cause problems for the interpretation of data in the months or quarters they affect. Hence, when such effects are detected in a time series, and are non-negligible, it is recommended to try to correct for them, i.e. to calculate and remove estimates of their effects.

These effects may be partly seasonal: the Catholic Easter, for example, falls more often in April than in March. Since the seasonal part is already captured by the seasonal adjustment filters, it should not be removed during the calendar adjustment. Usually, the non-seasonal part of the moving holiday effect can be estimated by removing from the regressor its long-term monthly/quarterly average.

Options

- Correction within proportional number of day adjustment;
- Automatic correction;
- Correction based on an estimation of the duration of the moving holidays effects;
- No correction.

Alternatives *

A) RegARIMA approach, with pre-tests for Easter and other moving holiday effects. Definition of the length of moving holiday effect on the basis of results of pre-tests. Check of plausibility of effects.

B) Regression approach based on the (provisional) irregular component (e.g. X-11Regression included in X-12-ARIMA).

C) No tests/correction for the above effects, despite diagnostic evidence of such effects or proportional adjustment.

* A) Best alternative; B) Acceptable; C) To be avoided

1 - PRE-TREATMENT

1.3.3 – National and EU/euro area calendars

Description

National and EU/euro area calendars can be used for calendar adjustment in order to take into account the national and EU/euro area specificities. Some seasonal adjustment programs, in particular TRAMO-SEATS and X-12-ARIMA, allow integrating those calendars either through regressors or as supplied functionality to perform the detection and correction of calendar effects.

An EU/euro area calendar, built from national calendars, i.e. by averaging the national numbers of working or trading days using appropriate weights, can be considered as an alternative in cases of direct seasonal adjustment of raw EU aggregates. Additional national calendars can be used in the above mentioned seasonal adjustment tools. To create and maintain national and European calendars is not an easy task and their effectiveness is strongly depending on their regular and accurate maintenance.

Member States are encouraged to compile, maintain and update their national calendars or, as a minimal alternative, to supply an historical list of public holidays including, whenever possible, information on compensation holidays. Moreover they should provide, in advance, the calendar for the year t+1 or the corresponding holidays list.

N.B. The unavailability of such information may jeopardise the possibility for Eurostat and Member states to achieve the objective of the guidelines for calendar adjustment

Options

- Use of default calendars;
- Use of national calendars or the EU/euro area calendar as appropriate;
- Definition of series not requiring calendar adjustment.

Alternatives *

A) The use of national calendars is recommended at the Member State level or for European aggregates when an indirect approach is chosen. The use of EU/euro area calendars is recommended when a direct approach is chosen for the seasonal adjustment of European aggregates in particular if national calendar adjusted series are not available, incomplete or of insufficient statistical quality. The calendar information used should be available to the public (at least upon request).

B) Use of default calendars (defined within the tool chosen for seasonal adjustment), complemented by an historical list of national public holidays to be corrected for (through the use of appropriate regressors).

C) Use of default calendars, without any reference to national and European public holidays, as well as no calendar correction despite diagnostic evidence of calendar effects.

* A) Best alternative; B) Acceptable; C) To be avoided

1 - PRE-TREATMENT

1.4 – Outlier detection and correction

Description

Outliers are abnormal values of the series. They can manifest themselves in a number of ways, the most important being impulse outliers (abnormal values in isolated points of the series), transitory changes (series of outliers with transitory effects on the level of the series), and level shifts (series of innovation outliers with a constant and permanent effect on the level of the series).

Seasonal adjustment methods, usually based on linear models, are likely to be severely affected by the presence of such outliers which should therefore be detected and replaced before estimating the seasonal and calendar components in order to avoid a distorted or biased estimation of them. However, outliers should remain visible in the seasonally adjusted data (unless they can be associated to data errors), because they give information about some specific events (like strikes etc.). Therefore, the outliers should be reintroduced in the time series after having estimated the calendar and/or seasonal component (which is the normal procedure in TRAMO-SEATS and X-12-ARIMA). This means that outliers due to data errors in the raw data have to be corrected before starting the seasonal adjustment procedure.

Outliers are not easy to manage, especially at the end of the series when it is difficult to distinguish a turning point from an outlier.

TRAMO-SEATS and X-12-ARIMA both have an automatic procedure to detect outliers and to correct for their effect. Shortening the time span or changing the critical value of the statistical tests may help for a good modelling of outliers.

See also item 5.2 for definition/treatment of problematic series.

Options

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

Alternatives *

A) The series should be checked for outliers of different types (see description). Once identified, outliers due to data errors should be corrected in the unadjusted (raw) data before pre-treatment. Remaining outliers should be explained/modelled using all available information. Outliers for whom a clear interpretation exists (e.g. strikes, consequences of changes in government policy, territory changes affecting countries or economic areas, etc.) are included as regressors in the model; particular attention should be paid at the end of the series.

B) As A), but with a completely automatic procedure for detecting outliers according to available tools.

C) No preliminary treatment of outliers.

* A) Best alternative; B) Acceptable; C) To be avoided

1 - PRE-TREATMENT

1.5 – Model selection

Description

Model selection pertains to: criteria to select the appropriate model for pre-adjustment and seasonal adjustment or forecast extension for seasonal adjustment; log versus non-log specification of the model; order of differencing for seasonal and non-seasonal part; use of additive or multiplicative components; statistical checking of the adequacy of the estimated model; analysis of decomposition on the basis of the chosen model; etc.

