

# Package ‘PDMIF’

July 21, 2025

**Title** Fits Heterogeneous Panel Data Models

**Version** 0.1.0

**Description** Fits heterogeneous panel data models with interactive effects for linear regression, logistic, count, probit, quantile, and clustering. Based on Ando, T. and Bai, J. (2015) ``A simple new test for slope homogeneity in panel data models with interactive effects" <[doi:10.1016/j.econlet.2015.09.019](https://doi.org/10.1016/j.econlet.2015.09.019)>, Ando, T. and Bai, J. (2015) ``Asset Pricing with a General Multifactor Structure" <[doi:10.1093/jjfinex/nbu026](https://doi.org/10.1093/jjfinex/nbu026)>, Ando, T. and Bai, J. (2016) ``Panel data models with grouped factor structure under unknown group membership" <[doi:10.1002/jae.2467](https://doi.org/10.1002/jae.2467)>, Ando, T. and Bai, J. (2017) ``Clustering huge number of financial time series: A panel data approach with high-dimensional predictors and factor structures" <[doi:10.1080/01621459.2016.1195743](https://doi.org/10.1080/01621459.2016.1195743)>, Ando, T. and Bai, J. (2020) ``Quantile co-movement in financial markets" <[doi:10.1080/01621459.2018.1543598](https://doi.org/10.1080/01621459.2018.1543598)>, Ando, T., Bai, J. and Li, K. (2021) ``Bayesian and maximum likelihood analysis of large-scale panel choice models with unobserved heterogeneity" <[doi:10.1016/j.jeconom.2020.11.013](https://doi.org/10.1016/j.jeconom.2020.11.013)>.

**License** MIT + file LICENSE

**Encoding** UTF-8

**LazyData** true

**LazyDataCompression** xz

**RoxygenNote** 7.1.1

**Imports** diagonals, ncvgreg, quantreg

**Depends** R (>= 2.10)

**NeedsCompilation** no

**Author** Tomohiro Ando [aut, cre],  
Hani Fayad [aut]

**Maintainer** Tomohiro Ando <[t.ando@mbs.edu](mailto:t.ando@mbs.edu)>

**Repository** CRAN

**Date/Publication** 2022-02-16 20:20:14 UTC

Contents

data1X . . . . .	2
data1Y . . . . .	3
data2X . . . . .	3
data2Y . . . . .	4
data3X . . . . .	4
data3Y . . . . .	5
data4LAB . . . . .	5
data4X . . . . .	6
data4Y . . . . .	6
data5X . . . . .	7
data5Y . . . . .	7
data6X . . . . .	8
data6Y . . . . .	8
data7X . . . . .	9
data7Y . . . . .	9
data8Y . . . . .	10
HOMTEST . . . . .	10
HOMTESTGLM . . . . .	11
HYPTEST . . . . .	12
PDMIFCLUST . . . . .	13
PDMIFCLUSTGLM . . . . .	14
PDMIFCOUNT . . . . .	16
PDMIFGLM . . . . .	17
PDMIFLIN . . . . .	18
PDMIFLING . . . . .	19
PDMIFLOGIT . . . . .	20
PDMIFPROBIT . . . . .	21
PDMIFQUANTILE . . . . .	22
PDMIFQVAR . . . . .	23
<b>Index</b>	<b>24</b>

---

data1X	<i>A synthesized input variable dataset to fit a linear model on a panel dataset.</i>
--------	---

---

Description

A synthesized input variable dataset to fit a linear model on a panel dataset.

Usage

data1X

**Format**

A data frame with 5,000 rows and 2 columns:

**columns** the two independent variables

**rows** each 100 rows represent the timeseries of each of the 50 individuals ...

---

data1Y	<i>A synthesized output variable dataset to fit a linear model on a panel dataset.</i>
--------	--

---

**Description**

A synthesized output variable dataset to fit a linear model on a panel dataset.

