Package ‘sdpdth’

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Description

M-estimator for threshold and non-threshold spatial dynamic panel data model.

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Description

A simulated data set for testing

Usage

data_n

Format

An object of class `list` of length 4.

data_nw

Description

A simulated data set for testing

Usage

data_nw

Format

An object of class `matrix` with 12 rows and 12 columns.
data_th

Description
A simulated data set for testing

Usage
data_th

Format
An object of class list of length 8.

data_w

Description
A simulated data set for testing

Usage
data_w

Format
An object of class matrix with 16 rows and 16 columns.

msdpd

Description
Estimating the spatial dynamic panel data model with M-estimator
Usage

msdpd(
  y,
  x,
  w1,
  correction = TRUE,
  hessian_er = FALSE,
  true_range = FALSE,
  max_try = 5,
  w2 = w1,
  w3 = w1,
  no_tf = FALSE,
  model = "full",
  rcpp = TRUE,
  cma_pop_multi = 1
)

Arguments

y matrix, containing regional index (first column), time index (second column, numeric) and dependent variable (third column, numeric).

x matrix, containing regional index (first column), time index (second column, numeric) and regressors (numeric).

w1 matrix, the spatial weight matrix. If w2 and w3 are supplied, the spatial weight matrix for spatial lag.

correction logical, whether to use adjusted score function. Default value is TRUE.

hessian_er logical, whether to output hessian based se. Ignored if correction is set to False. Default value is FALSE.

true_range logical, whether to used the accurate stationary check. Default value is FALSE due to performance reasons.

max_try integer, maximum attempt for the solver. Default value is 5.

w2 matrix, the spatial weight matrix for spatio-temporal lag. Default value is the same as w1.

w3 matrix, the spatial weight matrix for spatial error. Default value is the same as w1.

no_tf logical, whether to account for time effect. Default value is TRUE.

model character, indicates the model used for estimation, can be "full", "slm", "sem", "sltl". See Details.

rcpp logical, whether to use the rcpp implementation to calculate the score function. Default value is TRUE.

cma_pop_multi integer, multiplier for the population size used in CMA-ES. Default value is 1.
Details

Estimating the spatial dynamic panel data model with Yang(2018)'s M-estimator

\[ y_{ti} = \mu_i + \alpha_t + x_{ti} \beta + \rho y_{t-1,i} + \lambda_1 \sum_{j=1}^{n} w_{1,ij} y_{tj} + \lambda_2 \sum_{j=1}^{n} w_{2,ij} y_{t-1,j} + u_{ti}, u_{ti} = \lambda_3 \sum_{j=1}^{n} w_{3,ij} u_{tj} + v_{ti}, i = 1, \ldots, n, t = 1, \ldots, \]

The minimum number of time-periods is 4. Make sure the rows and columns of \( w_1, w_2, \) and \( w_3 \) are lined up with the regional index. Sub-models can be specified by argument "model"

- "full" Full model
- "slm" \( \lambda_2 = \lambda_3 = 0 \)
- "sem" \( \lambda_1 = \lambda_2 = 0 \)
- "sltl" \( \lambda_3 = 0 \)

Some suggestions when the optimizer fails:

- Increase max_try
- Increase cma_pop_multi
- try a different submodel

Value

A list of estimation results of S3 class "msdpd"

- "coefficient" list, coefficients and standard errors
- "model" character, model used for estimation
- "vc_mat" matrix, variance-covariance matrix
- "hessian" matrix, optional, hessian matrix

References


Examples

data(data_n, data_nw)
result <- msdpd(y = data_n$y, x = data_n$x, w1 = data_nw)
msdpdth  

*M-estimator for threshold spatial dynamic panel data model*

Description

Estimating threshold spatial dynamic panel data model with M-estimator

Usage

```r
msdpdth(
  y,
  x,
  w1,
  th,
  correction = TRUE,
  max_try = 5,
  all_er = FALSE,
  true_range = FALSE,
  residual = FALSE,
  w3 = w1,
  w2 = w1,
  no_tf = FALSE,
  model = "full",
  th_type = "row",
  ini_val = NULL,
  rcpp = TRUE,
  cma_pop_multi = 1
)
```

Arguments

- **y**: matrix, containing regional index (first column), time index (second column) and dependent variable (third column).
- **x**: matrix, containing regional index (first column), time index (second column) and regressors.
- **w1**: matrix, the spatial weight matrix. If w2 and w3 are supplied, the spatial weight matrix for spatial lag.
- **th**: data.frame, containing regional index (first column, numeric) and grouping indicator (second column, logical). The number of rows should be the same as the number of regions.
- **correction**: logical, whether to use adjusted score function. Default value is TRUE.
- **max_try**: integer, maximum attempt for the solver. Default value is 5.
- **all_er**: logical, whether to output Hessian and Gamma matrix based se. Ignored if correction is set to FALSE. Default value is FALSE.
true_range  logical, whether to used the accurate stationary check. Default value is FALSE due to performance reasons.