The relevance of this item is quite different if we deal with model-based methods or non-parametric ones.

See also item 5.2 for definition/treatment of problematic series.

Options

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

Alternatives *

A) Automatic selection within a large number of models according to the options of the tool, after checking for model adequacy using standard statistical tests (e.g. normality, heteroskedasticity, serial correlation, etc.) and spectrum diagnostics. Then use of manual model selection for important or problematic series.

B) As before, but with a completely automatic procedure.

C) Selection based on restricted number of pre-defined models that have not been tested for adequacy with the set of series being adjusted.

* A) Best alternative; B) Acceptable; C) To be avoided

1 - PRE-TREATMENT

1.6 – Decomposition scheme

Description

The decomposition scheme specifies how the various components - basically trend-cycle, seasonal and calendar component and irregular – combine to form the original series. Usually, the decomposition scheme is multiplicative (either pure multiplicative or log-additive), because in most economic time series, the magnitudes of the seasonal component appear to vary proportionally to the level of the series. Depending on the nature of the seasonality several different schemes are used: the additive and the log-additive (offered by both TRAMO-SEATS and X-12-ARIMA); the multiplicative and the pseudo-additive (offered by X-12-ARIMA only).

For series with trends in both the mean and the variance (presence of heteroskedasticity) the log-additive decomposition seems to be the most appropriate one; whereas when only trend in the mean is present, the multiplicative decomposition is generally used.

TRAMO-SEATS and X-12-ARIMA provide the user with an automatic test for log-transformation. The result of this test will also suggest the choice of the decomposition scheme.

For series with zero or negative values the additive decomposition is automatically selected by seasonal adjustment procedures whatever it is the underlying real decomposition scheme.

The choice of the decomposition scheme and the choice of the differencing orders aim to achieve stationary autocovariance function. These two decisions have the greatest impact on forecasts and on model-based seasonal adjustments and trend-cycle estimates.

Options

- Automatic decomposition scheme selection;
- Manual decomposition scheme selection after graphical inspection of the series;
- For series with zero or negative values, adding a constant to make the series positive and select the appropriate decomposition scheme;
- For stationary series (with no trend in mean and in variance) the additive decomposition has to be chosen.

Alternatives *

A) Automatic decomposition scheme selection using appropriate criteria (e.g. information criteria) after graphical inspection of the series. Special investigations for non positive series (i.e. adding a constant before testing for the decomposition scheme and checking the impact on the seasonally adjusted series). Use of manual selection for more problematic series.

B) Fully automatic decomposition scheme selection using information criteria.

C) Use of fixed decomposition scheme (e.g. multiplicative for positive series, additive for non positive series).

* A) Best alternative; B) Acceptable; C) To be avoided

2 - SEASONAL ADJUSTMENT

2.1 – Choice of seasonal adjustment approach

Description

TRAMO-SEATS and X-12-ARIMA are currently the most commonly used seasonal adjustment approaches. TRAMO-SEATS is based on a parametric approach while X-12-ARIMA is based on a non-parametric approach. Structural time series models represent a reasonable alternative, provided they allow for a complete calendar and outlier treatment and include an adequate set of diagnostics. The consistent use of a common set of seasonal adjustment packages will improve transparency and comparability of seasonally adjusted time series across countries.

Options

- X-12-ARIMA;
- TRAMO-SEATS;
- Structural time series models.

Alternatives *

A) TRAMO-SEATS, X-12-ARIMA together with well-documented and stable interfaces to these tools should be used for seasonal adjustment. The choice between TRAMO-SEATS and X-12-ARIMA can be based on past experience, subjective appreciation and characteristics of the time series. Production tools should be updated on a regular basis after satisfactory testing. Methods and tools versions currently used in data production should be clearly communicated to users.

B) Use of structural time series models based on simultaneous representation of the unobserved components of the series. The chosen software has to estimate calendar and outlier effects with diagnostics for all components and effects. For mass data production the chosen software should offer automatic modelling procedures that can reliably identify the presence of the effects mentioned.

C) Use of other production tools.

* A) Best alternative; B) Acceptable; C) To be avoided

2 - SEASONAL ADJUSTMENT

2.2 – Consistency between raw and seasonally adjusted data

Description

It is unrealistic to assume that seasonality is neutral over the whole year (either calendar or financial), especially in a multiplicative decomposition model with evolving seasonality, calendar effects and outliers. It is possible to force the sum (or average) of seasonally adjusted data over each year to equal the sum (or average) of the raw data, but from a theoretical point of view, there is no justification for this.

The disadvantages in forcing equality over the year between the seasonally adjusted data and the raw data (e.g. sum or average) are:

- Bias in the seasonally adjusted data, especially where calendar and other non-linear effects are relevant;
- The final seasonally adjusted data are not optimal;
- Additional post-processing calculations are required.

The only benefit of this approach is that there is consistency over the year between adjusted and the not seasonally adjusted data. This can be of particular interest when low-frequency (e.g. annual) benchmarking figures officially exist (e.g. National Accounts, Balance of Payments, External Trade, etc) where users' needs for time consistency are stronger.

