

Package ‘frmhet’

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Title Regression Analysis of Fractional Responses Under Unobserved Heterogeneity

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Description Estimation and specification analysis of fractional regression models with neglected heterogeneity and/or endogenous covariates.

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frmhet-package	<i>Regression Analysis of Fractional Responses Under Unobserved Heterogeneity</i>
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Description

Estimation and specification analysis of fractional regression models with neglected heterogeneity and/or endogenous covariates.

Details

Package: frm
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 Version: 1.1.3
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Author(s)

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References

Ramalho, E.A. and J.J.S. Ramalho (2016), "Moment-based estimation of nonlinear regression models with boundary outcomes and endogeneity, with applications to nonnegative and fractional responses", *Econometric Reviews*, forthcoming (DOI: 10.1080/07474938.2014.976531).

frmh

Fitting Fractional Regression Models under Unobserved Heterogeneity

Description

frmh is used to fit fractional regression models under unobserved heterogeneity, i.e. regression models for proportions, percentages or fractions that suffer from neglected heterogeneity and/or endogeneity issues.

Usage

```
frmh(y, x, z = x, var.endog, start, type = "GMMx", link = "logit", intercept = T,
table = T, variance = T, var.type = "robust", var.cluster, adjust = 0, ...)
```

Arguments

y	a numeric vector containing the values of the response variable.
x	a numeric matrix, with column names, containing the values of all covariates (exogenous and endogenous).
z	a numeric matrix, with column names, containing the values of all exogenous variables (covariates and instrumental variables). Defaults to x.
var.endog	a numeric vector containing the values of the endogenous covariate (or of some transformation of it), which will be used as dependent variable in the linear reduced form assumed for application of xv-type estimators.
start	a numeric vector containing the initial values for the parameters to be optimized. Optional.

type	a description of the estimator to compute: GMMx (the default), GMMxv, GMMz, LINx, LINxv, LINz or QMLxv.
link	a description of the link function to use. Available options for all estimators: logit and cloglog. Additional available options for QML and LIN estimators: probit, cauchit and loglog.
intercept	a logical value indicating whether the model should include a constant term or not.
table	a logical value indicating whether a summary table with the regression results should be printed.
variance	a logical value indicating whether the variance of the estimated parameters should be calculated. Defaults to TRUE whenever table = TRUE.
var.type	a description of the type of variance of the estimated parameters to be calculated. Options are robust, the default, and cluster.
var.cluster	a numeric vector containing the values of the variable that specifies to which cluster each observation belongs.
adjust	the numeric value to be added to the response variable in case of boundary observations when the LIN estimators are applied or the string drop, which implies that the boundary observations are dropped.
...	Arguments to pass to nlminb .

Details

frmh computes the GMM estimators proposed in Ramalho and Ramalho (2016) for fractional regression models with unobserved heterogeneity: GMMx, which allows for neglected heterogeneity but not for endogeneity; GMMxv, which allows both issues and assumes a linear reduced form for the endogenous covariate (or for a transformation of it); and GMMz, which also allows for both issues but does not require the assumption of a reduced form for the endogenous covariate. In addition, frmh also computes three linearized estimators (LINx, LINxv and LINz) that have similar features to their GMM counterparts as well as a QML estimator that allows for endogeneity but not for neglected heterogeneity (QMLxv); see Ramalho and Ramalho (2016) for details on each estimator. For overidentified models, frmh calculates Hansen's J statistic. For GMMx and LINx, frmh stores the information needed to implement the RESET test ([frmh.reset](#)). For all estimators, frmh stores the information needed to calculate partial effects ([frmh.pe](#)).

Value

frmh returns a list with the following elements:

class	"frmh".
formula	the model formula.
type	the name of the estimator computed.
link	the name of the specified link.
adjust	The value or the type of the adjustment applied to LIN estimators.
p	a named vector of coefficients.

