Package ‘DPTM’

April 4, 2024

Type Package
Title Dynamic Panel Multiple Threshold Model with Fixed Effects
Version 1.3.8
Date 2024-03-28
Description Compute the fixed effects dynamic panel threshold model suggested by Ramírez-Rondán (2020) <doi:10.1080/07474938.2019.1624401>, and dynamic panel linear model suggested by Hsiao et al. (2002) <doi:10.1016/S0304-4076(01)00143-9>, where maximum likelihood type estimators are used. Multiple threshold estimation based on Markov Chain Monte Carlo (MCMC) is allowed, and model selection of linear model, threshold model and multiple threshold model is also allowed.
License GPL (>= 3)
URL https://github.com/HujieBai/DPTM
Encoding UTF-8
Imports Rcpp (>= 1.0.12),BayesianTools, purrr, MASS,stats,coda,parabar
LinkingTo Rcpp,RcppEigen
RoxygenNote 7.3.1
Depends R (>= 4.3.0)
LazyData true
NeedsCompilation yes
Author Bai Hujie [aut, cre, cph] (<https://orcid.org/0009-0004-2060-4351>)
Maintainer Bai Hujie <hujiebai@163.com>
Repository CRAN
Date/Publication 2024-04-04 12:13:01 UTC

R topics documented:

  data ................................................................. 2
  DPML ............................................................... 2
  DPTS ............................................................... 4
  Threshold_Test .................................................... 7

Index 11
data  
A simulation data used for examples

Description
A simulation data used for examples

Usage
data

Format
A simulation data used for examples
None

DPML  
The dynamic panel linear model with fixed effects

Description
The dynamic panel linear model with fixed effects

Usage

DPML(
  y,
  y1 = NULL,
  x = NULL,
  w = NULL,
  var_u = NULL,
  tt,
  nn,
  time_trend = FALSE,
  time_fix_effects = FALSE,
  restart = FALSE,
  x1 = NULL,
  delty0 = NULL,
  Only_b = FALSE,
  display = TRUE
)
DPML

Arguments

y the dependent variable; vector type input.
y1 the lag dependent variable; vector type input; By default, y1 is NULL, and then y1 will be computed by y automatically.
x the independent variable; matrix type input.
w the variance ratio; By default, is NULL; It must be greater than 1.
var_u the option of variance of error term; By default, is NULL; It must be greater than 0; When meet relevant ERROR, please change the var_u.

tt the length of time period.
nn the number of individuals.
time_trend the time trend; By default, it is FALSE.
time_fix_effects the time fixed effects; By default, it is FALSE.
restart the option of iterations; By default, restart is FALSE, if encounters iteration failure, please set restart as TRUE.
x1 the initial values of independent variable; matrix type input. By default, x1 is NULL, and thus x1 will be computed by x automatically.

delty0 the option of delta_y; By default, delty0 is NULL; Please do not change delty0.

Only_b the option of initial equation; By default, Only_b is FALSE, and if Only_b is TRUE, initial delta y will be a constant C. Please see Hsiao (2002) and Ramírez-Rondán (2020) for more details.
display the option of whether to print the messages of estimated results; By default, the display is TRUE.

Value

A list containing the following components:
ssemin the negative log-likelihood function value
Coefs parameter estimates containing t-values
pars iterated results for all parameters
duit the first-difference form of residuals
dy0 the first-difference form of dependent variable
xx the independent variables and their initial values
covariance_matrix the covariance matrix
Ses the standard errors of coefs
Zvalues the values of the statistic
ccd the number of independent variables
coefs parameter estimates containing their initial values
Functions

- **DPML()**: This is a dynamic panel linear model with fixed effects, which allows time trend term or time fixed effects.

Author(s)

Hujie Bai

References


Examples

data("data", package = "DPTM")
y <- data$data_test_linear$y
q <- data$data_test_linear$q
x <- as.matrix(data$data_test_linear$x)
z <- as.matrix(data$data_test_linear$z)
tt <- data$data_test_linear$tt
nn <- data$data_test_linear$nn
xx <- cbind(x,z)
m1 <- DPML(y=y,x=xx,tt=tt,nn=nn)
m1$Coefs

---

**DPTS**

The Dynamic panel threshold model with multiple thresholds

Description

DPTS This is a dynamic panel threshold model with fixed effects, which allows multiple thresholds, time trend term or time fixed effects.