Options

- Do not apply any constraint;
- Apply constraining techniques;
- Constrain the equality over the year of seasonally adjusted data to original data (e.g. sum or average);
- Constrain the equality over the year of seasonally adjusted data to calendar (only) adjusted data (e.g. sum or average).

Alternatives *

A) Do not impose the equality over the year to the raw and the seasonally adjusted or the 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 (if significant calendar effects are present) or alternatively between original and the only seasonally adjusted data under particular circumstances, e.g. requirements from users. In this case, recognised benchmarking methods should be used.

C) Always impose the equality over the year between the seasonally and calendar adjusted data and the raw data (e.g. sum or average) or use a benchmarking technique that leaves residual seasonality.

* A) Best alternative; B) Acceptable; C) To be avoided

2 - SEASONAL ADJUSTMENT

2.3 – Direct versus indirect approach

Description

Direct seasonal adjustment is performed if all time series, including aggregates, are seasonally adjusted on an individual basis. Indirect seasonal adjustment is performed if the seasonally adjusted estimate for a time series is derived by combining the estimates for two or more directly adjusted series. The direct and indirect issue is relevant in different cases, e.g. within a system of time series estimates at a sector level, or aggregation of similar time series estimates from different geographical entities. Whether it is more appropriate to use direct or indirect seasonal adjustment is still an open question. Neither theoretical nor empirical evidence uniformly favours one approach over the other.

For an informed choice between the direct and the indirect approach users should consider:

- Descriptive statistics on the quality of the indirect and direct seasonally adjusted estimates, e.g. the smoothness of the component time series, residual seasonality tests on the indirect seasonally adjusted estimates, and measures of revision;
- Characteristics of the seasonal pattern in the component time series;
- User demand for consistent and coherent outputs, especially where they are additively related.

Options

- Direct approach where the raw data are aggregated and the aggregates and components are then directly seasonally adjusted using the same approach and software. Any discrepancies across the aggregation structure are not removed;
- Direct approach, as described above, with the distribution of discrepancies across the aggregation structure. If the discrepancies are small enough, it is possible to apply appropriate procedures to ensure additivity;
- Indirect approach where the seasonal adjustment of components occurs using the same approach and software, and then totals are derived by aggregation of the seasonally adjusted components;
- Mixed indirect approach where the seasonal adjustment of components occurs using different approaches and software, and totals are derived by aggregation of the seasonally adjusted components without enough information on options and parameters used.

Alternatives *

A) Users should carefully consider the application of either direct or indirect and make an informed choice relating to all known requirements. The direct approach is preferred for transparency and accuracy, especially when component series show similar seasonal patterns. The indirect approach is preferred when components series show seasonal patterns differing in a significant way. The presence of residual seasonality should always be checked in all of the indirectly seasonally adjusted aggregates.

B) The use of either the direct approach associated with benchmarking techniques to remove discrepancies, or the indirect approach is acceptable for consistency especially when there are strong user requirements for consistency between lower and higher level aggregates (e.g. additivity). The presence of residual seasonality should always be checked in all of the indirectly seasonally adjusted aggregates.

C) Any other alternative approach which is not consistent or transparent for all individual time series.

* A) Best alternative; B) Acceptable; C) To be avoided

2 - SEASONAL ADJUSTMENT

2.3.1 – Direct versus indirect approach: dealing with data from different agencies

Description

Seasonal adjustment can be performed at different geographical aggregation levels (horizontal aggregation). This case is relevant for European aggregates, which are usually derived as an aggregation of corresponding national ones. The issue of direct versus indirect in the case of geographical aggregation has a great relevance for users who consider the consistency between disaggregated and aggregated data as a priority especially for their forecasting exercise.

Options

- Seasonal adjustment can be performed either by local or central statistical institutions (e.g. NSIs and Eurostat) on disaggregated series with the same method and software, and then totals derived by their aggregation (decentralized or centralized indirect approach);
- All time series, including geographical aggregates, are seasonally adjusted on an individual basis;
- Same as before, but aggregation constraints imposed ex-post by means of multivariate benchmarking techniques;
- Each geographical component is seasonally adjusted, possibly with many different methods and software, and the seasonally adjusted geographical aggregates are derived from the seasonally adjusted components (mixed indirect approach).

Alternatives *

A) The direct approach is recommended for transparency reasons, under the condition that geographical component series show similar seasonal patterns and in case of lack of harmonisation in the use of national approaches. The centralized indirect approach is recommended for special cases where it has been agreed that seasonal adjustment should be delegated to the centralised agency. The decentralized indirect approach can also be considered in the presence of a satisfactory degree of harmonisation of national seasonal adjustment practices and if component series show seasonal patterns differing in significant ways.

B) In the presence of strong users requirements of consistency (i.e. additivity) between European aggregates and national ones, the decentralized indirect approach in presence of a satisfactory degree of harmonisation of national seasonal adjustment practices can be also accepted even when national series show similar seasonal patterns. However, indirectly adjusted European aggregates should be checked for the presence of residual seasonality.

C) The use of the mixed indirect approach.

