

Treatment of seasonal adjustment and working-day correction

Seasonal adjustment

Seasonal adjustment is a treatment of infra-annual time series to remove the spurious effect of seasonal patterns from the series' trend and cycle. These patterns can be caused by weather, public holidays such as Easter and Christmas, the timing of school vacations or of dividend payments and a number of other reasons. In national accounts, only the quarterly series are seasonally adjusted; it is not applicable to annual accounts.

There are several techniques to seasonally adjust quarterly series. Two main groups of methods can be distinguished: moving average based methods and model-based methods (see Eurostat Handbook of quarterly national accounts, paragraph 8.30). The most widely used moving average based method for seasonal adjustment is Census-X11 and its upgrades. TRAMO/SEATS is a well-known method that belongs to the model-based group of procedures.

Eurostat disseminates seasonally adjusted quarterly figures for both the European aggregates and for single countries:

- Seasonal adjustment of country data is carried out directly by the statistical offices, and subsequently transmitted to Eurostat. Most countries compile quarterly accounts both in raw (i.e. unadjusted) and seasonally adjusted form, other countries compile just a partial seasonally adjusted set, and a few others, in particular among the new Member States, still compile unadjusted figures only. National Statistical Institutes in the EU Member States use differing methods of seasonal adjustment, all of them however belonging either to the X11 or the TRAMO/SEATS families of methods. See the table below for a complete list of methods currently used in the Member States.

For certain series, notably on employment, Eurostat seasonally adjusts country data of countries not doing it themselves; those seasonally adjusted country data are used as input for estimating the EU / euro area (EA) accounts and are not published.

- Eurostat produces the estimates for the EU/EA based on country data. This can be done indirectly, i.e. seasonally adjusted EU/EA series are calculated in parallel to the raw ones, with the same method, but using as an input the seasonally adjusted Member States' data, or directly, i.e. by deriving first the unadjusted EU/EA figures from unadjusted Member States' data and then applying a seasonal adjustment to this raw series. (Please note that the choice between direct and indirect approaches is not specific to the EU/EA accounts; this choice arises naturally in any context in which one variable is the sum of others). **Eurostat uses the indirect approach to seasonally adjust the quarterly European aggregates.**

The use of indirect approach by Eurostat means that the European seasonally adjusted series include a mix of seasonal adjustment procedures. It also means that the set of countries accounted for when estimating EU/EA may differ between the estimation of raw and of seasonally adjusted European series.

There is no evidence that either the direct or the indirect approach is generally superior to the other one. Observing that seasonal patterns in country data across the EU show considerable variation, which is to be expected considering differences in climate and in administrative

frameworks. It is then sound to remove the seasonality in the national series, rather than confounding the different patterns before trying to remove them from the European aggregate.

Fundamentally, seasonal adjustment is an univariate technique. When applied to several raw series linked by accounting relations (e.g. GDP equals gross value added plus taxes on products less subsidies on products), those accounting relations are not necessarily preserved by the seasonal adjustment. The same stands for additivity of breakdowns of any kind (e.g. the sum of value added broken down by industry does not equal the total value added if each component is seasonally adjusted independently). There are several techniques to overcome this problem and recover additivity; most countries recover additivity at the end of their seasonal adjustment or, as is the case for Eurostat, in a separate final step of the compilation procedure.

Working-day correction

The so-called working-day correction takes account of the different number of working days in the quarter. Some reasons for an uneven quarterly number of working days are: different length of months, different distribution of weekends, bank holidays, Christmas, moving holidays such as Easter, etc. To the extent that they are linked to fixed calendar features, this effect can be accounted for by the seasonal adjustment.

Differences in the number of working days between subsequent quarters can significantly affect growth rates. Therefore, a working-day adjustment is usually applied as an optional pre-treatment in the seasonal adjusted data. For most, but not all, Member States the seasonal adjustment comprises also a working-day correction (see the table below).

In the European aggregates, the working-day correction must be implemented with an indirect approach due to differences in national working-day calendars, different impact of additional working days and different methods of seasonal and working-day adjustment across countries. As not all Member States correct for working-day effect, the quarterly EU/EA aggregates are not fully working-day corrected. Given that all of the bigger Member States apply a working-day correction, no significant working-day effect is expected to remain in the quarterly EU/EA aggregates.

SEASONAL ADJUSTMENT METHOD BY COUNTRY

Country	Method	Working day correction
Belgium	X-11	Yes
Bulgaria	No seasonal adjustment applied yet	---
Czech Republic	Tramo-Seats	Yes
Denmark	X11	No
Germany	X12 /Berlin BV.1 for most important aggregates	Yes
Estonia	X12	No
Ireland	X11	No
Greece	X12	No
Spain	Tramo-Seats	Yes
France	X11	Yes
Italy	Tramo-Seats	Yes
Cyprus	Tramo-Seats	No
Latvia	Tramo-Seats	No
Lithuania	Tramo-Seats	Yes
Luxembourg	X12	No
Hungary	Tramo-Seats	Yes
Malta	Tramo-Seats	Yes
The Netherlands	X12	Yes
Austria	Tramo-Seats	Yes
Poland	Tramo-Seats	Yes
Portugal	X11	No
Romania	No seasonal adjustment applied yet	---
Slovenia	Tramo-Seats	Yes
Slovakia	Tramo-Seats	No
Finland	Tramo-Seats	Yes
Sweden	Tramo-Seats	Yes
United Kingdom	X11	Yes