

Seasonal Adjustment Center of Excellence

**JD+ Quality Report For Eurostat Job Vacancy Survey**

**Plug-In Version 2**

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# Introduction

Job vacancy statistics (JVS) provide information on the level and structure of labor demand. Eurostat publishes quarterly data on the number of job vacancies and the number of occupied posts which are collected under the JVS framework regulation and the two implementing regulations: the implementing regulation on the definition of a job vacancy, the reference dates for data collection, data transmission specifications and feasibility studies, as well as the implementing regulation on seasonal adjustment procedures and quality reports. Eurostat disseminates also the job vacancy rate which is calculated on the basis of the data provided by the countries.

A quality report has been adopted by the working group on labor market statistics in order to harmonize the seasonal adjustment of JVS series. The template includes the following information:

* The time span and number of observations adjusted;
* Whether a direct or indirect method was used in case of aggregated NACE sections;
* The list of detected outliers with their type;
* The presence/absence of calendar effects (trading-working day, leap year effect, Easter effect etc.);
* The identified SARIMA model;
* The result of the combined seasonality test;
* A residual seasonality test;
* A residual trading-day test;
* The overall quality of the adjustment (JD+ diagnostic);
* The maximum relative adjustment of the original series (in %), due to seasonal adjustment, calculated over all observations;
* And if X12-related methods are used: the applied trend and seasonal filters as well as Q statistics.

Most of this information could be created in JDEMETRA+ and in April 2016, the SACE developed for Eurostat a plug-in for version 2.1 which facilitates the production of the above-mentioned required information.

# Towards a Version 2 of the JVS Plug-In

The following suggestions were made by Eurostat for a second version of the plug-in, with some comments from the SACE:

1. *Adding a seasonality test at the beginning of the report. Ideally, this simple or composite test should be acknowledged by both the X12 and TRAMO-SEATS communities. One idea is to use an uneven number of tests and decide based on the majority rule;*

Comment:

We implement a combined test based on 3 tests: the Fisher test, the Kruskal-Wallis test and the Ljung-Box test. We use the following rule:

* A score is affected to each test: 1 if the p-value is < 0.05, 0.5 if the p-value is between 0.05 and 0.10 and 0 if the p-value is larger than 0.10.
* The combined test is based on the sum of the 3 scores. If the sum is larger than or equal to 2, the seasonality is present ("Yes"); if the sum is smaller than or equal to 1, the seasonality is not present ("No"); between 1 and 2, the presence of seasonality is "Uncertain".

1. Adding a test for calendar effect;

Comment:

The JD+ Fisher joint test has been added to the plug-in and is reported as "Yes" if the p-value of the test is smaller than 0.05 and "No" otherwise. This test is based on the set of regressors and the ARIMA model used in the detection.

1. Adding an indication if seasonal and/or calendar adjustments were made with a precise coding such as ***csa***: both calendar and seasonal effect adjustments; ***ca***: only calendar adjustment; ***sa***: only seasonal adjustment; ***nsa***: no adjustment;

Comment:

This is a difficult point as the definition of the modalities is not clear enough. After dicussion, we have implemented the following definitions:

A series is said Calendar Adjusted (CA) if the number of TD regressors used by JD+, including the Leap Year regressor, is greater than 0 or if an Easter effect has been detected.

A series is said Seasonally Adjusted if the variance of the seasonal component output by JD+ is not equal to 0.

1. Changing the residual seasonality test: it should not be the Ljung-Box test as it is now but one available in the diagnostics of JD+ (F-test);

Comment:

The Fisher test is now used.

1. Using Q-statistics only if the X12 method is used and, if possible, translate them into e.g. "good", "poor", "uncertain"

Comment:

The only "official" threshold for the Q-statistic is that it reveals no problem if less than 1. We implement a slight different (and purely ad-hoc) rule: "good" if Q < 0.95, "uncertain" if 0.95 <= Q <= 1.05 and "poor" if Q > 1.05.

Note that if we want to have different indicators for TS and X13, we must at this stage derive 2 different plug-ins.

1. Likewise, using for the quality assessment of TRAMO-SEATS: "good", "uncertain" and "poor" (instead of "severe", if possible) and make it appear only if this method has been used

Comment:

The referred indicator is the JD+ Global Quality Adjustment Indicator which is valid for both methods (X13 and TS). It is true anyway that it is "Tramo-Seats oriented" in the sense that Reg-Arima diagnostics contribute a lot to this diagnostic.

Note that if we want to have different indicators for TS and X13, we must at this stage derive 2 different plug-ins.

1. Adding the calculation for the 1st order autocorrelation of the 1st differences of SA data calculated as the autocorrelation between (SAq - SAq-1) and (SAq-1 - SAq-2). Highlight it in red when the autocorrelation is significantly negative.

Comment:

It has been done. Highlighting in red the autocorrelation when it is negative and significant is not possible. But an indicator ("Warning") is now output with the autocorrelation in this case. Note that is likely that you find quite a lot of significant negative autocorrelations as they are a direct consequence of the adjustment. At the moment, the significance of the autocorrelation is judged with a Ljung-Box test at 5%.

1. Adding the standard deviation of the irregular component (as an indicator for the volatility of the underlying series) defined here as: (SA – Trend).

Comment:

The indicator has been implemented.

1. Adding a legend for each indicator (if possible)

Comment:

It is not possible but the names of the indicators in the report can be (have been) made more explicit and a complete documentation is provided.