* A) Best alternative; B) Acceptable; C) To be avoided

3 - REVISION POLICIES

3.1 – General revisions policy

Description

Revisions of seasonally adjusted data take place for two main reasons. First, seasonally adjusted data may be revised due to a revision of the unadjusted (raw) data. These revisions of unadjusted data may be the result of an improved information set (in terms of coverage and/or reliability). Second, revisions of seasonally adjusted data can also take place because of a better estimate of the seasonal pattern due to new information provided by new unadjusted data and due to the characteristics of the filters and procedures removing seasonal and calendar components. As far as revisions are solely based on new information, they are mostly welcome. However, in seasonal adjustment it may be the case that just one more observation results in revisions of the seasonally adjusted data for several years, which sometimes confuses users.

The challenge is to find a balance between the need for the best possible seasonally adjusted data, especially at the end of the series, and the need to avoid unimportant revisions that may later be reversed (the trade-off between the precision of seasonally adjusted data and their stability over time).

Prior to developing a revision policy, consideration needs to be given to the needs of users and resources available to implement the policy. The policy should address at least the following: the frequency and relative size of revisions due to seasonal adjustment; the precision of the seasonally adjusted data, the time period over which the raw data have been revised and the relationship between the timing of publication of revisions to the seasonally adjusted data and publication of the revisions to the raw data.

It is important that the revision policy is as coherent and transparent as possible and that it should not lead to the publication of sub-optimal seasonally adjusted data, which could mislead users interpreting the economic picture.

Options

- Revise seasonally adjusted data in accordance with a well-defined and publically available revisions policy and release calendar;
- Revise both raw and seasonally adjusted data between two consecutive official releases of the release calendar;
- Revise seasonally adjusted data only once a year independently of any revisions of past raw data;
- Revise seasonally adjusted data once a year if past raw data do not change when a new observation is added, or revise seasonally adjusted data whenever past raw data are revised;
- Do not use any official release calendar and/or perform revisions on an irregular basis and/or do not revise at all.

Alternatives *

A) Revisions to seasonally adjusted data are published in accordance with a coherent, transparent and officially published revision policy and release calendar, that is aligned with the revision policy and the revision calendar for the unadjusted data. Revisions to the seasonally adjusted data should not be released more often than releases of the raw /unadjusted data. The public are informed about the average revisions of important seasonally adjusted macroeconomic variables which have been observed in the past.

B) Revisions to seasonally adjusted data are published in accordance with several independent revision policies that apply to particular data releases.

C) No revision of seasonally adjusted data, absence of a clear and public revision policy, as well as policies leading to the publication of misleading information for the current period.

* A) Best alternative; B) Acceptable; C) To be avoided

3 - REVISION POLICIES

3.2 – Concurrent versus current adjustment

Description

The way in which seasonally adjustment is carried out has implications for the revisions of seasonally adjusted data. There is a range of possible strategies, the extremes of which are as follow:

- Current adjustment

The model, filters, outliers and regression parameters are re-identified and the respective parameters and factors re-estimated at appropriately set review periods. The seasonal and calendar factors to be used to adjust for seasonal and calendar effects new raw data in-between the review periods are those estimated in the previous review period and forecasted up to the next review period.

- Concurrent adjustment

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

The current adjustment strategy minimises the frequency of revisions and concentrates the revisions mainly on the review period. The concurrent adjustment strategy generates the most accurate seasonally adjusted data at any given time point but will lead to more revisions, many of which will be small and perhaps in opposing directions.

Both of these extreme strategies have drawbacks: for example, the current adjustment strategy can lead to a lack of precision in the estimation of the latest adjusted figures and the concurrent adjustment strategy can lead to a high instability of the seasonal pattern. Therefore, in practice, other balanced alternatives between these two extremes are followed in order to cope with data specificities and aiming to provide good quality adjustment:

- Partial concurrent adjustment

The model, filters, outliers and calendar regressors are re-identified once a year and the respective parameters and factors re-estimated every time a new or revised data becomes available.

- Controlled current adjustment

Forecasted seasonal and calendar factors derived from a current adjustment are used to seasonally adjust the new or revised raw data. However, an internal check is performed against the results of the "partial concurrent adjustment", which is preferred if a perceptible difference exists. This means that each series needs to be seasonally adjusted twice. The approach is only practicable for a limited number of important series.

A full review of all seasonal adjustment parameters should be undertaken at least once a year and whenever significant revisions occur (e.g. annual benchmark).

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) When past data are revised for less than two years and/or new observations are available, partial concurrent adjustment is preferred to take into account the new information and to minimise the size of revisions due to the seasonal adjustment process.

However, if the seasonal component is stable enough, controlled current adjustment could be considered to minimise the frequency of revisions. In this case, a full review of all seasonal adjustment parameters should be undertaken at least once a year.

When revisions covering two or more years occur (as observed in national accounts) mode l, filters, outliers and regression parameters have to be re-identified and re-estimated.

B) Current adjustment with a full review every year.

C) Current adjustment without annual review as well as concurrent adjustment.

