

Package ‘nowcasting’

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Type Package

Title Nowcast Analysis and Create Real-Time Data Basis

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Description

Methods and tools to estimate 'forecasts' of Brazilian macroeconomic variables in the near future or the recent past, i.e. 'nowcast'. It allows: extract information in real time, creating a real time data base; estimate relationship between macroeconomic variables via dynamic factors; forecast time series in previous periods of reference; forecast time series in the current period of reference (nowcasting); recreate a data base simulating the information available in the past for evaluating forecasting models accuracy (pseudo real-time data base); access information available in a specific date in the past (real-time data base), for some variables.

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BugReports <https://github.com/nmeccsys/nowcasting/issues>

URL <https://github.com/nmeccsys/nowcasting>

Encoding UTF-8

LazyData true

RoxygenNote 6.0.1

NeedsCompilation no

VignetteBuilder knitr

Suggests knitr

Imports corpcor, httr, lubridate, matlab, RCurl, xts, zoo, DBI, magic, RMySQL, Matrix

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base_extraction	<i>Create a real time data base</i>
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Description

Create a time series matrix `mts` extracting information from Bacen (Banco Central do Brasil) API.

Usage

```
base_extraction(series_code)
```

Arguments

`series_code` Vector with the series encoding following the Bacen (Banco Central do Brasil) standards.

References

Central Bank of Brazil

Examples

```
# Extracting GDP serie at real-time from Central Bank of Brasil data base
## Not run:
gdp<-base_extraction(22099)
# Industrial production (21859) serie at real-time from Central Bank of Brasil data base
ind_prod<-base_extraction(21859)

# Creating real time data base with the series:
# Vehicles production (1373);
# Industrial production, general index (21859).
mybase<-base_extraction(c(1373,21859))

# Creating real time data base with the series:
```

```

# Exchange rate - Free - United States dollar (1);
# Interest rate - CDI (12).
mybase<-base_extraction(c(1,12))

# Creating real time data base with the series:
# Vehicles production (1373);
# Credit Sales Index (1453);
# Retail sales (1455);
# Industrial production, general index (21859).
mybase<-base_extraction(c(1373,1453,1455,21859))
## End(Not run)

```

Bpanel

Balanced panel

Description

This function transforms the original monthly time series to its stationary representation following the user specification. The time series with more than 1/3 missing, i.e. NAs are deleted, and the remaining are modified such that the missings and outliers are replaced by an approximated value.

The missings and outliers are “corrected” following the same method available in the replication files of Giannone et al. 2008. Outliers are defined as observations that lie more than 4 IQR from the median. All missings and outliers are replaced by the median. A centered moving average of degree *k* is calculated, forming a new panel. Then the missings and outliers are replaced by their equivalent observations on this new panel. We’ve made an important modification on the outlier_correction function found in the above mentioned files: Here the median of an even-sized sample is calculated by the mean of the two most central values, rather than using the largest of those numbers. Because of this modification the results obtained with the original replication files in (USGDP) are slightly different than those found here.

Usage

```
Bpanel(base = NULL, trans = NULL, aggregate = F, k_ma = 3)
```

Arguments

base	A mts with the series to be transformed.
trans	A vector where each coordinate is a code for the transformation of the correspondent coordinate in the base argument. The transformation is specified by codes, as follows: <ul style="list-style-type: none"> • trans = 0: the original serie is preserved; • trans = 1: monthly rate of change

$$\frac{X_t - X_{t-1}}{X_{t-1}}$$

- transf = 2: monthly difference

$$X_t - X_{t-1}$$

- transf = 3: monthly difference of year-over-year rate of change

$$\frac{X_t - X_{t-12}}{X_{t-12}} - \frac{X_{t-1} - X_{t-13}}{X_{t-13}}$$

- transf = 4: monthly difference of year difference

$$(X_t - X_{t-12}) - (X_{t-1} - X_{t-13})$$

aggregate	A boolean representing if you want aggregate the monthly variables to represent quarterly quantities. If TRUE the aggregation is made following the approximation of <i>Mariano and Murasawsa 2003</i> .
k_ma	A numeric representing the degree of the moving average correction.

References

- Giannone, D., Reichlin, L., & Small, D. (2008). Nowcasting: The real-time informational content of macroeconomic data. *Journal of Monetary Economics*, 55(4), 665-676.<doi:10.1016/j.jmoneco.2008.05.010>
- Mariano, R. S., & Murasawa, Y. (2003). A new coincident index of business cycles based on monthly and quarterly series. *Journal of applied Econometrics*, 18(4), 427-443.<doi:10.1002/jae.695>

Examples

```
# Example from database BRGDP:
Bpanel(BRGDP, rep(3, dim(BRGDP)[2]))
```

BRGDP

Real Time Data Base Extracted in 03/10/2017

Description

This is a panel containing a piece of the information set of a specific date for Brazilian economic activity. The panel is formatted as a matrix time series `mts` containing: Exchange rate - Free - United States dollar (1); Interest rate - CDI (12); Vehicles production (1373); Credit Sales Index (1453); Retail sales (1455); Current economic conditions index (4394); Industrial production, general index (21859); Quarterly GDP - observed data - GDP at market prices (22099).