Hy	the transformed values of the response variable when GMM or LIN estimators are computed or the values of the response variable in the QML case.
xbhat	the fitted mean values of the linear predictor (for xv-type estimators, includes the term relative to the first-stage residual).
converged	logical. Was the algorithm judged to have converged?
x.names	a vector containing the names of the covariates.

In case of an overidentifying model, the following element is also returned:

J	the result of Hansen's J test of overidentifying moment conditions.
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If `variance = TRUE` or `table = TRUE` and the algorithm converged successfully, the previous list also contains the following elements:

p.var	a named covariance matrix.
var.type	covariance matrix type.

If `var.type = "cluster"`, the list also contains the following element:

var.cluster	the variable that specifies to which cluster each observation belongs.
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Author(s)

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References

Ramalho, E.A. and J.J.S. Ramalho (2016), "Moment-based estimation of nonlinear regression models with boundary outcomes and endogeneity, with applications to nonnegative and fractional responses", *Econometric Reviews*, forthcoming (DOI: 10.1080/07474938.2014.976531).

See Also

[frmhct.reset](#), for the RESET test.
[frmhct.pe](#), for computing partial effects.
[frm](#), for fitting standard cross-sectional fractional regression models.
[frmpd](#), for fitting panel data fractional regression models.

Examples

```
N <- 250
u <- rnorm(N)

X <- cbind(rnorm(N), rnorm(N))
dimnames(X)[[2]] <- c("X1", "X2")

Z <- cbind(rnorm(N), rnorm(N), rnorm(N))
dimnames(Z)[[2]] <- c("Z1", "Z2", "Z3")

y <- exp(X[,1]+X[,2]+u)/(1+exp(X[,1]+X[,2]+u))
```

```

#Exogeneity, GMMx estimator
frmhnet(y,X,type="GMMx")

#Endogeneity, GMMz estimator
frmhnet(y,X,Z,type="GMMz")

#Endogeneity, GMMxv estimator
frmhnet(y,X,Z,X[,1],type="GMMxv")

## See the website http://evunix.uevora.pt/~jsr/FRM.htm for more examples.

```

frmhnet.pe	<i>Fractional Regression Models under Unobserved Heterogeneity - Partial Effects</i>
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Description

frmhnet.pe is used to compute average and/or conditional partial effects in fractional regression models under unobserved heterogeneity.

Usage

```
frmhnet.pe(object, smearing = T, APE = T, CPE = F, at = NULL, which.x = NULL,
table = T, variance = T)
```

Arguments

object	an object containing the results of an frmhnet command.
smearing	a logical value indicating whether the smearing correction is to be applied
APE	a logical value indicating whether average partial effects are to be computed.
CPE	a logical value indicating whether conditional partial effects are to be computed.
at	a numeric vector containing the covariates' values at which the conditional partial effects are to be computed or the strings "mean" (the default) or "median", in which cases the covariates are evaluated at their mean or median values (or mode, in case of dummy variables), respectively.
which.x	a vector containing the names of the covariates to which the partial effects are to be computed.
table	a logical value indicating whether a summary table with the results should be printed.
variance	a logical value indicating whether the variance of the estimated partial effects should be calculated. Defaults to TRUE whenever table = TRUE.

Details

frmhnet.pe calculates partial effects for fractional regression models estimated via frmhnet. frmhnet.pe may be used to compute average or conditional partial effects. These partial effects may be conditional only on observables, using the smearing estimator, or also on unobservables, setting the error term to zero. For calculating standard errors, it is taken into account the option that was previously chosen for estimating the model. See Ramalho and Ramalho (2016) for details on the computation of partial effects for fractional regression models under unobserved heterogeneity.

Value

frmhnet.pe returns a list with the following element:

PE.p a named vector of partial effects.

If variance = TRUE or table = TRUE, the previous list also contains the following element:

PE.sd a named vector of standard errors of the estimated partial effects.