**Usage**

data1Y

**Format**

A data frame with 100 rows and 50 columns:

**columns** the individuals

**rows** the time points in the timeseries of each individual ...

---

data2X	<i>A synthesized input variable dataset to fit a binomial model on a panel dataset.</i>
--------	---

---

**Description**

A synthesized input variable dataset to fit a binomial model on a panel dataset.

**Usage**

data2X

**Format**

A data frame with 5,000 rows and 2 columns:

**columns** the two independent variables

**rows** each 50 rows represent the timeseries of each of the 100 individuals ...

---

data2Y	<i>A synthesized output variable dataset to fit a binomial model on a panel dataset.</i>
--------	--

---

**Description**

A synthesized output variable dataset to fit a binomial model on a panel dataset.

**Usage**

data2Y

**Format**

A data frame with 50 rows and 100 columns:

**columns** the individuals

**rows** the time points in the timeseries of each individual ...

---

data3X	<i>A synthesized input variable dataset to fit a poisson model on a panel dataset.</i>
--------	--

---

**Description**

A synthesized input variable dataset to fit a poisson model on a panel dataset.

**Usage**

data3X

**Format**

A data frame with 5,000 rows and 3 columns:

**columns** the three independent variables

**rows** each 50 rows represent the timeseries of each of the 100 individuals ...

---

data3Y	<i>A synthesized output variable dataset to fit a poisson model on a panel dataset.</i>
--------	---

---

**Description**

A synthesized output variable dataset to fit a poisson model on a panel dataset.

**Usage**

data3Y

**Format**

A data frame with 50 rows and 100 columns:

**columns** the individuals

**rows** the time points in the timeseries of each individual ...

---

data4LAB	<i>A synthesized vector of memberships needed to fit a linear model on a panel dataset under known group memberships.</i>
----------	---

---

**Description**

A synthesized vector of memberships needed to fit a linear model on a panel dataset under known group memberships.

**Usage**

data4LAB

**Format**

A vector with 300 entries indicating the group membership of each individual.

---

data4X	<i>A synthesized input variable dataset to fit a linear model on a panel dataset under known group memberships.</i>
--------	---

---

**Description**

A synthesized input variable dataset to fit a linear model on a panel dataset under known group memberships.

**Usage**

data4X

**Format**

A data frame with 30,000 rows and 2 columns:

**columns** the two independent variables

**rows** each 100 rows represent the timeseries of each of the 300 individuals ...

---

data4Y	<i>A synthesized output variable dataset to fit a linear model on a panel dataset under known group memberships.</i>
--------	--

---

**Description**

A synthesized output variable dataset to fit a linear model on a panel dataset under known group memberships.

**Usage**

data4Y

**Format**

A data frame with 100 rows and 300 columns:

**columns** the individuals

**rows** the time points in the timeseries of each individual ...

---

data5X	<i>A synthesized input variable dataset to cluster individuals by heterogeneous panel data models with interactive effects.</i>
--------	---

---

**Description**

A synthesized input variable dataset to cluster individuals by heterogeneous panel data models with interactive effects.

**Usage**

data5X

**Format**

A data frame with 30,000 rows and 2 columns:

**columns** the two independent variables

**rows** each 100 rows represent the timeseries of each of the 300 individuals ...

---

data5Y	<i>A synthesized output variable dataset to cluster individuals by heterogeneous panel data models with interactive effects.</i>
--------	--

---

**Description**

A synthesized output variable dataset to cluster individuals by heterogeneous panel data models with interactive effects.