* A) Best alternative; B) Acceptable; C) To be avoided

3 - REVISION POLICIES

3.3 – Horizon for published revisions

Description

As a rule, when seasonal factors are re-estimated the seasonally adjusted results from the beginning of the time series change. These changes may be, but do not necessarily have to be, published in their entirety. Two factors speak in favour of always carrying out a revision from the beginning of the series: the methodically identical treatment of all values and the fact that the calculation of the seasonally adjusted results is easy to understand and to replicate. It is, however, questionable whether a current newly added figure really contains relevant information for significant revisions of the estimation of the usual seasonal fluctuations in previous decades. As a way of balancing the information gain and the revision horizon, the revision period for the seasonally adjusted data is often, in practice, limited. As a broad rule, barring serious model misspecification, a revision period between 3 and 4 years longer than the revision period for the unadjusted data can be a sensible choice. For the earlier period, seasonal factors could be frozen. This choice takes into account the extent of revisions of raw data (e.g. National Accounts) as well as the normal convergence properties of seasonal adjustment filters.
TRAMO-SEATS output indicates how fast the revision decreases as additional observations become available, as well as the size of the revision. Combining the two, an optimal length of the revision period can be established, if desired, for each series.
For the X-12-ARIMA case, the information provided by diagnostics – such as the Sliding Spans and the Revision History, together with the properties of the filters employed, may inform the choice of the appropriate revision horizon.
In situations where the raw data are revised from the beginning of the series (e.g. changes in: definitions, nomenclatures, sampling scheme, etc.), the entire seasonally adjusted series should be revised.

Options

- Define the extent of revisions according to the specificities of the series based on the information from TRAMO/SEATS and/or X-12-ARIMA;
- Limit the revision period for the seasonally adjusted results to 3-4 years (preferably 4) before the revision period of the unadjusted data and freeze the older data;
- Revise the entire time series in the event of a re-estimation of the seasonal factors;
- Revise the whole series in case of major revisions on raw data;
- Do not perform any revision.

Alternatives *

A) The revision period for the seasonally adjusted data must at least cover the extent of the raw data revision period. Due to the property of filters, it is normally acceptable to revise the seasonally adjusted data from a point 3-4 years before the beginning of the revision period of the unadjusted data; earlier data should be frozen.

B) Revise the whole time series, irrespective of the revision period for the unadjusted data.

C) Do not revise, revise only the last year data, or revise for a shorter period than the revision period for the unadjusted data.

* A) Best alternative B) Acceptable C) To be avoided

4 - QUALITY OF SEASONAL ADJUSTMENT

4.1 – Validation of seasonal adjustment

Description

Seasonal adjustment is a complex statistical data treatment which needs accurate monitoring before the results are accepted. In order to ensure that seasonally adjusted data are of good quality they have to be validated using a wide range of quality measures. Among others, the absence of residual seasonal and/or calendar effects as well as the stability of the seasonally adjusted pattern has to be carefully assessed. The validation of seasonally adjusted data can be performed by means of several graphical, descriptive, non-parametric and parametric criteria included in the output of the seasonal adjustment program. If possible this could be complemented with graphical diagnostics and additional statistical tests obtained from external statistical packages.

Options

- Use an detailed set of graphical, descriptive, non-parametric and parametric criteria defined to check the suitable characteristics of seasonally adjusted data;
- Restrict validation to the use of standard measures proposed by different seasonal adjustment tools;
- Use only graphical inspection and descriptive statistics to validate the seasonal adjustment.

Alternatives *

A) Use a detailed set of graphical, descriptive, non-parametric and parametric criteria to validate the seasonal adjustment. Re-do the seasonal adjustment with a different set of options in case of non-acceptance of results. Particular attention must be paid to the following suitable characteristics of seasonal adjustment series:
- absence of residual seasonality
- absence of residual calendar effects
- absence of an over-adjustment of seasonal and calendar effects
- absence of significant and positive autocorrelation for seasonal lags in the irregular component
- stability of the seasonal component

In addition, the appropriateness of the identified model used in the complete adjustment procedure should be checked using standard diagnostics and some additional considerations. An important consideration is that the number of outliers should be relatively small, and not unduly concentrated around the same period of the year.

B) Use only default criteria defined within the different tools to validate the results and, if validation fails, re-run the seasonal adjustment as in alternative A).

C) No validation of performed seasonal adjustment or use of only a basic set of graphical and descriptive statistics to validate the seasonal adjustment.

* A) Best alternative; B) Acceptable; C) To be avoided

4 - QUALITY OF SEASONAL ADJUSTMENT

4.2 – Quality measures for seasonal adjustment

Description

Both TRAMO-SEATS and X-12-ARIMA provide a wide range of quality measures, together with graphical and spectral analysis. The measures reflect, to an extent, the different underlying philosophies on which the two approaches are based; nevertheless they include a number of common measures.

The full model-based structure of TRAMO-SEATS implies that diagnostics on the appropriateness of the model are particularly important. Further, the model-based structure can also be exploited to provide additional insights into the quality of the decomposition achieved (for example, size of the innovation in the seasonal component, SA series estimation error, standard error of the revision and of the growth rates, significance of seasonality, …) which extend in a natural way to forecasts of the components. The output of TRAMO-SEATS also provides summary tables which contain diagnostics and quality measures. These tables can be read and abnormal values or errors can be picked up. In this way, identification of problematic series can be fully automatic.