Usage

DPTS(
y,
y1 = NULL,
x = NULL,
q,
cvs = NULL,
time_trend = FALSE,
time_fix_effects = FALSE,
x1 = NULL,
tt,
nn,
Th = 1,
ms = 1000,
burnin = 1000,
types = "DREAMzs",
ADs = FALSE,
r0x = NULL,
r1x = NULL,
NoY = FALSE,
restart = FALSE,
Only_b = FALSE,
w = NULL,
var_u = NULL,
delty0 = NULL,
nCR = 3,
autoburnin = TRUE,
sro = 0.1,
display = TRUE
)

Arguments

y the dependent variable; vector type input.
y1 the lag dependent variable; vector type input; By default, y1 is NULL, and then y1 will be computed by y automatically.
x the independent variable; matrix type input.
q the threshold variable; vector type input.
cvs the set of control variables; matrix type input; By default, cvs is NULL.
time_trend the time trend; By default, it is FALSE.
time_fix_effects the time fixed effects; By default, it is FALSE.
x1 the initial values of independent variable; matrix type input. By default, x1 is NULL, and thus x1 will be computed by x automatically.
tt the length of time period.
nn the number of individuals.
Th the number of thresholds.
ms the length of MCMC chains after burn-in.
burnin the length of burn-in.
types the type of MCMC used; More details see BayesianTools::runMCMC.
ADs the options for MCMC; More details see BayesianTools::runMCMC.
r0x the lower bound of thresholds; By default, r0x is NULL, and thus r0x will be computed by q automatically.
**r1x**
the upper bound of thresholds; By default, r0x is NULL, and thus r1x will be computed by q automatically.

**NoY**
the option of threshold effects on the lag dependent variable; By default, NoY is False, and thus there will be threshold effects on y1.

**restart**
the option of iterations; By default, restart is FALSE, if encounters iteration failure, please set restart as TRUE.

**Only_b**
the option of initial equation; By default, Only_b is FALSE, and if Only_b is TRUE, initial delta y will be a constant C.; Please see Hsiao (2002) and Ramírez-Rondán (2020) for more details.

**w**
the variance ratio; By default, is NULL; It must be greater than 1.

**var_u**
the option of variance of error term; By default, is NULL; It must be greater than 0; When meet relevant ERROR, please change the var_u.

**delty0**
the option of delta_y; By default, delty0 is NULL; Please do not change delty0.

**nCR**
parameter determining the number of cross-over proposals of DREAM MCMC. If nCR = 1 all parameters are updated jointly.

**autoburnin**
a logical flag indicating of the Gelman and Rubin’s convergence diagnostic, whether variables in x should be transformed to improve the normality of the distribution. If set to TRUE, a log transform or logit transform, as appropriate, will be applied.

**sro**
the least ratio of sample in regimes.

**display**
the option of whether to print the messages of estimated results; By default, the display is TRUE.

### Value
A list containing the following components:

**ssemin**
the negative log-likelihood function value

**Ths**
a vector of multiple thresholds in order

**Ths_IC**
a matrix of confidence intervals of all thresholds

**Coefs**
parameter estimates containing t-values

**MCMC_Convergence_Diagnostic**
the Gelman and Rubin’s convergence diagnostic results of MCMC sample

**model**
a list of results of DMPL

**MCMC**
an object of class mcmcSampler (if one chain is run) or mcmcSamplerList, more details see BayesianTools::runMCMC

### Author(s)
Hujie Bai
**Threshold_Test**

**References**


**Examples**

```r
data("data", package = "DPTM")
y <- data$data_test$y
c <- data$data_test$q
x <- as.matrix(data$data_test$x)
z <- as.matrix(data$data_test$z)
tt <- data$data_test$tt
nn <- data$data_test$nn
m1 <- DPTS(y=y,q=c,x=x,cvs = z,tt=tt,nn=nn,Th=0,ms = 100,burnin = 100)
m1$Ths
m1$Ths_IC
m1$Coefs
m1$MCMC_Convergence_Diagnostic
plot(m1$MCMC)
```

---

**Threshold_Test**  
*The test for the number of thresholds.*

**Description**

Threshold_test This is a test for the number of thresholds, and it is noted that when under H0 the number of Thresholds is 0, this test is the so called threshold existence test.

