Generalitat de Catalunya Institut d'Estadística de Catalunya

Evolving with JDemetra+

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Idescat (Statistical Institute of Catalonia) has combined the graphical interface of JDemetra + with custom extensions of the released R-interfaces (jdemetra-R, JDLight and RJDemetra) to obtain a solid architecture for a **medium-scale statistical production**.

QUARTERLY NATIONAL ACCOUNTS – GDP FLASH

R: workspaces reading and

aggregates computation

SCRIPT FOLDER (RELATIVE)

setwd(data.path)



- Manual seasonal adjustment with TSW.
- Temporal disaggregation in Matlab (E.M. Quilis). - Process driven by Excel sheets and formulas.

2018 Process driven by R scripts: first stage.

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AGR > agr_pc (frozen)	Start			
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FIN ► fin_pc (frozen) PRO ► pro_pc (frozen) Stm SNM ► snm_pc (frozen)	Edit Clear selection	AGR ► agr_pc [froze	+ Arima parameters + Last outliers	
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	PIB PC Variation information Variation information PIB PK Variation information Variation Vari	leleinenlealn
DATA FOLDER (RELATIVE) lata.path<-paste0(root.path,"/dades")	Cannet proc Cannet bed County Cannet Cannet Cannet Cannet Cannet Cannet Fred C	Pral Draral
<pre>SCRIPT FOLDER (RELATIVE) script.path<-paste0(root.path,"/DEV")</pre>	2 19 19 5 10 5 19 10 19 10 10 10 10 10 10 10 10 10 10 10 10 10	-3,5 -4,4 5,7 -4,5 -4,5 -4,3 -5,7 -4,1
JD+/R INTERFACE FILES (INSIDE SCRIPT PATH, RELATIVE) d.path<-paste0(script.path,"/jdemetra-R-master/R files")	1980 685, 6800 <th< td=""><td>5,5 4,1 4,5 4,1 5,2 4,1 5,2 4,1</td></th<>	5,5 4,1 4,5 4,1 5,2 4,1 5,2 4,1
<pre>wetwd(script.path) ource("helperJD.R") ource("nTRI.functions.R") setwd(data.path)</pre>		0 0 40 0 50 0 40 0 40 0 40 0
ile.in<-paste0("PIB",cntry,"_",side,"_trim_MG.xlsx") # INPUT FILE: SERIES & PARAM: ile.out<-paste0("PIB",cntry,"_",side,"_PROCESSED.xlsx") # OUTPUT FILE :heet.def<-paste0("variables_",cntry) # Var definition's Worksheet	agr pes ind con cth tic pro inm fin snm art	imp
<pre>wetwd(jd.path) ource("jd_init.R");source("jd_ts.R");source("jd_sa.R"); ource("jd_ws.R");source("jd_sa.R");source("jd_spec.R"); ource("jd_regression.R");source("jd_calendars.R");source("jd_sa_advanced.R")</pre>		iécésé Kesses
Construction: deflator q-q growth rates (JDemetra+)	Producte interior brut (PIB) corregit d'estacionalitat. Índexs en volum. Catalunya. T1/2000-T2/2019	1/4
δ . φ . νps], FUN=function(x)jd_processing_series . . </td <td>110,0</td> <td>/</td>	110,0	/
A B C D E F G F 1 VAB STEP type BIC adj.R2 rho jb		
2 agr PC RAW 6,5449 -0,0455 0 0,5343	105.0	
A A A A A A A A A A A A A A A A A A A		
5 1 1 4 agr PC SA 6,5467 -0,0474 0 0,5306		
○	c 100.0	
8 6 agr PK CT 3,3447 -0,0523 0 0,6189		
O V 7 agr PK SA 3,345 -0,0527 0 0,6173		
8 pes PC RAW 0,8437 0,4269 0 0,2739		
9 pes PC CT 0,7015 0,5028 0 0,1103	93.0	
10 pes PC SA 0.7345 0.4861 0 0.2525		

GDP NOWCASTING

- Development of 2 Factor Models (FM) inspired on 2016
 - the FASE model (spanish AIReF)
 - the JDemetra+ plugging
- Development of 3 bridges to predict GDP from factor(s). 2017 Implementation of a battery of connectors for daily downloads.
- New FM estimated from *MARSS* and *nowcasting* R-packages. 2018

IASS imputation





Nowcast generation based on a suite of 12 models (combination or selection?).