X-12-ARIMA supplies a large set of quality measures reflecting the particular structure of the method with an essentially parametric pre-treatment part and a fully non parametric seasonally adjustment one. These quality diagnostics have to be used to assess the result of each step of the seasonal adjustment process (See item 5.2 for definition/treatment of problematic series). Diagnostic checking of the regARIMA model, performed through various analyses of the residuals from model estimation, and diagnostic checking of the seasonal adjustment are included in the output. In particular, the output provides 11 summary statistics to judge the quality of seasonal adjustment.

Options

- Use the full set of diagnostics and graphical facilities to assess the whole process of seasonal adjustment. This is particularly appropriated for the treatment of individual series;
- Use a selected set of diagnostics and graphics especially for massive treatment of data;
- Complement the set of available diagnostics by additional measures and tests to achieve a more robust quality assessment;
- Do not use any quality measures for seasonal adjustment assessment.

Alternatives *

A) Use all available quality measures, perhaps complemented with measures not yet included within the tool, to achieve a more robust quality assessment. In the case of treatment of large numbers of series, use an appropriate selection of diagnostics, including at least the following aspects: significance and plausibility of calendar adjustment coefficients, presence and number of outliers by type, model fit, absence of residual calendar effects, absence of residual seasonality or over smoothing.

B) Use only the quality measures already provided by the program or a subset of them.

C) No quality measures are used to evaluate seasonal adjustment.

* A) Best alternative; B) Acceptable; C) To be avoided

4 - QUALITY OF SEASONAL ADJUSTMENT

4.3 – Comparing alternative approaches and strategies

Description

Even though TRAMO-SEATS and X-12-ARIMA provide their own quality measures many of them are shared and it is possible to construct a wide set of common quality measures. Work to that effect has been and continues to be done at the US Bureau of Census, EUROSTAT, and the Bank of Spain. The use of a set of common quality measures should be particularly useful when comparing seasonally adjusted data obtained by different methods (i.e. TRAMO-SEATS, X-12 ARIMA) and/or under different strategies (e.g. direct versus indirect, current versus concurrent).

The set of common diagnostics should contain the following measures:

- M-statistics
- Roughness measures (R1, R2, smoothness of trend-cycle and of seasonal components)
- Spectral diagnostics
- Revisions analysis (history of revisions, sliding spans)
- Presence of seasonality (e.g. Kendall and Friedman, Harvey Canova Hansen)

Options

- Use a common set - as wide as possible - of quality measures to compare alternative approaches and strategies, complementing it with quality measures specific to each approach;
- Use only common diagnostics for both approaches;
- Use specific quality measures for each approach.

Alternatives *

A) Use of common and specific measures/diagnostics for assessing and/or comparing the quality of alternative seasonal adjustment methods and strategies.

B) Use a subset of common quality diagnostics.

C) Use specific diagnostics to each software or no quality measures/diagnostics to compare the quality of alternative seasonal adjustment methods and strategies.

* A) Best alternative; B) Acceptable; C) To be avoided

4 - QUALITY OF SEASONAL ADJUSTMENT

4.4 – Metadata template for seasonal adjustment

Description

It is important that seasonally adjusted data are appropriately documented using a standard format, possibly in line with the SDMX (Standard Data and Metadata Exchange) guidelines currently under adoption. Seasonal adjustment metadata will be very useful not only for exchange of information within the ESS and for dissemination purposes, but also to monitoring the implementation of the seasonal adjustment guidelines. A template, designed to record in a standard form the metadata on how seasonal adjustment is performed for different groups of series, is included in the Annex.
The metadata template should be attached to each data release and kept regularly updated.

Options

- Use the version of the standard template for SA metadata as presented in the Annex;
- Include seasonal adjustment information into existing standard metadata files.

Alternatives *

A) Use of the template for seasonal adjustment metadata in the Annex possibly for all groups of series or, at least, for the most relevant ones. The information in the metadata template has to be regularly updated to reflect changes in the seasonal adjustment process.

B) Include seasonal adjustment information within the existing reference metadata files.

C) No methodological information is supplied for seasonal adjustment.

* A) Best alternative; B) Acceptable; C) To be avoided

5 - SPECIFIC ISSUES ON SEASONAL ADJUSTMENT

5.1 – Seasonal adjustment of short time series

Description

For some series that are too short to be seasonally adjusted using either TRAMO-SEATS or X-12-ARIMA, it is possible to adjust them using alternative, less standard, procedures. For series that are long enough to run X-12-ARIMA or TRAMO-SEATS but remain quite short (3-7 years), some instability problems can appear. Several empirical comparisons have been done to investigate the relative performance of X-12-ARIMA and TRAMO-SEATS on short time series.
As a general rule when the series are shorter than seven years, the specification of the parameters used for pre-treatment and seasonal adjustment has to be checked more often (e.g. twice a year in order to deal with the higher degree of instability of such series).

Options

- Do not adjust time series when they are shorter than the minimum requirement for TRAMO-SEATS and X-12-ARIMA;
- Use of alternative procedures to seasonally adjust short time series;
- Re-specify all parameters involved in the pre-treatment and seasonal adjustment of short series more often than in the standard case;
- Conduct comparative studies on the relative performance of TRAMO-SEATS and X-12-ARIMA when series are 3-7 years long;
- Inform users about instability problems when series are shorter than 7 years.