Usage

BRGDP

Format

The format is: Time-Series [1:278, 1:7] from 1994 to 2018: 0.933 0.899 0.865 0.846 0.842 ... -
`attr(*, "dimnames")=List of 2 ..$: NULL ..$: chr [1:7] "serie1" "serie12" "serie1373" "serie1453"`
 ...

month2qtr	<i>Monthly to quarterly agregation</i>
-----------	--

Description

It transformms a monthly time series in a quarterly one, selecting the last value of the last month of the quarter to represent it.

Usage

```
month2qtr(x)
```

Arguments

x	Variable in month frequency
---	-----------------------------

Examples

```
# Selecting only last month of matrix time series BRGDP:
month2qtr(BRGDP)

# Vehicle production in the quarter from vehicle production in the month
month2qtr(stats::filter(BRGDP[,3],c(1,1,1),sides=1))
```

nowcast	<i>Nowcasting of a quarterly time serie using a dynamic factor.</i>
---------	---

Description

Estimate nowcasting and forecasting for a quarterly time serie. For more details read the Vignettes.

Usage

```
nowcast(y, x, q = NULL, r = NULL, p = NULL, method = "2sq",
        blocks = NULL)
```

Arguments

y	Stationary quarterly time-series
x	A time series matrix (mts) representing the regressors of interest. The series must be stationary.
q	Dynamic rank. Number of error terms.
r	Static rank or number of factors ($r \geq q$, for methods 2sq and 2sm).
p	AR order of factors.

method	2sq: Two stages quarterly as in Giannone et al. 2008; 2sm: Two stages monthly as in Bańbura and Runstler 2011; EM: Expected Maximization as in Bańbura et al. 2011
blocks	only for EM method. Select which factors impact the variables (global, nominal or real).

Value

A list containing two elements:

A mts named `main` contains the original serie, the estimation in the sample, the estimation out of the sample;

A list named `factors` contains the estimated factors and coefficients.

A mts named `fore_x` contains the output of all regressors.

A mts named `month_y` contains the a monthly measure for GDP.

References

- Giannone, D., Reichlin, L., & Small, D. (2008). Nowcasting: The real-time informational content of macroeconomic data. *Journal of Monetary Economics*, 55(4), 665-676.<doi:10.1016/j.jmoneco.2008.05.010>
- Bańbura, M., & Rünstler, G. (2011). A look into the factor model black box: publication lags and the role of hard and soft data in forecasting GDP. *International Journal of Forecasting*, 27(2), 333-346. <doi:10.1016/j.ijforecast.2010.01.011>
- Bańbura M., Giannone, D. & Reichlin, L. (2011). Nowcasting, in Michael P. Clements and David F. Hendry, editors, *Oxford Handbook on Economic Forecasting*, pages 193-224, January 2011. <doi:10.1093/oxfordhb/9780195398649.001.0001>

See Also

[base_extraction](#)

Examples

```
## Not run:
# nowcast function examples:
### Method 2sq
pib<-BRGDP[,8]
y<-month2qtr(diff(diff(pib,3),12))
x<-Bpanel(BRGDP[,-8],rep(4,dim(BRGDP)[2]),aggregate = T)
q<-1
r<-2
p<-1
now_2sq<-nowcast(y,x,q,r,p,method = '2sq')

### Method 2sm
pib<-BRGDP[,8]
y<-month2qtr(diff(diff(pib,3),12))
x<-Bpanel(BRGDP[,-8],rep(4,dim(BRGDP)[2]),aggregate = F)
now_2sm<-nowcast(y,x,q,r,p,method = '2sm')
```

```

### Method EM
y<-month2qtr(diff(diff(pib,3),12))
x<-Bpanel(BRGDP[,-8],rep(4,dim(BRGDP)[2]),aggregate = F)
now_em<-nowcast(y,x,q,r,p,'EM')

## End(Not run)

```

nowcast.plot

Plot for nowcast output function

Description

Make plot to visualize the output of nowcast function

Usage

```
nowcast.plot(out, type = "fcst")
```

Arguments

out	Output of function nowcast
type	'fcst', 'factors', 'eigenvalues', 'eigenvectors', 'month_y'