**Usage**

data5Y

**Format**

A data frame with 100 rows and 300 columns:

**columns** the individuals

**rows** the time points in the timeseries of each individual ...

---

data6X	<i>A synthesized input variable dataset to cluster individual units by nonlinear heterogeneous panel data models with interactive effects when the group membership is unknown</i>
--------	--

---

### Description

A synthesized input variable dataset to cluster individual units by nonlinear heterogeneous panel data models with interactive effects when the group membership is unknown

### Usage

data6X

### Format

A data frame with 4,500 rows and 2 columns:

**columns** the two independent variables

**rows** each 50 rows represent the timeseries of each of the 90 individuals ...

---

data6Y	<i>A synthesized output variable dataset to cluster individual units by nonlinear heterogeneous panel data models with interactive effects when the group membership is unknown.</i>
--------	--

---

### Description

A synthesized output variable dataset to cluster individual units by nonlinear heterogeneous panel data models with interactive effects when the group membership is unknown.

### Usage

data6Y

### Format

A data frame with 50 rows and 90 columns:

**columns** the individuals

**rows** the time points in the timeseries of each individual ...

---

data7X	<i>A synthesized input variable dataset to fit a quantile panel data model on a panel dataset.</i>
--------	--

---

**Description**

A synthesized input variable dataset to fit a quantile panel data model on a panel dataset.

**Usage**

data7X

**Format**

A data frame with 20,000 rows and 3 columns:

**columns** the three independent variables

**rows** each 100 rows represent the timeseries of each of the 200 individuals ...

---

data7Y	<i>A synthesized output variable dataset to fit a quantile panel data model on a panel dataset.</i>
--------	---

---

**Description**

A synthesized output variable dataset to fit a quantile panel data model on a panel dataset.

**Usage**

data7Y

**Format**

A data frame with 100 rows and 200 columns:

**columns** the individuals

**rows** the time points in the timeseries of each individual ...

---

data8Y	<i>A synthesized output variable dataset to fit a quantile VAR model with interactive effects and lag=2.</i>
--------	--

---

### Description

A synthesized output variable dataset to fit a quantile VAR model with interactive effects and lag=2.

### Usage

data8Y

### Format

A data frame with 102 rows and 15 columns:

**columns** the individuals

**rows** the time points in the timeseries of each individual ...

---

HOMTEST	<i>HOMTEST</i>
---------	----------------

---

### Description

This function tests homogeneity of the regression coefficients in heterogeneous panel data models with interactive effects.

### Usage

```
HOMTEST(X, Y, Nfactors, Maxit = 100, tol = 0.001)
```

### Arguments

X	The (NT) times p design matrix, without an intercept where N=number of individuals, T=length of time series, p=number of explanatory variables.
Y	The T times N panel of response where N=number of individuals, T=length of time series.
Nfactors	A pre-specified number of common factors.
Maxit	A maximum number of iterations in optimization. Default is 100.
tol	Tolerance level of convergence. Default is 0.001.

**Value**

A list with the following components:

- Coefficients: The estimated heterogeneous coefficients.
- Factors: The estimated common factors across groups.
- Loadings: The estimated factor loadings for the common factors.
- pvalue: The p-value of the homogeneity test.

**References**

Ando, T. and Bai, J. (2015) A simple new test for slope homogeneity in panel data models with interactive effects. *Economics Letters*, 136, 112-117.

**Examples**

```
fit <- HOMTEST(data1X,data1Y,2,20,0.5)
```

---

HOMTESTGLM

*HOMTESTGLM*


---

**Description**

This function tests homogeneity of the regression coefficients in heterogeneous generalized linear models with interactive effects.

**Usage**

```
HOMTESTGLM(X, Y, FAMILY, Nfactors, Maxit = 100, tol = 0.001)
```

**Arguments**

X	The (NT) times p design matrix, without an intercept where N=number of individuals, T=length of time series, p=number of explanatory variables.
Y	The T times N panel of response where N=number of individuals, T=length of time series.
FAMILY	A description of the error distribution and link function to be used in the model just like in glm functions.
Nfactors	A pre-specified number of common factors.
Maxit	A maximum number of iterations in optimization. Default is 100.
tol	Tolerance level of convergence. Default is 0.001.