my.spec<-JDLight::spec_create();JDLight::spec_strs(my.spec,"tramo.outlier.types" ,c("A0","LS","TC","50"))</pre> sa.objects<-invisible(lapply(ts.list,FUN=function(serie)sa_tramoseats(na.omit(serie),"RSAfull"))) sa.series<-invisible(lapply(sa.objects,FUN=function(obj)proc_ts(obj,"sa")))
names(sa.objects)<-names(sa.series)<-names(ts.list)
lapply(seq_along(sa.series),FUN=function(i)if(model.def\$sa[which(model.def\$variable==names(sa.series)[i])]==-1</pre> sa.series[[i]]<<--na.omit(ts.list[[which(model.def\$variable==names(sa.series)[i])]]))</pre> 4. FORECASTS OF ADJUSTED SERIES, MAYBE NEEDED FOR I sa.forecasts<-invisible(lapply(sa.objects,FUN=function(obj)ts.connect(proc_ts(obj,"sa"),proc_ts(obj,"sa_f")))</pre> MoM rates (SA adjusted) ICM imputation -6 -4 -2 0 2 4 6 JDemetra-— Actual

visats

JD.reg.ARIMA<-function(y,x,my.spec=NULL,name.spec="RSAfull",to.lag=0) JDLight::jd_registerVariable(x,"x") if(is.null(my.spec))my.spec<-JDLight::spec_create()</pre> JDLight::spec_str(my.spec,"tramo.regression.user1.name" ,"vars.x") JDLight::spec_str(my.spec,"tramo.regression.user1.effect" ,"Undefined") if(to.lag>0) JDLight::spec_int(my.spec,"tramo.regression.user1.lastlag",to.lag)

sa.obj<-JDLight::sa_tramoseats(y, name.spec, my.spec)</pre> proc_parameters(sa.obi, "regression.coefficients" f1<-window(JDLight::proc_ts(sa.obj,"y_f"),end=end(x)) return(list(model=sa.obj,forecast=f1))





JDemetra+ GUI: partial concurrent adjustment of indicators and deflators

NEXT development stage \rightarrow whole process with **RJDemetra**.







SEASONAL ADJUSTMENT OF SHORT-TERM INDICATORS: MAIN ACHIEVEMENTS

2014 Producing with **TRAMO/SEATS** (TSW), we started the **JDemetra+ 1.5.1** GUI evaluation.

2015 JDemetra+ and TSW comparisons: GUI use, parameterization, calendar regressors and results.

2016 With the help of the **SACE**, and extending some methods of the **jdemetra-R interface** (JDemetra+ 2.1.0), we performed a wide analysis of seasonal outliers (SO) effects on industrial production and services activities indexes adjustments.





jdemetra-R interface: group analysis



2017 Extension of a custom package based on the **JDLight** and **jdemetra-R interface** fusion, developed for versions 2.1 and 2.2 of JDemetra+:

- Creation of functions for setting an automatic seasonal adjustment output as an input specification for another one. \bullet
- Creation of functions for national calendars management: validity periods and weights.

Modelization - Intensive simulation functions for assessing:

- the impact of adding/removing a single national calendar day
- Trading Days/Working Days specifications
- revisions and model stability

- effects of Easter duration
- scheme sensibility (log/level)
- effects of the raw data revisions