Examples

```

## Not run:
trans <- USGDP$Legenda$Transformation[-length(USGDP$Legenda$Transformation)]
base <- USGDP$Base[,-dim(USGDP$Base)[2]]
gdp <- month2qtr(USGDP$Base[,dim(USGDP$Base)[2]])
x <- Bpanel(base = base, trans = trans)
now <- nowcast(y = gdp, x = x,method = '2sq')

nowcast.plot(now, type = "fcst")
nowcast.plot(now, type = "factors")
nowcast.plot(now, type = "eigenvalues")
nowcast.plot(now, type = "eigenvectors")

x2 <- Bpanel(base = base, trans = trans,aggregate = F)
now2 <- nowcast(y = gdp, x = x2, q = 2, r = 3,method = '2sm')

nowcast.plot(now2, type = "fcst")
nowcast.plot(now2, type = "factors")
nowcast.plot(now2, type = "eigenvalues")
nowcast.plot(now2, type = "eigenvectors")

## End(Not run)

```

Description

This package is an initiative of the Center for Statistical and Computational Methods (NMEC) belonging to the Brazilian Institute of Economics (IBRE) of the Getulio Vargas Foundation (FGV). Our goal is to develop a real-time predictive measure of Brazilian GDP that helps IBRE researchers in their analysis about the Brazilian economy.

The purpose of this package is to disseminate to the community of R users the statistical tools and techniques of 'nowcast' already known in the academic literature. One can find in this package a simple and practical way to reproduce several of these techniques for their studies.

In this version of the package we present three methods, based on seminal articles in this literature: *Giannone et al. 2008*, *Bańbura et al. 2011* and *Bańbura and Rünstler 2011*. Some backend functions are adaptations and translations of these paper's *replication files* available in MATLAB. One can find these *replication files* in the following url: <https://www.newyorkfed.org/research/economists/giannone/pub>

Note

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References

- Giannone, D., Reichlin, L., & Small, D. (2008). Nowcasting: The real-time informational content of macroeconomic data. *Journal of Monetary Economics*, 55(4), 665-676.<doi:10.1016/j.jmoneco.2008.05.010>
- Bańbura, M., & Rünstler, G. (2011). A look into the factor model black box: publication lags and the role of hard and soft data in forecasting GDP. *International Journal of Forecasting*, 27(2), 333-346. <doi:10.1016/j.ijforecast.2010.01.011>
- Bańbura M., Giannone, D. & Reichlin, L. (2011). Nowcasting, in Michael P. Clements and David F. Hendry, editors, *Oxford Handbook on Economic Forecasting*, pages 193-224, January 2011. <doi:10.1093/oxfordhb/9780195398649.001.0001>

PRTDB	<i>Pseudo Real Time Data Base</i>
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Description

Create a pseudo real time data base, based on data and delays of disclosure estipulated by the user.

Usage

```
PRTDB(mts, delay, vintage = Sys.Date())
```

Arguments

mts	A matrix time series - mts - with the series to be transformed.
delay	A numeric vector with the delay in days the information is available after the reference month. Each element correspond to the series in the respective column in mts.
vintage	The day where the data is supposed to be collected.

Value

A mts with the series transformed.

Examples

```
# Pseudo Real Time Data Base from data base BRGDP
PRTDB(BRGDP, 1:dim(BRGDP)[2])
```

qtr2month	<i>Quarterly to monthly desagregation</i>
-----------	---

Description

It transformms a quarterly time series in a monthly. To the last month of the monthly ts is set the value of the quarterly ts.

Usage

```
qtr2month(x)
```

Arguments

x	Variable in quarterly frequency
---	---------------------------------

Value

The correspondent monthly transformation or agregation.

Examples

```
# Selecting only last month of matrix time series BRGDP:
mestri_vintage<-month2qtr(BRGDP[,dim(BRGDP)[2]])

qtr2month(mestri_vintage)
```

RTDB

Create Real Time Data Base

Description

Create a time series matrix mts replicating the information available in a given date.

Usage

```
RTDB(series_code = NULL, vintage = NULL)
```

Arguments

series_code	Vector with the series encoding follow the Bacen (Banco Central do Brasil) standards.
vintage	The vintage encoded by the day of the extraction

References

Central Bank of Brazil

Examples

```
# Show series available:
# RTDB()
# Show vintages available for a serie:
# RTDB(series_code=1)
```

USGDP

Example of replication files in Giannone et al. 2008

Description

Dataset available to replicate the results in *Giannone et al. 2008*.

Usage

USGDP

Format

A list with 2 elements:

- Base is a mts with 193 series and 312 observations;
- Legenda is a data.frame with specifications of the series in Base.

Source

This dataset is available as *replication files* of the seminal work *Giannone 2008*. One can find these *replication files* in the following url: <https://www.newyorkfed.org/research/economists/giannone/pub>

References

Giannone, D., Reichlin, L., & Small, D. (2008). Nowcasting: The real-time informational content of macroeconomic data. *Journal of Monetary Economics*, 55(4), 665-676.<doi:10.1016/j.jmoneco.2008.05.010>

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