**Value**

A list with the following components:

- Coefficients: The estimated heterogeneous coefficients.
- Factors: The estimated common factors across groups.
- Loadings: The estimated factor loadings for the common factors.
- pvalue: The p-value of the homogeneity test.

**References**

Ando, T. and Bai, J. (2015) A simple new test for slope homogeneity in panel data models with interactive effects. *Economics Letters*, 136, 112-117.

**Examples**

```
fit <- HOMTESTGLM(data2X,data2Y,binomial(link=logit),2,10,0.5)
```

---

HYPTTEST	<i>HYPTTEST</i>
----------	-----------------

---

**Description**

This function undergoes hypothesis testing for regression coefficients obtained from the various functions in the package.

**Usage**

```
HYPTTEST(  
  B,  
  B0,  
  Se,  
  test = "two",  
  variables = seq(1, nrow(B)),  
  individuals = seq(1, ncol(B))  
)
```

**Arguments**

B	A dataframe of Coefficients as obtained in the output of any function in the package.
B0	A dataframe of hypothetical coefficients to be evaluated in the test. (nrows should match number of variables and ncols should match number of individuals)
Se	A dataframe of Standard Errors as obtained in the output of any function in the package.

test	A string to determine what kind of test to run ("two" for two-tailed, "right" for right-tailed and "left" for left-tailed).
variables	A list of variables whose coefficients are to be tested. Default is all variables in the B dataframe.
individuals	A list of individuals whose coefficients are to be tested. Default is all individuals in the B dataframe.

### Value

A dataframe of p-values resulting from each individual test.

### Examples

```
fit <- PDMIFLOGIT(data2X,data2Y,2,20,0.5)
HYPTTEST(fit$Coefficients,data.frame(c(0,1),c(-1,2)),fit$Se,"two",c(1,3),c(1,2))
```

---

PDMIFCLUST

---

*PDMIFCLUST*


---

### Description

Under a pre-specified number of groups and the number of common factors, this function implements clustering for N individuals in the panels. Each of individuals in the group are subject to the group-specific unobserved common factors.

### Usage

```
PDMIFCLUST(X, Y, NGfactors, NLfactors, Maxit = 100, tol = 0.001)
```

### Arguments

X	The (NT) times p design matrix, without an intercept where N=number of individuals, T=length of time series, p=number of explanatory variables.
Y	The T times N panel of response where N=number of individuals, T=length of time series.
NGfactors	A pre-specified number of common factors across groups (see example).
NLfactors	A pre-specified number of factors in each groups (see example).
Maxit	A maximum number of iterations in optimization. Default is 100.
tol	Tolerance level of convergence. Default is 0.001.

**Value**

A list with the following components:

- Label: The estimated group membership for each of the individuals.
- Coefficients: The estimated heterogeneous coefficients.
- Lower05: Lower end (5%) of the 90% confidence interval of the regression coefficients.
- Upper95: Upper end (95%) of the 90% confidence interval of the regression coefficients.
- GlobalFactors: The estimated common factors across groups.
- GlobalLoadings: The estimated factor loadings for the common factors.
- GroupFactors: The estimated group-specific factors.
- GroupLoadings: The estimated factor loadings for each group.
- pval: p-value for testing hypothesis on heterogeneous coefficients.
- Se: Standard error of the estimated regression coefficients.

**References**

Ando, T. and Bai, J. (2016) Panel data models with grouped factor structure under unknown group membership Journal of Applied Econometrics, 31, 163-191.

Ando, T. and Bai, J. (2017) Clustering huge number of financial time series: A panel data approach with high-dimensional predictors and factor structures. Journal of the American Statistical Association, 112, 1182-1198.

**Examples**

```
fit <- PDMIFCLUST(data5X,data5Y,2,c(2,2,2),20,0.5)
```

---

PDMIFCLUSTGLM

---

*PDMIFCLUSTGLM*


---

**Description**

Under a pre-specified number of groups and the number of common factors, this function implements clustering for N individual units by nonlinear heterogeneous panel data models with interactive effects. Exponential family of distributions are used Each of individuals in the group are subject to the group-specific unobserved common factors.