# HELPER FUNCTIONS FOR JDEMETRA+ MANAGEMENT	TREND-CYCLE SA		WD	WD WD SO		TRADING DAYS			WORKING DAYS			IPI GENERAL SA INDEX	
	S	SA 8 -			holiday	auto model	BIC	LY BTH	auto model	BIC	LY BTH	2017 rev. hist.	max. dev. SA index
p.selector_r2jd<-function(periods){cm} mv.id_addFixedDav<-function(idcal, month, dav, weight=1.start=NULL, end=NULL){cm}		WD i wp.so			1-January	(011)(011)	-6.8062	0.0321 -0.3350	(200)(010)	-6.8135	0.0275		
my.jd_addEasterRelatedDay<-function(jdcal, offset, weight=1,start=NULL, end=NULL, julianEaster=FALSE){					6-January	(011)(011)	-6.8570	0.0322 -0.3253	(011)(011)	-6.7427	0.0276 -0.4294		8
tramo_seats.clone<-function(input.serie.saobi.cal=NUL){rem}	₩		φ - 2 9 9 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		Easter -2	(011)(011)	-6.8951	0.0320 -0.3366	(011)(011)	-6.8004	0.0279 -0.4261	× 0	
	I A	₩ -			Easter 1	(011)(011)	-6.8239	0.0318 -0.3763	(011)(011)	-6.7759	0.0298 -0.4335		ĕ T IIIIIIIIIIIIIIIIIIIIII
<pre>set.arima.jd<-function(spec,pdqPDQ){ [[[</pre>	<u>د المجار المجا</u>	g	φ	φ	1-May	(011)(011)	-6.8542	0.0321 -0.3364	(011)(011)	-6.8422	0.0272 -0.3987	9	
<pre>get.arima.jd<-function(jdResults)</pre>	- 14/	₽ 			24-June	(011)(011)	-6.8435	0.0318 -0.3375	(200)(010)	-6.7744	0.0259		°
<pre>return(list(p=proc_numeric(jdResults,"arima.p"),d=proc_numeric(jdResults,"arima.d"),q=proc_numeric(jdResults,"arima.q"),</pre>	8 - 7 10	8 -	νΩ ισιιτ Ν	ιΩ sa.ΥΥ	15-August	(011)(011)	-6.9095	0.0328 -0.3400	(011)(011)	-6.8625	0.0275 -0.4162	2005 2010 2015	2005 2010 2015
bp=proc_numeric(jakesuits, arima.bp),bd=proc_numeric(jakesuits, arima.bd),bq=proc_numeric(jakesuits, arima.bq)))		»	,	•	11-September	(200)(010)	-6.7082	0.0301	(200)(010)	-6.8097	0.0261		
<pre>print.arima.jd<-function(jdResults)</pre>	2005 2010 2015	2005 2010 2015	2005 2010 2015	2005 2010 2015	12-October	(011)(011)	-6.8414	0.0311 -0.3356	(200)(010)	-6.8282	0.0253		
<pre>return(paste0(paste("(",proc_numeric(idResults,"arima,p"),proc_numeric(idResults,"arima,d"),proc_numeric(idResults,"arima,g"),")"),</pre>	SEASONAL	IRREGULAR	TD	TD.SO	1-November	(300)(010)	-6.7525	0.0330	(200)(010)	-6.6772	0.0265	max dev SA v.v	max dev SA m.m.
paste("(",proc_numeric(jdResults,"arima.bp"),proc_numeric(jdResults,"arima.bd"),proc_numeric(jdResults,"arima.bq"),")")))					6-December	(011)(011)	-6.9716	0.0296 -0.3197	(011)(011)	-6.7777	0.0269 -0.4503	max. dev. SA y-y	max. dev. 5A m-m
get.calendar.CAT<-function(){ [[]	- in tradition the state of the state	<u>त्र</u>	° TUERNE NEMMA	° TURNE NEDAWAN	8-December	(011)(011)	-6.8403	0.0321 -0.3187	(011)(011)	-6.7993	0.0279 -0.4037	8	8 -
get.calendar.ESP_COM<-function() {	2 - 4 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	≓ T	 +************************************	• + * * * * * * * * * * * * * * * * * *	25-December	(200)(010)	-6.7611	0.0313	(200)(010)	-6.8300	0.0290	-	
get.calendar.ESP_IASS<-function(){ constant of the second sec	- T - FR K. F. KARLIK B. K. K. B. K. K. F. K. K. F. K. K. F. K. K. K. F. K.		φ -	φ -	26-December	(011)(011)	-6.9553	0.0323 -0.3216	(011)(011)	-6.8784	0.0283 -0.3851	(%)	§ 7. –
get.calendar.ESP_PIB<-function() {		5 - WWW WWWW			23-May	(011)(011)	-6.9041	0.0318 -0.3291	(011)(011)	-6.8048	0.0277 -0.4193		
set spec proce function (SApper SAiter) (•		₩	φ	16-May	(011)(011)	-6.9032	0.0318 -0.3299	(011)(011)	-6.7956	0.0276 -0.4233	e _ himself internet and i	
sec. spec. proc<-runceron(saproc, sartem) (96. –			13-June	(011)(011)	-6.9039	0.0318 -0.3293	(011)(011)	-6.8050	0.0277 -0.4211	2005 2010 2015	2005 2010 2015
<pre>set.spec.df<-function(dfspec){</pre>			γ -L	⁸ ^γ - L	16-May	(011)(011)	-6.9032	0.0318 -0.3299	(011)(011	-6.7930	0.0278 -0.4255	2003 2010 2013	2003 2010 2013
<pre>set.spec.jd<-function(saobj,cal=NULL){ []]</pre>	2005 2010 2015	2005 2010 2015	2005 2010 2015	2005 2010 2015	NONE	(011)(011)	-6.9041	0.0318 -0.3291	(011)(011)	-6.8048	0.0277 -0.4193		

JDLight and jdemetra-R auxiliar functions

Components and YoY rates **consistency** of 4 models

Effects of omitting national holidays

Assessing revisions sizes

2018 Analysis of the process **spectral properties:** comparisons with the **Direct Filter Approach** (DFA) and other spectrum-based adjustment methods:

	3 NEW METHODS FOR SEASONALADJUSTMENT	3. NEW METHODS FOR SEASONAL ADJUSTMENT	3. NEW METHODS FOR SEASONALADJUSTMENT	4. DIRECT SEASONAL ADJUSTMENT (DSA)	4. DIRECT SEASONAL ADJUSTMENT (DSA)		
Trading Days Working Days	NEW METHODS: PRE-ADJUSTMENT WITH A BAND-PASS FILTER	NEW METHODS: WAVELETS	NEW METHODS: SINGULAR SPECTRUM ANALYSIS	PIPI: ENERGY ARIMA ARIMA BASED	S MoM rates		
	The filter is designed to drop a wide spectral band before the seasonal treatment	Spectral analysis is not suitable for non-stationary applications, instead wavelets have	Singular spectrum analysis (SSA) applies nonparametric techniques that adapt the commonly used	2 - MODEL	₽		



2019 Derivation of the **Wienner-Kolmogorov** filter weights from the canonical decomposition provided by the **RJDemetra** package.

