MONTHLY SEASONAL ADJUSTMENT OF EURO AREA BALANCE OF PAYMENTS STATISTICS

Introduction

Seasonal patterns are often so large that they hide other characteristics of the data that are of interest to analysts of economic trends. For example, if the seasonal effect changes each month – inflating and dampening figures – it can be difficult to detect the general direction of monthly developments in a time series (e.g. increases, decreases, turning points, a lack of changes, or consistency with other economic indicators). Seasonal adjustment makes it easier to compare data for a given month with those for previous and subsequent months.

The aim of the ECB's monthly seasonal adjustment is to estimate and remove seasonal effects from time series in order to better reveal non-seasonal features. Seasonal effects are reasonably stable in terms of their annual timing, direction and magnitude. Possible causes of seasonality include natural factors (e.g. the weather), administrative measures (e.g. the start and end of the school year), and social, cultural or religious traditions (e.g. fixed holidays such as Christmas). Effects related to trading days or moving holidays such as Easter are not stable in terms of their annual timing, but if they are statistically significant they can hamper the comparison of series values. If these effects are detected, they should be estimated and removed before conducting the pure seasonal adjustment.

This note describes how seasonal adjustment is performed for euro area monthly balance of payments (b.o.p.) data.

- Section I describes the overall calculation method.
- Section II provides the specifications of the ARIMA model used and describes the estimation of the parameters.
- Section III summarises the monthly procedures followed for seasonal adjustment.

I. Description of the seasonal adjustment of the euro area b.o.p. current account

Seasonally adjusted data compiled by the ECB are provided for the total b.o.p. current account and its main sub-items (i.e. goods, services, primary income and secondary income) in the ECB's Statistics Bulletin, Table 1 of Section 7.2, as well available in time series format in the ECB's Statistical Data Warehouse. The approach adopted is based on multiplicative decomposition using X-12-ARIMA/X-13ARIMA-SEATS or TRAMO/SEATS methods in the JDemetra+ platform.[1] The seasonally adjusted series are obtained by removing any significant seasonal and calendar effects from the raw series. The multiplicative approach means that the adjustment is made by dividing the raw series by the product of the trading day, holiday and seasonal factors. The product factors are usually called "combined" factors, although they are referred to here as "seasonal" factors for the sake of simplicity.

The adjustments are made directly for the euro area aggregates.[2] The seasonally adjusted euro area current account series for credits and debits are obtained indirectly by aggregating their seasonally adjusted components: goods, services, primary income and secondary income. Raw data are pre-adjusted to take account of any significant working day effects or other effects (for example the effect of Easter – i.e. the fact that the level of daily activity changes in the run-up to Easter and remains at this new level until a few days after Easter). The working day adjustment for goods and services is corrected for national public holidays – i.e. the number of working days per month for the euro area is calculated as a weighted average of the number of working days adjusted for public holidays in each country.

Due to the methodology followed when estimating seasonal factors, the sum of the resulting seasonally adjusted monthly data over a 12-month period, may not fully match the published non-seasonally adjusted annual aggregate.

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[1] JDemetra+ (JD+) is open source, platform independent, extensible software for seasonal adjustment (SA) and other related time series problems developed by the National Bank of Belgium The tool includes the TRAMO/SEATS and X-12-ARIMA/X-13ARIMA-SEATS methods. The X-12-ARIMA/X-13ARIMA-SEATS method of seasonal adjustment has been developed by the US Census Bureau. The TRAMO-SEATS method of seasonal adjustment has been developed by Professor Maravall and Dr Gomez. "TRAMO" stands for "Time Series Regression with ARIMA Noise, Missing Observations and Outliers". "SEATS" stands for "Signal Extraction in ARIMA Time Series". More detailed information is available in "Seasonal adjustment of monetary aggregates and HICP for the euro area", which was published by the ECB in August 2000 and is available on the ECB's website.