**Usage**

```
PDMIFCLUSTGLM(X, Y, FAMILY, NLfactors, Maxit = 100, tol = 0.001)
```

**Arguments**

X	The (NT) times p design matrix, without an intercept where N=number of individuals, T=length of time series, p=number of explanatory variables.
Y	The T times N panel of response where N=number of individuals, T=length of time series.
FAMILY	A description of the error distribution and link function to be used in the model just like in glm functions.
NLfactors	A pre-specified number of factors in each groups (see example).
Maxit	A maximum number of iterations in optimization. Default is 100.
tol	Tolerance level of convergence. Default is 0.001.

**Value**

A list with the following components:

- Label: The estimated group membership for each of the individuals.
- Coefficients: The estimated heterogeneous coefficients.
- Lower05: Lower end (5%) of the 90% confidence interval of the regression coefficients.
- Upper95: Upper end (95%) of the 90% confidence interval of the regression coefficients.
- GroupFactors: The estimated group-specific factors.
- GroupLoadings: The estimated factor loadings for each group.
- pval: p-value for testing hypothesis on heterogeneous coefficients.
- Se: Standard error of the estimated regression coefficients.

**References**

Ando, T. and Bai, J. (2016) Panel data models with grouped factor structure under unknown group membership *Journal of Applied Econometrics*, 31, 163-191.

Ando, T. and Bai, J. (2017) Clustering huge number of financial time series: A panel data approach with high-dimensional predictors and factor structures. *Journal of the American Statistical Association*, 112, 1182-1198.

**Examples**

```
fit <- PDMIFCLUSTGLM(data6X,data6Y,binomial(link=logit),c(1,1,1),3,0.5)
```

---

PDMIFCOUNT

---

*PDMIFCOUNT*


---

### Description

Under a known group membership, this function estimates heterogeneous poisson panel data models with interactive effects.

### Usage

```
PDMIFCOUNT(X, Y, Nfactors, Maxit = 100, tol = 0.001)
```

### Arguments

X	The (NT) times p design matrix, without an intercept where N=number of individuals, T=length of time series, p=number of explanatory variables.
Y	The T times N panel of response where N=number of individuals, T=length of time series.
Nfactors	A pre-specified number of common factors.
Maxit	A maximum number of iterations in optimization. Default is 100.
tol	Tolerance level of convergence. Default is 0.001.

### Value

A list with the following components:

- Coefficients: The estimated heterogeneous coefficients.
- Lower05: Lower end (5%) of the 90% confidence interval of the regression coefficients.
- Upper95: Upper end (95%) of the 90% confidence interval of the regression coefficients.
- Factors: The estimated common factors across groups.
- Loadings: The estimated factor loadings for the common factors.
- Predict: The conditional expectation of response variable.
- pval: p-value for testing hypothesis on heterogeneous coefficients.
- Se: Standard error of the estimated regression coefficients.

### References

Ando, T., Bai, J. and Li, K. (2021) Bayesian and maximum likelihood analysis of large-scale panel choice models with unobserved heterogeneity, *Journal of Econometrics*.

### Examples

```
fit <- PDMIFCOUNT(data3X,data3Y,3,30,0.5)
```

PDMIFGLM

*PDMIFGLM***Description**

This function estimates heterogeneous panel data models with interactive effects through generalised linear models.

**Usage**

```
PDMIFGLM(X, Y, FAMILY, Nfactors, Maxit = 100, tol = 0.001)
```

**Arguments**

X	The (NT) times p design matrix, without an intercept where N=number of individuals, T=length of time series, p=number of explanatory variables.
Y	The T times N panel of response where N=number of individuals, T=length of time series.
FAMILY	A description of the error distribution and link function to be used in the model just like in glm functions.
Nfactors	A pre-specified number of common factors.
Maxit	A maximum number of iterations in optimization. Default is 100.
tol	Tolerance level of convergence. Default is 0.001.