Alternatives *

A) Series shorter than 3 years should not be seasonally adjusted. Seasonal adjustment of short time series (3-7 years) should be performed, whenever possible, with standard tools. Moreover back-recalculated time series (even non-official) should be used to extend the sample and stabilise seasonal adjustment when they are reliable for estimating a seasonal component. Simulations on relative performances of the existing standard tools for adjustment of short series should be carried out. Users should be informed of the greater instability of seasonally adjusted data for short series, and of methods used. Clear publication policy rules should be defined. The settings and parameters for seasonal adjustment should be checked more than once per year.

B) Do not perform any seasonal adjustment of quite short (3-7 years) time-series.

C) Use of non-standard tools for short time series.

* A) Best alternative; B) Acceptable; C) To be avoided

5 - SPECIFIC ISSUE ON SEASONAL ADJUSTMENT

5.2 – Treatment of problematic series

Description

Some series can be characterised by very specific features such as:
1) High non-linearity, which does not allow the identification of a model with acceptable modelling diagnostics, even by shortening the series;
2) Absence of a clear signal due to the presence of a dominant irregular component, (e.g. small or no seasonal peaks in the differenced (and logged, if appropriate) original data);
3) Unstable seasonality (e.g. visible in graphs or in inconsistent adjustments from overlapping spans of data);
4) Large number of outliers compared with the length of the series (i.e. more than 10% of irregular points);
5) Heteroskedasticity (in the series/components) which is not restricted to a few calendar months or which cannot be avoided by deleting some early years of data, leaving enough data for model estimation.

These series cannot be submitted to standard seasonal adjustment: ad hoc treatment should be carried out, both in terms of software and set of options. The quality of seasonally adjusted data will depend on the suitability of the strategy adopted.

Options

- Seasonally adjust only recent years of the series if deleting earlier data makes it possible to find a model/adjustment of reasonable quality;
- Perform ad hoc seasonal adjustment for all problematic series;
- Perform ad hoc seasonal adjustment only when problematic series are relevant;
- Perform no ad hoc seasonal adjustment.

Alternatives *

A) Seasonal adjustment is performed for problematic series. A case by case approach to seasonal adjustment should be preferred to a standard one. The literature, the manuals and experts should be consulted in order to develop a solution. Users should be informed of the adopted strategy.

B) Seasonal adjustment is performed only on relevant problematic series, when failure to adjust these series leads to residual seasonality in important higher level aggregates. Other problematic series are treated in a standard way.

C) Seasonal adjustment performed in automatic way for all series.

* A) Best alternative; B) Acceptable; C) To be avoided

6 - DATA PRESENTATION ISSUES

6.1 – Data availability in databases

Description

Outputs associated with the seasonal adjustment process should be stored within a secure and usable database environment. The minimal time series outputs that should be stored are: raw data, seasonally adjusted data and time series identifiers. Additional outputs that could be stored include: related time series outputs such as calendar adjusted data, trend-cycle data, seasonal factors, associated metadata relating to seasonal adjustment parameter options and prior corrections. The database should be secure but accessible for the purposes of producing and storing time series estimates. The stored information may be used as part of a dissemination strategy and should be accessible to users on request, provided there are no confidentiality issues.

Options

- Storage and availability of raw and seasonally adjusted data;
- Storage and availability of additional time series outputs (e.g. prior corrections, working day adjusted data);
- Storage of all associated metadata information relating to an individual time series;
- Storage of data vintages to enable revision analysis.

Alternatives *

A) Systematic storage of raw, seasonally adjusted and other time series metadata (i.e. seasonal adjustment options, prior corrections and trend-cycle data) in a consistent format in a central coordinated database. This should ideally include data vintages. Metadata standards should be followed to ensure that all data can be easily exchanged. The database information should be secure but be able to be extracted and accessed as required. The principles of ensuring transparency and enabling all users to understand and replicate the seasonal adjustment process should be fulfilled.

B) Systematic storage of raw and seasonally adjusted data with associated metadata identifiers. The information should be made available on request and should allow for replicating the seasonally adjusted figures.

C) No database solution or systematic storage of time series estimates.

* A) Best alternative; B) Acceptable; C) To be avoided

6 - DATA PRESENTATION ISSUES

6.2 – Press releases

Description

Data can typically be presented either in raw, seasonally adjusted, calendar-adjusted only or trend-cycle form. The raw data contain all characteristics of the time series. The seasonally adjusted data contains the "news" of the series, i.e. the trend-cycle and the irregular component.

Much of the discussion on trend-cycle analysis focuses on the so-called end-point problem. Since the trend-cycle values at the end of the series are usually estimated by extrapolation, the estimated trend-cycle for the most recent data is very uncertain and can suffer of phase-shift problems. Particular care is required at turning points, where it often takes months until the new correct direction of development appears.
In all cases, the information contained within the press release should adhere to the principles of ensuring transparency and assisting users in making informed decisions.

Further details on data presentation recommendations for press releases are available in the OECD Data and Metadata Reporting and Presentation Handbook, Chapter 5.

Options

- Include only raw data in press releases;
- Extend the informative content of press releases with one or more of the following transformations: seasonally adjusted series, seasonally adjusted plus calendar adjusted series, trend-cycle series;
- Present only levels or different forms of growth rates;
- Include empirical revision errors for the seasonally adjusted and/or trend-cycle series.

