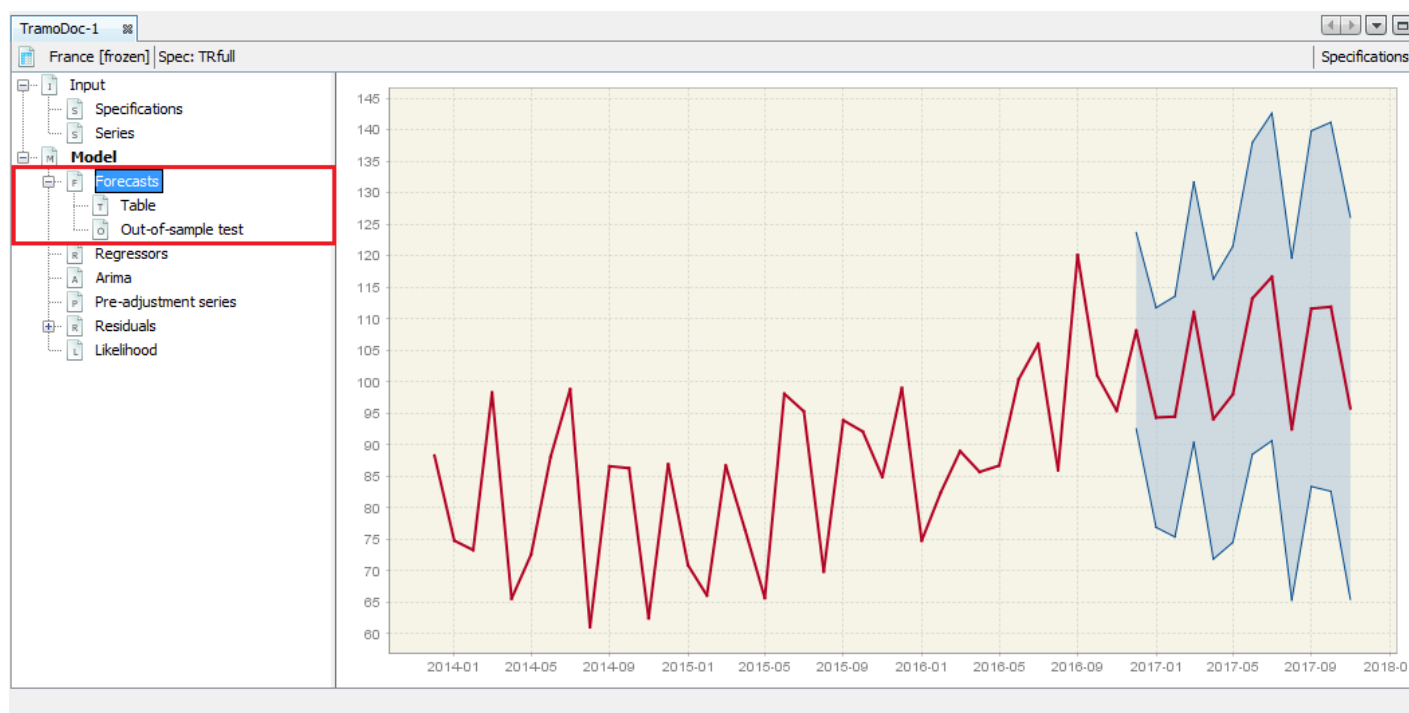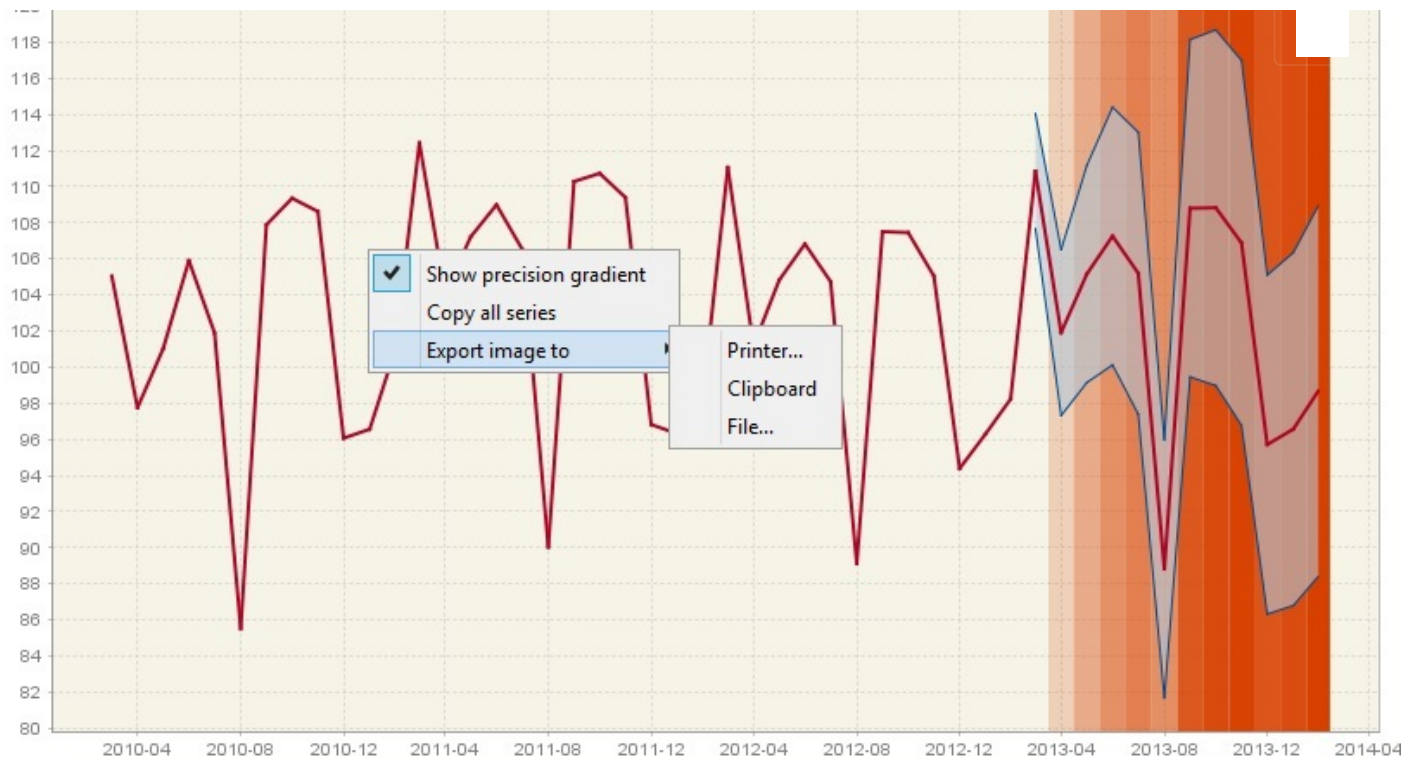# Forecasts