**Value**

A list with the following components:

- Coefficients: The estimated heterogeneous coefficients.
- Lower05: Lower end (5%) of the 90% confidence interval of the regression coefficients.
- Upper95: Upper end (95%) of the 90% confidence interval of the regression coefficients.
- Factors: The estimated common factors across groups.
- Loadings: The estimated factor loadings for the common factors.
- Predict: The conditional expectation of response variable.
- pval: p-value for testing hypothesis on heterogeneous coefficients.
- Se: Standard error of the estimated regression coefficients.

**References**

Ando, T., Bai, J. and Li, K. (2021) Bayesian and maximum likelihood analysis of large-scale panel choice models with unobserved heterogeneity, *Journal of Econometrics*.

**Examples**

```
fit <- PDMIFGLM(data2X,data2Y,binomial(link=logit),2,20,0.5)
```

PDMIFLIN

*PDMIFLIN***Description**

This function estimates heterogeneous panel data models with interactive effects. This function is similar version of PDMIFLING which accommodates a group structure.

**Usage**

```
PDMIFLIN(X, Y, Nfactors, Maxit = 100, tol = 0.001)
```

**Arguments**

X	The (NT) times p design matrix, without an intercept where N=number of individuals, T=length of time series, p=number of explanatory variables.
Y	The T times N panel of response where N=number of individuals, T=length of time series.
Nfactors	A pre-specified number of common factors.
Maxit	A maximum number of iterations in optimization. Default is 100.
tol	Tolerance level of convergence. Default is 0.001.

**Value**

A list with the following components:

- Coefficients: The estimated heterogeneous coefficients.
- Lower05: Lower end (5%) of the 90% confidence interval of the regression coefficients.
- Upper95: Upper end (95%) of the 90% confidence interval of the regression coefficients.
- Factors: The estimated common factors across groups.
- Loadings: The estimated factor loadings for the common factors.
- Predict: The conditional expectation of response variable.
- pval: p-value for testing hypothesis on heterogeneous coefficients.
- Se: Standard error of the estimated regression coefficients.

**References**

Ando, T. and Bai, J. (2015) Asset Pricing with a General Multifactor Structure Journal of Financial Econometrics, 13, 556-604.

**Examples**

```
fit <- PDMIFLIN(data1X,data1Y,2)
```

PDMIFLING

*PDMIFLING***Description**

Under a known group membership, this function estimates heterogeneous panel data models with interactive effects. Together with the regression coefficients, this function estimates the unobserved common factor structures both for across/within groups.

**Usage**

```
PDMIFLING(X, Y, Membership, NGfactors, NLfactors, Maxit = 100, tol = 0.001)
```

**Arguments**

X	The (NT) times p design matrix, without an intercept where N=number of individuals, T=length of time series, p=number of explanatory variables.
Y	The T times N panel of response where N=number of individuals, T=length of time series.
Membership	A pre-specified group membership.
NGfactors	A pre-specified number of common factors across groups (see example).
NLfactors	A pre-specified number of factors in each groups (see example).
Maxit	A maximum number of iterations in optimization. Default is 100.
tol	Tolerance level of convergence. Default is 0.001.

**Value**

A list with the following components:

- Coefficients: The estimated heterogeneous coefficients.
- Lower05: Lower end (5%) of the 90% confidence interval of the regression coefficients.
- Upper95: Upper end (95%) of the 90% confidence interval of the regression coefficients.
- GlobalFactors: The estimated common factors across groups.
- GlobalLoadings: The estimated factor loadings for the common factors.
- GroupFactors: The estimated group-specific factors.
- GroupLoadings: The estimated factor loadings for each group.
- pval: p-value for testing hypothesis on heterogeneous coefficients.
- Se: Standard error of the estimated regression coefficients.

