Package 'DPTM'

Type Package

Title Dynamic Panel Multiple Threshold Model with Fixed Effects

Version 1.3.8

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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.

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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

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R topics documented:

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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
)
```

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 negaive 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 valuess

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

Ramírez-Rondán, N. R. (2020). Maximum likelihood estimation of dynamic panel threshold models. Econometric Reviews, 39(3), 260-276.

Hsiao, C., Pesaran, M. H., & Tahmiscioglu, A. K. (2002). Maximum likelihood estimation of fixed effects dynamic panel data models covering short time periods. Journal of econometrics, 109(1), 107-150.

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 negaive 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

References

Ramírez-Rondán, N. R. (2020). Maximum likelihood estimation of dynamic panel threshold models. Econometric Reviews, 39(3), 260-276.

Hsiao, C., Pesaran, M. H., & Tahmiscioglu, A. K. (2002). Maximum likelihood estimation of fixed effects dynamic panel data models covering short time periods. Journal of econometrics, 109(1), 107-150.

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
m1 <- DPTS(y=y,q=q,x=x,cvs = z,tt=tt,nn=nn,Th=1,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 numer 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

```
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,
```

```
    types = "DREAMzs",
    ADs = FALSE,
    r0x = NULL,
    r1x = NULL,
    NoY = FALSE,
    restart = FALSE,
    Only_b = FALSE,
    w = NULL,
    var_u = NULL,
    nCR = 3,
    autoburnin = TRUE,
    bt = 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

Ramírez-Rondán, N. R. (2020). Maximum likelihood estimation of dynamic panel threshold models. Econometric Reviews, 39(3), 260-276.

Hsiao, C., Pesaran, M. H., & Tahmiscioglu, A. K. (2002). Maximum likelihood estimation of fixed effects dynamic panel data models covering short time periods. Journal of econometrics, 109(1), 107-150.

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
```

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