# Annex 1: The First Quality Report

## Contents

|  |  |
| --- | --- |
| Variable | Definition |
| Series | Name of the series |
| Method | Seasonal adjustment method used |
| Period | Periodicity of the series (Monthly = 12; Quarterly = 4) |
| Nobs | Number of observations |
| Start | Starting date |
| End | Ending date |
| Log-Transformation | Decomposition model. If "Yes":   * A logarithmic transformation is done by Tramo-Seats for the complete adjustment; * A logarithmic transformation is done by X13 for the Reg-Arima part and a multiplicative model is used for the decomposition per se. |
| P, D, Q, BP, BD, BQ | Orders of the ARIMA model |
| LeapYear | Presence of a Leap Year effect (Yes or No) |
| MovingHoliday | Presence of an Easter effect (Yes or No) |
| NbTD | Number of trading-day regressors (including the Leap Year regressor) |
| Noutliers | Total number of outliers |
| Outlier1, Outlier2, Outlier3 | The 3 main outliers. The importance is measured by the absolute value of the t-statistic associated with the outlier. |
| CombinedTest\_SI | The combined seasonality test measures the significance of the seasonal component. It is performed on the Seasonal-Irregular component and is a mixed between several tests: a Fisher test for stable seasonality, a Kruskal-Wallis test for stable seasonality and a Fisher test for moving seasonality. Originally developed for X13, it is here adapted to TS also. |
| Residual Seasonality | Presence of residual seasonality in the SCA series. The test used here is based on Maravall's QS statistic. The test is done at the 5% level. |
| Residual TD Effect | Presence of residual trading-day effect in the SCA series. The test used here is a Fisher test based on the default Gregorian trading-day regressors. The test is done at the 5% level. |
| Q-Stat | Final Q statistics (available for X13 only) |
| Final Henderson Filter | Length of the Henderson filter used in the final estimation of the trend-cycle in table D12 (available for X13 only). |
| Stage 2 Henderson Filter | Length of the Henderson filter used in the provisional estimation of the trend-cycle in table D6 (available for X13 only). |
| Seasonal Filter | Seasonal filter used in the final estimation of the seasonal component in table D10 (available for X13 only). |
| Quality | JD+ global quality assessment |
| Max-Adj | Indicator of the "size" of the seasonal and calendar adjustment. |

## Examples

The data used for the examples are in the Excel file "SeriesIPI\_fr.xlsx".

Default specifications have been used to run X13 (RSA5c) and Tramo-Seats (RSAfull).



 

# Annex 2: The second quality report

## Contents

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| --- | --- |
| Variable | Definition |
| Series | Name of the series |
| Method | Seasonal adjustment method used |
| Period | Periodicity of the series (Monthly = 12; Quarterly = 4) |
| Nobs | Number of observations |
| Start | Starting date |
| End | Ending date |
| Adjustment | Kind of adjustment performed: NSA(non seasonally and calendar adjusted), CA (calendar adjusted) or SCA (seasonally and calendar adjusted) |
| Presence of Seasonality in the raw series | Result (Yes, No, Uncertain) of a a combined test based on 3 tests: the Fisher test, the Kruskal-Wallis test and the Ljung-Box test. |
| Presence of TD effects | Result (Yes or No) of the JD+ Fisher joint test. |
| Log-Transformation | Decomposition model. If "Yes":   * A logarithmic transformation is done by Tramo-Seats for the complete adjustment; * A logarithmic transformation is done by X13 for the Reg-Arima part and a multiplicative model is used for the decomposition per se. |
| ARIMA model | Orders *(p,d,q)(P,D,Q)* of the ARIMA model |
| LeapYear | Presence of a Leap Year effect (Yes or No) |
| MovingHoliday | Presence of an Easter effect (Yes or No) |
| NbTD | Number of trading-day regressors (including the Leap Year regressor) |
| Noutliers | Total number of outliers |
| Outlier1, Outlier2, Outlier3 | The 3 main outliers. The importance is measured by the absolute value of the t-statistic associated with the outlier. |
| Residual Seasonality | Presence of residual seasonality in the SCA series. The test used here is a Fisher test. The test is done at the 5% level. |
| Residual TD Effect | Presence of residual trading-day effect in the SCA series. The test used here is a Fisher test based on the default Gregorian trading-day regressors. The test is done at the 5% level. |
| Q-Stat | Final Q statistics (available for X13 only) |
| Final Henderson Filter | Length of the Henderson filter used in the final estimation of the trend-cycle in table D12 (available for X13 only). |
| Stage 2 Henderson Filter | Length of the Henderson filter used in the provisional estimation of the trend-cycle in table D6 (available for X13 only). |
| Seasonal Filter | Seasonal filter used in the final estimation of the seasonal component in table D10 (available for X13 only). |
| Quality | JD+ global quality assessment |
| Autocorrelation of order 1 of the SA series | Reports the autocorrelation of order 1 of the series |
| Ljung-Box test (P\_value) | P-value of the Ljung-Box test to check if the autocorrelation is significant. |
| Autocorrelation negative and significant | A warning is issued when the autocorrelation is negative and significant. |
| Irregular standard deviation | Standard deviation of the irregular defined as (SA - Trend) |
| Max-Adj | Indicator of the "size" of the seasonal and calendar adjustment. |

## Example

 