**References**

Ando, T. and Bai, J. (2015) Asset Pricing with a General Multifactor Structure Journal of Financial Econometrics, 13, 556-604.

**Examples**

```
fit <- PDMIFLING(data4X,data4Y,data4LAB,2,c(2,2,2),30,0.1)
```

---

PDMIFLOGIT	<i>PDMIFLOGIT</i>
------------	-------------------

---

**Description**

This function estimates heterogeneous logistic panel data models with interactive effects.

**Usage**

```
PDMIFLOGIT(X, Y, Nfactors, Maxit = 100, tol = 0.001)
```

**Arguments**

X	The (NT) times p design matrix, without an intercept where N=number of individuals, T=length of time series, p=number of explanatory variables.
Y	The T times N panel of response where N=number of individuals, T=length of time series.
Nfactors	A pre-specified number of common factors.
Maxit	A maximum number of iterations in optimization. Default is 100.
tol	Tolerance level of convergence. Default is 0.001.

**Value**

A list with the following components:

- Coefficients: The estimated heterogeneous coefficients.
- Lower05: Lower end (5%) of the 90% confidence interval of the regression coefficients.
- Upper95: Upper end (95%) of the 90% confidence interval of the regression coefficients.
- Factors: The estimated common factors across groups.
- Loadings: The estimated factor loadings for the common factors.
- Predict: The conditional expectation of response variable.
- pval: p-value for testing hypothesis on heterogeneous coefficients.
- Se: Standard error of the estimated regression coefficients.

**References**

Ando, T., Bai, J. and Li, K. (2021) Bayesian and maximum likelihood analysis of large-scale panel choice models with unobserved heterogeneity, *Journal of Econometrics*.

**Examples**

```
fit <- PDMIFLOGIT(data2X,data2Y,2,20,0.5)
```

---

PDMIFPROBIT

---

*PDMIFPROBIT*


---

### Description

This function estimates heterogeneous probit panel data models with interactive effects.

### Usage

```
PDMIFPROBIT(X, Y, Nfactors, Maxit = 100, tol = 0.001)
```

### Arguments

X	The (NT) times p design matrix, without an intercept where N=number of individuals, T=length of time series, p=number of explanatory variables.
Y	The T times N panel of response where N=number of individuals, T=length of time series.
Nfactors	A pre-specified number of common factors.
Maxit	A maximum number of iterations in optimization. Default is 100.
tol	Tolerance level of convergence. Default is 0.001.

### Value

A list with the following components:

- Coefficients: The estimated heterogeneous coefficients.
- Lower05: Lower end (5%) of the 90% confidence interval of the regression coefficients.
- Upper95: Upper end (95%) of the 90% confidence interval of the regression coefficients.
- Factors: The estimated common factors across groups.
- Loadings: The estimated factor loadings for the common factors.
- Predict: The conditional expectation of response variable.
- pval: p-value for testing hypothesis on heterogeneous coefficients.
- Se: Standard error of the estimated regression coefficients.

### References

Ando, T., Bai, J. and Li, K. (2021) Bayesian and maximum likelihood analysis of large-scale panel choice models with unobserved heterogeneity, *Journal of Econometrics*.

### Examples

```
fit <- PDMIFPROBIT(data2X,data2Y,2,20,0.5)
```

---

PDMIFQUANTILE

*PDMIFQUANTILE*


---

### Description

This function estimates heterogeneous quantile panel data models with interactive effects.

### Usage

```
PDMIFQUANTILE(X, Y, TAU, Nfactors, Maxit = 100, tol = 0.001)
```

### Arguments

X	The (NT) times p design matrix, without an intercept where N=number of individuals, T=length of time series, p=number of explanatory variables.
Y	The T times N panel of response where N=number of individuals, T=length of time series.
TAU	A pre-specified quantile point.
Nfactors	A pre-specified number of common factors.
Maxit	A maximum number of iterations in optimization. Default is 100.
tol	Tolerance level of convergence. Default is 0.001.