When both average and conditional partial effects are requested, two lists containing the previous elements are returned, indexed by the prefixes ape and cpe.

Author(s)

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References

Ramalho, E.A. and J.J.S. Ramalho (2016), "Moment-based estimation of nonlinear regression models with boundary outcomes and endogeneity, with applications to nonnegative and fractional responses", *Econometric Reviews*, forthcoming (DOI: 10.1080/07474938.2014.976531).

See Also

[frmhnet](#), for fitting fractional regression models under unobserved heterogeneity.
[frmhnet.reset](#), for the RESET test.

Examples

```
N <- 250
u <- rnorm(N)

X <- cbind(rnorm(N), rnorm(N))
dimnames(X)[[2]] <- c("X1", "X2")

Z <- cbind(rnorm(N), rnorm(N), rnorm(N))
dimnames(Z)[[2]] <- c("Z1", "Z2", "Z3")

y <- exp(X[,1]+X[,2]+u)/(1+exp(X[,1]+X[,2]+u))

res <- frmhnet(y, X, type="GMMx", table=FALSE)
```

```
#Smearing estimator of average partial effects for variable X1
frmheter.pe(res,which.x="X1")

#Naive estimator of conditional partial effects for all covariates,
#which are evaluated at X1=1 and X2=-1
frmheter.pe(res,smearing=FALSE,APE=FALSE,CPE=TRUE,at=c(1,-1))

## See the website http://evunix.uevora.pt/~jsr/FRM.htm for more examples.
```

frmheter.reset	<i>RESET Test for Fractional Regression Models under Neglected Heterogeneity</i>
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Description

frmheter.reset is used to test the specification of fractional regression models estimated by GMMx or LINx.

Usage

```
frmheter.reset(object, lastpower.vec = 3, version = "Wald", table = T, ...)
```

Arguments

object	an object containing the results of an frmheter command.
lastpower.vec	a numeric vector containing the maximum powers of the linear predictors to be used in RESET tests.
version	a vector containing the test versions to use. Available options: Wald (the default) and LM (only available for GMMx).
table	a logical value indicating whether a summary table with the test results should be printed.
...	Arguments to pass to nlminb , which is used to estimate the model under the alternative hypothesis when version is equal to "Wald" and the null model was estimated by GMMx.

Details

frmheter.reset applies the RESET test statistic to fractional regression models estimated via frmheter using the options GMMx or LINx. frmheter.reset may be used to test simultaneously the validity of the link specification and the transformation applied to the response variable by each estimator. It is taken into account the option that was chosen for computing standard errors in the model under evaluation. See Ramalho and Ramalho and Ramalho (2016) for details.

Value

frmheter.reset returns a named vector with the test results.

Author(s)

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References

Ramalho, E.A. and J.J.S. Ramalho (2016), "Moment-based estimation of nonlinear regression models with boundary outcomes and endogeneity, with applications to nonnegative and fractional responses", *Econometric Reviews*, forthcoming (DOI: 10.1080/07474938.2014.976531).

See Also

[frmhet](#), for fitting fractional regression models under unobserved heterogeneity.
[frmhet.pe](#), for computing partial effects.

Examples

```
N <- 250
u <- rnorm(N)

X <- cbind(rnorm(N), rnorm(N))
dimnames(X)[[2]] <- c("X1", "X2")

Z <- cbind(rnorm(N), rnorm(N), rnorm(N))
dimnames(Z)[[2]] <- c("Z1", "Z2", "Z3")

y <- exp(X[,1]+X[,2]+u)/(1+exp(X[,1]+X[,2]+u))

res <- frmhet(y,X,type="GMMx",table=FALSE)

#LM and Wald versions of the RESET test, based on 1 or 2 fitted powers of xb
frmhet.reset(res,2:3,c("Wald", "LM"))

## See the website http://evunix.uevora.pt/~jsr/FRM.htm for more examples.
```


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