[2] Further information about direct and indirect adjustment for euro area exports and imports of goods and services can be found at: http://www.ecb.europa.eu/stats/pdf/bop/sa_methods.pdf?4f4b25cc76095e0febdb04210846f724. A summary of this note can be found in Box 1 of the 2009 quality report on the euro area balance of payments and international investment position statistics, which was published in March 2010: http://www.ecb.europa.eu/euro area 2009 Quality Report.pdf

II. Specifications of the model

Twice a year, the models for each of the series are re-estimated. This practice coincides with the incorporation of major revisions to the euro area b.o.p. aggregates, and is conducted on the basis of the comprehensive set of diagnostics and quality assessment checks provided by both aforementioned applications, as well as graphical analysis. On the basis of the model selected, filters, outliers, regression parameters and seasonal and trading day factors are estimated for the complete time series (i.e. from January1999 onwards) and seasonal factors are forecasted for the following six months ("frozen factors").

III. Monthly seasonal adjustment process (concurrent factors versus frozen factors)

In principle, the factors forecasted in April and October, are used in the seasonal adjustment procedure for the following six months. After the euro area aggregates have been compiled, the data are seasonally adjusted using the corresponding frozen factors.

For quality checking purposes, additional procedures are carried out on a monthly basis in order to re-estimate seasonal factors, incorporating all the new information available. These procedures comprise the re-estimation of parameters and factors for the specified model using the most up-to-date observations (including the latest updates and revisions to raw data received in accordance with revision practices). These re-estimated factors are called "concurrent" factors, while the factors estimated and forecasted previously are labelled "frozen" factors.

In principle, concurrent factors are expected to differ from frozen factors because they are calculated using a different dataset, one that incorporates updates and revisions. However, the differences should not be very significant for the most recent period, and should be even smaller for older data. Where differences appear sizeable, it is necessary to consider the reasons (short time series, unstable seasonal patterns, large revisions to raw data, new observations with unexpected values, turning points, etc.). Sizeable differences may reflect the fact that the estimation of the model's parameters is no longer optimal owing to the incorporation of new information in the estimation process. In the event of sizeable or meaningful discrepancies between the "frozen" and "concurrent" factors for a certain item, the concurrent factors may – after careful analysis of the relevant factors and models – be used to calculate the seasonally adjusted series and revise the entire seasonally adjusted series (i.e. from January 1999 onwards). In that case, the new forecasted factors would be used up to the next regular revision date (i.e. April or October). New information

could also indicate/confirm that: (i) the seasonal pattern has changed; and (ii) forecasted seasonal factors have become less reliable. Changes to the pattern of seasonal factors may reflect:

(i)   changes to the basic behaviour of economic agents;

(ii)   changes to the regulatory and administrative environment which can affect data (e.g. a change to the calendar for the payment of taxes to the European Union);

(iii)   changes to the methodology applied in the compilation of the data which are not applied for all historical observations, leading to a break in the series.

In such cases, adjustments need to be made either to the specifications of the model or to the estimation of factors. These problems can be detected in the monthly diagnostics, which provide information on:

(i)   the correctness of the ARIMA model for each series after new information has been included;

(ii)   new outliers detected;

(iii)   the existence of any problems related to seasonality;

(iv)   whether new raw data have been adequately predicted by the specified model, or otherwise.

Sizeable discrepancies between concurrent and frozen factors are monitored closely, the reasons for discrepancies are analysed, and action is taken only if a clear and stable trend is observed which confirms a change in seasonal behaviour.

Additional information:

For further information, please consult the following sources:

- Technical Notes in the ECB's Statistics Bulletin:
  http://sdw.ecb.europa.eu/reports.do?node=10000022
- ECB publication "Seasonal adjustment of monetary aggregates and HICP for the euro area" (August 2000): http://www.ecb.europa.eu/pub/pdf/other/sama0008en.pdf;
- ECB publication "Seasonal adjustment" (November 2003):
  http://www.ecb.europa.eu/pub/pdf/other/statseasonaladjustmenten.pdf;
- ESS guidelines on seasonal adjustment (2015 edition):
  http://ec.europa.eu/eurostat/documents/3859598/6830795/KS-GQ-15-001-EN-N.pdf