One of the important steps in of the a validation of the model is an analysis of the out-of-sample forecasts[1]. Using the identified TRAMO model JDemetra+ produces the point forecasts, the forecast standard errors, and a prediction interval. The prediction interval on the transformed scale is denoted as $point\ forecast \pm K \times forecast\ standard\ error$, where K is the standard error multiplier taken from a table of the normal distribution, corresponding to the specified coverage probability. JDemetra+ displays 95% prediction interval, which corresponds to $K = 1.96$. The forecasting procedure assumes that no outliers appear in the forecasting period.

The graph presenting time series together with the values forecasted for the next year and corresponding prediction interval can be found directly in the *Forecast* node.

The *Forecast* panel with visual presentation of the estimated forecasts

The local menu offers the copy and export options, including sending the graph to the printer and save the graph as clipboard or a file in the PNG format. The *Show precision gradient* option highlights the precision of the estimation using different shades of orange. As a rule, the precision decreases in time, which is depicted by gradually more intense orange. The *Copy all series* option enables the user to export time series together with the forecasts and the prediction intervals to the another application.

The *Forecast* panel with visual presentation of the precision of the estimated forecasts

The *Forecast* node is divided into two subsections: *Table* and *Out-of-sample test*. The *Table* section presents the forecasts as a table.