Alternatives *

A) Press releases aim to provide news and, therefore, seasonally adjusted data are the appropriate kind of data to be presented. In addition, users should be given access to the full historical raw, seasonally adjusted, calendar-adjusted and trend-cycle time series either on request, by reference or by internet download. When presenting trend-cycle estimates, the most recent values should not be shown because of the end-point problem. Analysis of real time revision errors of at least the seasonally adjusted estimates should also be included.
Period on period growth rates and changes in level should be computed on seasonally adjusted data and should be used with caution if the time series has high volatility. Year on year comparisons should be computed on calendar adjusted data or, in the case of absence of calendar effects, on raw data.

B) Presentation of seasonally adjusted data and presentation of the trend-cycle in a graphical way which includes estimates for the current end of the series. In this case the end-point problem of the trend-cycle estimate should be made very clear. Annualized growth rates can be also used, especially for well justified reasons (e.g. for monetary aggregates). Particular attention has to be paid in case of high volatile series. Users should be informed on the specific characteristics of annualized growth rates.

C) Presentation of the raw or trend-cycle data only, as well as the computation of yearly and period to period growth rates on either the raw or trend-cycle data.

* A) Best alternative; B) Acceptable; C) To be avoided

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Annex
Seasonal adjustment metadata template

SEASONAL ADJUSTMENT METADATA TEMPLATE ***LINK TO GUIDELINES / GLOSSARY***												
Group of series : *name*												
Country/Institution												
Contact Person responsible for SA (not a generic contact point)	*name / institution /position* *phone / e-mail / fax*											
GENERAL INFORMATION LINK TO OTHER STRUCTURAL METADATA FOR THE ORIGINAL (RAW) SERIES												
Frequency (*)												
Published series / relevant series	***Number of series by level of breakdown and kind of adjustment***											
	Kind of adjustment	***Level of breakdown:***										
		…	*Var j*	…	…	….	…	…	…	…	..	..	..
	Raw series											
	Only calendar adjusted series											
	Other adjustments (e.g. outliers correction)											
	Only seasonally adjusted											
	Seasonally and calendar adjusted,											
	Trend-cycle											
	Others											
	(*) if the indicators are published at a quarterly level but are available at a monthly level, please indicate if the adjustment is made at monthly or at quarterly level											
Method used	*Parametric (please specify)* *Non parametric (please specify)*											
Software used (*please also specify the version)*	*Software*									*Version*		
Publications	*title of hardcopy* *on-line access source*											

CALENDAR ADJUSTMENT													
Frequency *(**)*													
Calendar adjustment (trading/working day adjustment incl. moving holidays effect) If the indirect approach is followed the weight of the series on the aggregate should be indicated. If the direct approach is followed the number of series could be sufficient	***Series by level of breakdown and kind of adjustment (weight/number of series)***												
	Kind of adjustment	***Level of breakdown***											
		…	*Var j*	…									
	No calendar adjustment												
	Trading day/ working day (Indicate the kind of regressor used)												
	Moving holiday effect (indicate which)												
	Leap year effect												
	Others												
No calendar adjustment	*Reasons :* *a priori decision* *not significant calendar effect* *other (specify)*												
Calendar used	*Country-specific (national holidays) vs. default calendars* *series-specific: applicable for all the series in this group(s) as opposed to all other groups in the reporting country*												
	(**) if the indicators are published at a quarterly level but are available at a monthly level, please indicate if the adjustment is made at monthly or at quarterly level												
OTHER PRE-ADJUSTMENT													
Detection and replacement of outliers (°)	*yes (which outliers: impulse, transitory changes, level shifts) / no*												
	(°) In order to improve the seasonal and calendar effect estimate, not filtered out in the seasonally and/or trading day adjusted series.												

SEASONAL ADJUSTMENT						
	Number of series by level of breakdown, type of filter selection and decomposition					
Model/filter selection	***Type***	*Level of breakdown*				
		… *Var j* …				
	Manual	*Weight/Number of series*				*100%/1*
	Automatic					-
Seasonal adjustment decomposition	***Type***					
	Additive					
	Log-additive					
	Multiplicative					
	Other					

AGGREGATION	
Direct adjustment / indirect adjustment via components	*In case of indirect approach:* *- indicate whether residual seasonality is checked* *- indicate from which level of detail you are starting the aggregation*
Consistency amongst the different levels of breakdown	*Yes (please indicate whether indirect approach or direct approach complemented by benchmarking techniques)* *No*
Time consistency monthly/ annual Quarterly/annual	*Yes (Please specify e.g.: Calendar and SA, RAW and SA)* *No*
REVISIONS	
Model, filters, outliers, calendar regressors re-identification	*please describe the strategy adopted and specify the frequency of re-identification*
Parameters / factors re-estimation	*please describe the strategy adopted and specify the frequency of re-estimation*
Horizon for published revisions	*complete series* *limited time range (please specify)*
QUALITY INDICATORS	
Please indicate all the quality measures used	

AVAILABILITY OF STRUCTURAL METADATA	
Links to methodological reports	
Links to national calendars used (if any)	
Availability of detailed information sufficient to allow users to replicate the process:	*yes / upon request / no*
- all series	*yes / upon request / no*
- published series	*yes / upon request / no*
- other subsets (please specify)	*yes / upon request / no*

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