Production system developed with **RJDemetra**:

- partial concurrent revision from the JDemetra+ GUI.
- an R-script reads the workspace and perform all posterior transformations: base year adjustment, exportation formats, custom summaries...



WK filter weights computation: the canonical decomposition is the input for the tsdecomp package functions

≠ ESTABLIMENT DEL DIRECTORI DE TREBALL	Data		
setwd(here::here()) require(RJDemetra)	💽 as ym. wk	List of 4	
source("helperRJD.R")	my.cal.ts	Time-Series [1:192, 1:4] from	n 2002 to 2018: 112
base.year<-2015	my.cal.ts.adj	Time-Series [1:192, 1:4] from	n 2002 to 2018: 112
⊭ WORKSPACE	🕥 my. mp	Formal class multiprocessing	
<pre>my.ws<-load_workspace(paste0(here::here(),"/PROJECT 2018/JDSA2018.xml")) names(oet_all_objects(my.ws))</pre>	() my.mp.items	List of 4	
# MULTIPROCESSING	🚺 my.sa.obj	List of 4	
<pre>my.mp<-get_object(my.ws,1) names(my.mp.items<-net all objects(my.mp))</pre>	my.sa.ts	Time-Series [1:192, 1:4] from	n 2002 to 2018: 116
compute (my. ws .1)	my.sa.ts.adj	Time-Series [1:192, 1:4] from	n 2002 to 2018: 116
# RAW TIME SERIES			
	Files Plots Pac	kages Help Viewer	_
<pre>webic=det_model(my.mp.my.ws)</pre>	🛛 🧢 📥 🔎 Zoon	n - 🎦 Export 👻 🛛 🕑	💁 Publish 👻
<pre># SA series ts.plot(my.ts[,1],my.sa.ts<-ts(sapply(lapply(my.sa.obj,getElement, "final"),getElement, "series"), "[",TRUE,2),start=start(my.ts),frequency=frequency(my.ts)),</pre>			
my.sa.ts			
<pre># CALadj series my.cal.ts<-do.call(ts.union.lapply(lapply(my.sa.obj.get.calendar.seriesJD).getElement."cal.adj")) my.cal.ts</pre>	6 -		
<pre># PROCESSAMENT POSTERIOR DE LES SÉRIES AJUSTADES PER OBTENIR-LES EN LA BASE QUE TOCA: my.sa.factor<-colMeans(my.sa.ts[floor(time(my.sa.ts))==base.year.])</pre>		h Mu wa W Milde	
my sa ts adiy_100°my sa ts/matrix(ren(my sa factor nrow(my sa ts)) nrol-length(my sa factor) hyrow-T)			
aggregate.ts (my.sa.ts.adj.FUH=mean)	- NIV		, hik
<pre>aggregate.ts(my.sa.ts.adj.FUN=mean) my.cal.factor<-colMeans(my.cal.ts[floor(time(my.cal.ts))==base.year.])</pre>			
<pre>aggregate.ts(my.sa.ts.adj.FUM=mean) my.cal.ts.adj<-100*my.cal.ts/matrix(rep(my.cal.factor,nrow(my.cal.ts)),ncol=length(my.cal.factor),byrow=T) aggregate.ts(my.cal.ts.adj.FUM=mean)</pre>	1 00		
<pre>aggregate.ts(my.sa.ts.adj.FUN=mean) my.cal.factor<-colWeans(my.cal.ts[floor(time(my.cal.ts))==base.year.]) my.cal.ts.adj<-100°my.cal.ts/matrix(rep(my.cal.factor,nrow(my.cal.ts)),ncol=length(my.cal.factor),byrow=T) aggregate.ts(my.cal.ts.adj.FUN=mean) # FlLTRES DE WK: asym.wk<-lapply(lapply(lapply(my.sa.obj.getElement,"decomposition"),getElement,"model"),WK.from.canonical),getElement,"asym") sym.wk<-lapply(lapply(lapply(lapply(my.sa.obj.getElement,"decomposition"),getElement,"model"),WK.from.canonical),getElement,"sym")</pre>	80 - 100 - 1		A HAMPARAMA

Monthly production R-script



