Journal of Statistical Software

MMMMMM YYYY, Volume VV, Issue II. *doi: 10.18637/jss.v000.i00*

RJDemetra: A R Interface To JDemetra+ Seasonal Adjustment Software

Anna Michalek
European Central Bank

Alain Quartier-La-Tente
Insee

Abstract

The abstract of the article.

Keywords: R, seasonal adjustment, time series.

1. Introduction

The package **RJDemetra** provides a R interface to the seasonal adjustment software JDemetra+. Note that, JDemetra+ being implemented in Java, **RJDemetra** relies on the **rJava** package and Java SE 8 or later version is required. The two leading seasonal adjustment methods TRAMO/SEATS+ and X-12ARIMA/X-13ARIMA-SEATS can be used with all the specifications defined in JDemetra+.

1.1. Seasonal adjustment in brief

Mention the two SA methods and the two steps of adjustment: pre-adjustment and the decomposition. Briefly present the differences in the decomposition.

2. RJDemetra basics

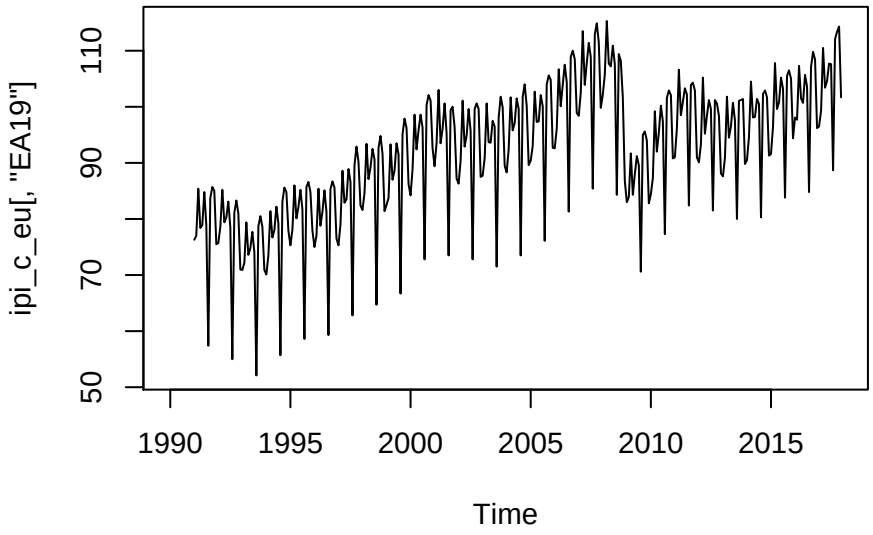
The **RJDemetra** package alows to:

- create and modify model specifications
- create and modify models
- import/export JDemetra+ workspaces

2.1. Dataset

In this package we include the sts_inpr_m database of Eurostat, which contains the monthly industrial production indices in manufacturing in the European Union. It contains 37 time series from january 1990 to december 2017 which are considered to be affect by seasonal and working day effects. The data is a `ts` object and can be accessed using the `ipi_c_eu` object. The following snippet of code plot the industrial production index of the Euro aera:

```
R> library(RJDemetra)
R> plot(ipi_c_eu[, "EA19"])
```



3. Estimate a predefined regarima and SA model

The package allows to estimate regarima and SA models using predefined specifications.

```
R> library(RJDemetra)
R> myseries <- ipi_c_eu[, "FR"]
R> mysa <- x13_def(myseries, spec=c("RSA5c"))
```

4. SA object structure

Table 1: SA object structure

When adjusted with:

			x13/x13_def	*tramoseats/tramoseats_def*
Object	Level	Type	Class	Class
sa_object	0	list	SA, X13	SA, TRAMO_SEATS
regarima	**1**	**list**	**regarima, X13**	**regarima, TRAMO_SEATS**
specification	2	list		
estimate	3	data.frame		
transform	3	data.frame		
regression	3	list		
userdef	4	list		
specification	5	data.frame		
outliers	5	data.frame or NA(empty)		
variables	5	list		
series	6	mts, ts, matrix or NA(empty)		
description	6	data.frame or NA(empty)		
trading.days	4	data.frame		
easter	4	data.frame		
outliers	3	data.frame		
arima	3	list		
specification	4	data.frame		
coefficients	4	data.frame or NA(empty)		
forecast	3	data.frame		
span	3	data.frame		
arma	2	vector - numeric		
arima.coefficients	2	matrix		
regression.coefficients	2	matrix		
loglik	2	matrix		
model	2	list		
spec_rslt	3	data.frame		
effects	3	mts, ts, matrix		
residuals	2	ts		
residuals.stat	2	list		
st.error	3	numeric		
tests	3	data.frame	regarima_rtests, data.frame	
forecast	2	mts, ts, matrix		
decomposition	**1**	**list**	**decomposition_X11**	
specification	2	data.frame	X11_spec, data.frame	
mode	2	character		
mstats	2	matrix		
si_ratio	2	mts, ts, matrix		
s_filter	2	vector - character		
t_filter	2	character		
decomposition	**1**	**list**		**decomposition_SEATS**
specification	2	data.frame	seats_spec, data.frame	
mode	2	character		
model	2	list		
model	3	matrix or empty list		
sa	3	matrix or empty list		
trend	3	matrix or empty list		
seasonal	3	matrix or empty list		
transitory	3	matrix or empty list		
irregular	3	matrix or empty list		
linearized	2	mts, ts, matrix		
components	2	mts, ts, matrix		
final	**1**	**list**	**final**	
series	2	mts, ts, matrix		
forecasts	2	mts, ts, matrix		
diagnostics	**1**	**list**	**diagnostics**	
variance_decomposition	2	data.frame		
combined_test	2	list	combined_test	
tests_for_stable_seasonality	3	data.frame		
combined_seasonality_test	3	character		