**Usage**

```r
Threshold_Test(
  y,
  y1 = NULL,
  x = NULL,
  q,
  cvs = NULL,
  time_trend = FALSE,
  time_fix_effects = FALSE,
  x1 = NULL,
  tt,
  nn,
  Th = 0,
  ms = 1000,
  burnin = 1000,
)```
Threshold_Test

types = "DREAMzs",
ADs = FALSE,
r0x = NULL,
r1x = NULL,
NoY = FALSE,
restart = FALSE,
Only_b = FALSE,
w = NULL,
var_u = NULL,
nCR = 3,
autoburnin = TRUE,
bet = 100,
parallel = TRUE,
sro = 0.1,
display = TRUE
)

Arguments

y the dependent variable; vector type input.
y1 the lag dependent variable; vector type input; By default, y1 is NULL, and then y1 will be computed by y automatically.
x the independent variable; matrix type input.
q the threshold variable; vector type input.
cvs the set of control variables; matrix type input; By default, cvs is NULL.
time_trend the time trend; By default, it is FALSE.
time_fix_effects the time fixed effects; By default, it is FALSE.
x1 the initial values of independent variable; matrix type input. By default, x1 is NULL, and thus x1 will be computed by x automatically.
tt the length of time period.
nn the number of individuals.
Th the number of thresholds.
ms the length of MCMC chains after burn-in.
burnin the length of burn-in.
types the type of MCMC used; More details see BayesianTools::runMCMC.
ADs the options for MCMC; More details see BayesianTools::runMCMC.
r0x the lower bound of thresholds; By default, r0x is NULL, and thus r0x will be computed by q automatically.
r1x the upper bound of thresholds; By default, r0x is NULL, and thus r1x will be computed by q automatically.
NoY the option of threshold effects on the lag dependent variable; By default, NoY is False, and thus there will be threshold effects on y1.
restart the option of iterations; By default, restart is FALSE, if encounters iteration failure, please set restart as TRUE.

Only_b the option of initial equation; By default, Only_b is FALSE, and if Only_b is TRUE, initial delta y will be a constant C. Please see Hsiao (2002) and Ramírez-Rondán (2020) for more details.

w the variance ratio; By default, is NULL; It must be greater than 1.

var_u the option of variance of error term; By default, is NULL; It must be greater than 0; When meet relevant ERROR, please change the var_u.

nCR parameter determining the number of cross-over proposals of DREAM MCMC. If nCR = 1 all parameters are updated jointly.

autoburnin a logical flag indicating of the Gelman and Rubin’s convergence diagnostic, whether variables in x should be transformed to improve the normality of the distribution. If set to TRUE, a log transform or logit transform, as appropriate, will be applied.

bt the number of bootstrap.

parallel the option of parallel; By default, parallel is FALSE, when parallel is TRUE, this test will run in parallel.

sro the least ratio of sample in regimes.

display the option of whether to print the messages of estimated results; By default, the display is TRUE.

Value

A list containing the following components:

ps the p-value of test

crit the crit value of test

LR the statistic

LRs a vector of statistics in bootstrap

Author(s)

Hujie Bai

References


Examples

data("data", package = "DPTM")
y <- data$data_test$y
q <- data$data_test$q
x <- as.matrix(data$data_test$x)
z <- as.matrix(data$data_test$z)
tt <- data$data_test$tt
nn <- data$data_test$nn

### Examples elapsed time > 5s
m1 <- Threshold_Test(y=y,x=x,q=q,cvs=z,tt=tt,nn=nn,Th=0,ms = 500,burnin=500,
bt=10,parallel=FALSE)
m1$ps
Index

* datasets
  - data, 2

  data, 2
  DPML, 2
  DPTS, 4

  Threshold_Test, 7