Package ‘frmhet’

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frmhet-package

Regression Analysis of Fractional Responses Under Unobserved Heterogeneity

Description

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

Details


frmhet

Fitting Fractional Regression Models under Unobserved Heterogeneity

Description

frmhet 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

frmhet(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

<table>
<thead>
<tr>
<th>Argument</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>y</td>
<td>a numeric vector containing the values of the response variable.</td>
</tr>
<tr>
<td>x</td>
<td>a numeric matrix, with column names, containing the values of all covariates (exogenous and endogenous).</td>
</tr>
<tr>
<td>z</td>
<td>a numeric matrix, with column names, containing the values of all exogenous variables (covariates and instrumental variables). Defaults to x.</td>
</tr>
<tr>
<td>var.endog</td>
<td>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.</td>
</tr>
<tr>
<td>start</td>
<td>a numeric vector containing the initial values for the parameters to be optimized. Optional.</td>
</tr>
</tbody>
</table>
frmhet 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 endogeneous 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, frmhet 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, frmhet calculates Hansen’s J statistic. For GMMx and LINx, frmhet stores the information needed to implement the RESET test (frmhet.reset). For all estimators, frmhet stores the information needed to calculate partial effects (frmhet.pe).

Details

frmhet returns a list with the following elements:

class "frmhet".
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.
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.

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.

Author(s)
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References

See Also
frmhet.reset, for the RESET test.
frmhet.pe, for computing partial effects.
frm, for fitting standard cross-sectional fractional regression models.
frmpd, for fitting panel data fractional regression models.

Examples

```r
N <- 250
t <- 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]+t)/(1+exp(X[,1]+X[,2]+t))
```
# Exogeneity, GMMx estimator
frmhet(y,X,type="GMMx")

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

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

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

### Description

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

### Usage

`frmhet.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 `frmhet` 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

`frmhet.pe` calculates partial effects for fractional regression models estimated via `frmhet`. `frmhet.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

`frmhet.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`.

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References


See Also

- `frmhet`, for fitting fractional regression models under unobserved heterogeneity.
- `frmhet.reset`, for the RESET test.

Examples

```r
N <- 250
t <- 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]+t)/(1+exp(X[,1]+X[,2]+t))
res <- frmhet(y, X, type="GMMx", table=FALSE)
```
**frmhet.reset**

**RESET Test for Fractional Regression Models under Neglected Heterogeneity**

**Description**

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

**Usage**

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

**Arguments**

- `object`: an object containing the results of an `frmhet` 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**

`frmhet.reset` applies the RESET test statistic to fractional regression models estimated via `frmhet` using the options GMMx or LINx. `frmhet.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**

`frm.reset` returns a named vector with the test results.
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References


See Also

*frmhet*, for fitting fractional regression models under unobserved heterogeneity.

*frmhet.pe*, for computing partial effects.

Examples

```r
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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