residuals_test	2	data.frame	
user_defined	**1**	**list**	**user_defined**

4.1. Regarima

Here we can also present the output: print and graphs.

```
R> library(RJDemetra)
R> myseries <- ipi_c_eu[, "FR"]
R> mysa <- x13_def(myseries, spec=c("RSA5c"))
R> mysa$regarima

y = regression model + arima (0, 1, 1, 0, 1, 1)
Log-transformation: no
Coefficients:
          Estimate Std. Error
Theta(1)   -0.5270      0.048
BTheta(1)  -0.4865      0.051

              Estimate Std. Error
Monday       -0.133839      0.164
Tuesday      -0.002384      0.163
Wednesday     0.241712      0.163
Thursday     -0.531275      0.163
Friday        0.432474      0.164
Saturday      0.152956      0.163
Leap year    -0.045977      0.501
Easter [1]   -1.094082      0.335
LS (11-2008) -8.441602      1.307
LS (1-2009)  -7.274012      1.306
LS (5-2008)  -5.020079      1.257


Residual standard error: 1.665 on 323 degrees of freedom
Log likelihood = -624.7, aic =  1277 aicc =  1279, bic(corrected for length) = 1.252

R> library(RJDemetra)
R> myseries <- ipi_c_eu[, "FR"]
R> mysa <- x13_def(myseries, spec=c("RSA5c"))
R> mysa$regarima

y = regression model + arima (0, 1, 1, 0, 1, 1)
Log-transformation: no
Coefficients:
          Estimate Std. Error
Theta(1)   -0.5270      0.048
```

```
BTheta(1)  -0.4865      0.051

              Estimate Std. Error
Monday       -0.133839      0.164
Tuesday      -0.002384      0.163
Wednesday     0.241712      0.163
Thursday     -0.531275      0.163
Friday        0.432474      0.164
Saturday      0.152956      0.163
Leap year    -0.045977      0.501
Easter [1]   -1.094082      0.335
LS (11-2008) -8.441602      1.307
LS (1-2009)  -7.274012      1.306
LS (5-2008)  -5.020079      1.257


Residual standard error: 1.665 on 323 degrees of freedom
Log likelihood = -624.7, aic =  1277 aicc =  1279, bic(corrected for length) = 1.252
```

4.2. Decomposition

4.3. Final

4.4. Diagnostics

4.5. user defined

5. Model specification: creation and modification

Like in JDemetra+, the **RJDemetra** package contains pre-defined specifications that can be used to:

- pre-adjust a timeseries with TRAMO (`regarima_def_tramoseats()`) or RegARIMA (`regarima_def_x13()`);
- seasonally adjust a time series with TRAMO/SEATS (`tramoseats_def()`) and X-13ARIMA-SEATS (`x13_def()`).

They are described in tables 2 and 3. They correspond to the most commonly used specifications and users are recommended to start their analysis with one of those specification. Pre-defined specifications are identical for pre-adjustment and for seasonal adjustment.

Table 2: Pre-defined specification for TRAMO and TRAMO-SEATS

Specification								
TRAMO	TRAMO-SEATS	Transformation	Pre-adjustment for leap-year	Working days	Trading days	Easter effect	Outliers	ARIMA model
TR0	RSA0	no	no	no	no	no	no	(0,1,1)(0,1,1)
TR1	RSA1	test	no	no	no	no	test	(0,1,1)(0,1,1)
TR2	RSA2	test	no	test	no	test	test	(0,1,1)(0,1,1)
TR3	RSA3	test	no	no	no	no	test	AMI
TR4	RSA4	test	no	test	no	test	test	AMI
TR5	RSA5	test	no	no	yes	test (Standard)	test	AMI
TRfull (default)	RSAfull (default)	test	yes	no	test	test (Include Easter)	test	AMI

Table 3: Pre-defined specification for RegARIMA and X-13ARIMA-SEATS

Specification								
RegARIMA	X-13ARIMA-SEATS	Transformation	Pre-adjustment for leap-year	Working days	Trading days	Easter effect	Outliers	ARIMA model
RG0	X11	no	no	no	no	no	no	(0,1,1)(0,1,1)
RG1	RSA1	test	no	no	no	no	test	(0,1,1)(0,1,1)
RG2c	RSA2c	test	test	test	no	test	test	(0,1,1)(0,1,1)
RG3	RSA3	test	no	no	no	no	test	AMI
RG4c	RSA4c	test	test	test	no	test	test	AMI
RG5c (default)	RSA5 (default)	test	test	no	test	test	test	AMI

The model specification can be defined from an existing model specification or an estimated model, as each of the estimated model contains also its specification.

5.1. X13

5.2. TRAMOSEATS

5.3. Regarima

5.4. Wrong specifications corrections

Parler des corrections automatiques ?

6. Manipulate JDemetra+ workspaces

Mise en garde sur ce que l'on ne peut pas faire (problèmes d'imports)

Affiliation:

Journal of Statistical Software http://www.jstatsoft.org/
published by the Foundation for Open Access Statistics http://www.foastat.org/
MMMMMM YYYY, Volume VV, Issue II *Submitted:* yyyy-mm-dd
doi:10.18637/jss.v000.i00 *Accepted:* yyyy-mm-dd