### Value

A list with the following components:

- Coefficients: The estimated heterogeneous coefficients.
- Lower05: Lower end (5%) of the 90% confidence interval of the regression coefficients.
- Upper95: Upper end (95%) of the 90% confidence interval of the regression coefficients.
- Factors: The estimated common factors across groups.
- Loadings: The estimated quantile point under a given tau.
- Predict: The conditional expectation of response variable.
- pval: p-value for testing hypothesis on heterogeneous coefficients.
- Se: Standard error of the estimated regression coefficients.

### References

Ando, T. and Bai, J. (2020) Quantile co-movement in financial markets Journal of the American Statistical Association.

### Examples

```
fit <- PDMIFQUANTILE(data7X,data7Y,0.95,2,10,0.8)
```

---

PDMIFQVAR

---

*PDMIFQVAR*


---

### Description

This function estimates heterogeneous quantile panel data VAR models with interactive effects.

### Usage

```
PDMIFQVAR(Y, LAG, TAU, Nfactors, Maxit = 100, tol = 0.001)
```

### Arguments

Y	The T times N panel of response where N=number of individuals, T=length of time series.
LAG	The number of lags from $y_{t-1}$ to $y_{t-LAG}$ used in the VAR.
TAU	A pre-specified quantile point.
Nfactors	A pre-specified number of common factors.
Maxit	A maximum number of iterations in optimization. Default is 100.
tol	Tolerance level of convergence. Default is 0.001.

### Value

A list with the following components:

- Coefficients: The estimated heterogeneous coefficients.
- Lower05: Lower end (5%) of the 90% confidence interval of the regression coefficients.
- Upper95: Upper end (95%) of the 90% confidence interval of the regression coefficients.
- Factors: The estimated common factors across groups.
- Loadings: The estimated quantile point under a given tau.
- Predict: The conditional expectation of response variable.
- pval: p-value for testing hypothesis on heterogeneous coefficients.
- Se: Standard error of the estimated regression coefficients.

### References

Ando, T. and Bai, J. (2020) Quantile co-movement in financial markets Journal of the American Statistical Association.

### Examples

```
fit <- PDMIFQVAR(data8Y,2,0.1,2,5,0.8)
```

# Index

## \* datasets

- data1X, [2](#)
- data1Y, [3](#)
- data2X, [3](#)
- data2Y, [4](#)
- data3X, [4](#)
- data3Y, [5](#)
- data4LAB, [5](#)
- data4X, [6](#)
- data4Y, [6](#)
- data5X, [7](#)
- data5Y, [7](#)
- data6X, [8](#)
- data6Y, [8](#)
- data7X, [9](#)
- data7Y, [9](#)
- data8Y, [10](#)

- data1X, [2](#)
- data1Y, [3](#)
- data2X, [3](#)
- data2Y, [4](#)
- data3X, [4](#)
- data3Y, [5](#)
- data4LAB, [5](#)
- data4X, [6](#)
- data4Y, [6](#)
- data5X, [7](#)
- data5Y, [7](#)
- data6X, [8](#)
- data6Y, [8](#)
- data7X, [9](#)
- data7Y, [9](#)
- data8Y, [10](#)

- HOMTEST, [10](#)
- HOMTESTGLM, [11](#)
- HYPTTEST, [12](#)

- PDMIFCLUST, [13](#)

- PDMIFCLUSTGLM, [14](#)
- PDMIFCOUNT, [16](#)
- PDMIFGLM, [17](#)
- PDMIFLIN, [18](#)
- PDMIFLING, [19](#)
- PDMIFLOGIT, [20](#)
- PDMIFPROBIT, [21](#)
- PDMIFQUANTILE, [22](#)
- PDMIFQVAR, [23](#)