A local menu for the content of the *Table* panel

A standard local menu, which is available for this table, includes:

- **Select all** – copies series and allows it to be pasted to the another application e.g. into Excel.

- **Transpose** – changes the orientation of the table from horizontal to vertical.

- **Reverse chronology** – displays the series from last to first observation.

Single time series – when it is marked observations are divided by calendar's periods. Otherwise, ~~~are~~~ presented as a standard time series.

- **Edit format** – allows changing the format used for displaying dates and values.

- **Use color scheme** – allows series values to be displayed in colour.

- **Color scheme** – allows for a choice of colour scheme from a pre-specified list.

- **Show bars** – presents values in a table as horizontal bars.

- **Show crosshair** – highlights an active cell.

- **Zoom** – an option for modifying the chart size.

Paste and **Clear** are disabled as they are not relevant for this view.

When a time series is marked, a local menu offers the following options:

- **Open** – opens selected time series in the new window that contain *Chart* and *Grid* panels.

- **Open with** – opens the time series in a separate window according to the user choice (*Chart & grid* or *Simple chart*). The *All ts views* option is not currently available.

- **Save** – saves the marked series in a spreadsheet file or in a text file.

- **Rename** – enables the user to change the time series name.

- **Copy** – copies series and allows it to be pasted to another application e.g. into Excel.

- **Paste** – pastes the time series previously marked.

- **Select all** – selects all time series presented in the graph.

- **Transpose** – changes the orientation of the table from horizontal to vertical.

- **Reverse chronology** – displays the series from the last to the first observation.

- **Single time series** – removes from the table all time series apart from the selected one.

- **Clear** – removes all time series from the chart.

- **Edit format** – enables the user to change a data format.

- **Use color scheme** – allows the series to be displayed in colour.

- **Color scheme** – allows the colour scheme used in the graph to be changed.

- **Show bars** – presents values in a table as horizontal bars.

- **Show crosshair** – highlights an active cell.

- **Zoom** – option for modifying the chart size.

A local menu for a selected series in the *Table* panel

The *Out-of-sample test* section presents two tests. These tests check the performance of the out-of-sample forecasts, by comparison of forecast limits and the data. To perform this exercise, first the historical data sample is divided into a fit period (whole estimation span excluding last 18 observations) and a test period (last 18 observations). For the fit period the model is automatically selected and its parameters are fixed. The model is used to produce a one-period-ahead forecast (i.e. the forecast for $n+1$, where n is the length of the time series). This estimation is performed 18 times for the gradually extended time series.

The first test compares forecast errors with the standard error of the in-sample residuals. The goodness of fit is assessed by checking if the mean of the forecast errors can be assumed zero.

The second test compares mean squared of forecast error with mean squared of in-sample residuals. The result of the test is accepted when these two indicators are close to each other. The lack of consistency is a clear evidence of a model inadequacy.

Europe - European Union (27 countries) | Spec: TRfull | S   ations

- Input
  - Specifications
  - Series
- **Model**
  - Forecasts
    - **Out-of-sample test**
  - Regressors
  - Arima
  - Pre-adjustment series
  - Residuals
  - Likelihood

Out of sample test

Model re-estimated on Linearized series for first 127 observations and 18 One-Period-Ahead Forecasts computed with model fixed.

Mean

Comparison between forecast errors (last 18 observations) and residuals (in-sample)
In sample standard eror of the residuals is 0,0117

	Mean	P-Value
In sample	0,0001	0,9205
Out of sample	-0,0046	0,0986

Mean of forecast errors can be assumed zero

MSE

Comparison between mean squared of forecast errors (last 18 observations) and mean squared of residuals (in-sample)
The test is strongly sensitive to the possible non-normality of the residuals.

	MSE
In sample	0,0001
Out of sample	0,0002

Test for equality of MSE = 1,5326
Distribution: $F_{(18,127)}$
P-Value: 0,0890

Mean Squared of forecast errors can be assumed close to the Mean Squared of in sample residuals.

An example of out-of-sample test results

1. PEÑA, D. (2001). ↵