residual  logical, whether to output the residual. Default value is FALSE.

w3  matrix, the spatial weight matrix for spatial error. Default value is the same as w1.

w2  matrix, the spatial weight matrix for spatio-temporal lag. Default value is the same as w1.

no_tf  logical, whether to account for time effect. Default value is TRUE.

model  character, indicates the model used for estimation, can be "full", "slm", "sem", "sltl". See Details.

th_type  character, "row" or "col". Indicates whether the threshold is applied to the columns or the rows of the weight matrix. Default value is "row".

ini_val  vector msdpd object. A length 4 vector of the initial values of lambda1, lambda2, lambda3, rho or an msdpd object that contain the non-threshold estimation result. If unsupplied msdpd() will be called.

rcpp  logical, whether to use the rcpp implementation to calculate the score function. Default value is TRUE.

cma_pop_multi  integer, multiplier for the population size used in CMA-ES. Default value is 1.

Details

Estimating threshold spatial dynamic panel data model with extended Yang(2018)'s M-estimator

\[ y_{ti} = \mu_i + \alpha_t + x_{ti} \beta_q + \rho q y_{t-1,i} + \lambda_1 \sum_{j=1}^{n} w_{1,ij} y_{tj} + \lambda_2 \sum_{j=1}^{n} w_{2,ij} y_{t-1,j} + u_{ti}, \quad u_{ti} = \lambda_3 \sum_{j=1}^{n} w_{3,ij} u_{tj} + v_{ti}, \quad i = 1, \ldots, n, \quad t = 1, \ldots, T, q = 1, 2 \]

The minimum number of time-periods is 4. Make sure the rows and columns of w1, w2, and w3 are lined up with the regional index. Sub-models can be specified by argument "model"

- "full" Full model
- "slm" \( \lambda_2 = \lambda_3 = 0 \)
- "sem" \( \lambda_1 = \lambda_2 = 0 \)
- "sltl" \( \lambda_3 = 0 \)

Some suggestions when the optimizer fails:

- Increase max_try
- Increase cma_pop_multi
- try a different submodel

Value

A list of estimation results of S3 class "msdpdth"

- "coefficient" list, coefficients and standard errors
- "model" character, model used for estimation
print.msdpd

- "vc_mat" matrix, variance-covariance matrix
- "hes_mat" matrix, optional, Hessian matrix
- "gamma_mat" matrix, optional, Gamma matrix
- "residual" numeric, optional, residuals

References


Examples

data(data_th, data_w)
result <- msdpdth(y = data_th$y, x = data_th$x, w1 = data_w, th = data_th$th)

print.msdpd

Print method for msdpd class

Description

Print method for msdpd class

Usage

## S3 method for class 'msdpd'
print(x, ...)

Arguments

x
msdpd class

... other parameters

Details

Print method for msdpd class

Value

A data.frame containing the coefficients and the corresponding standard error.

Examples

data(data_n, data_nw)
result <- msdpd(y = data_n$y, x = data_n$x, w1 = data_nw)
result
**print.msdpdth**

**Print method for msdpdth class**

**Description**

Print method for msdpdth class

**Usage**

```r
## S3 method for class 'msdpdth'
print(x, ...)
```

**Arguments**

- `x` msdpdth class
- `...` other parameters

**Details**

Print method for msdpdth class

**Value**

A data.frame containing the coefficients and the corresponding standard error.

**Examples**

```r
data(data_th, data_w)
result <- msdpdth(y = data_th$y, x = data_th$x, w1 = data_w, th = data_th$th)
result
```

---

**wald_test**

Wald test for threshold spatial dynamic panel data model

**Description**

Wald test for threshold spatial dynamic panel data model

**Usage**

```r
wald_test(th_res)
```

**Arguments**

- `th_res` msdpdth class, generated by function msdpdth()
Details

Two sided Wald test for testing whether two estimated parameters for each group are equal

- "h_0" $\theta_1 = \theta_2$
- "h_1" $\theta_1 \neq \theta_2$

Value

A list of p-values for each parameter.

Examples

```r
data(data_th, data_w)
result <- msdpdth(y = data_th$y, x = data_th$x, w1 = data_w, th = data_th$th)
wald_test(result)
```
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