Package 'feisr'

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Title Estimating Fixed Effects Individual Slope Models

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Description Provides a function to estimate fixed effects individual slope models.

Depends R (>= 3.4.0)

License GPL (>= 2)

Encoding UTF-8

LazyData true

RdMacros Rdpack

Imports aod, Formula, plm, Rdpack, stats

Suggests texreg, testthat

RoxygenNote 6.0.1

R topics documented:

`extract.feis` *Extract method for* `feis`*-class*

Description

Provides extract method for usage of `texreg` with `feis`-class

Usage

```
extract.feis(model, include.rsquared = TRUE, include.adjrs = TRUE,
  include.nobs = TRUE, include.groups = TRUE, include.rmse = TRUE, ...)
```

Arguments

`model`	an object of class `feis`
`include.rsquared`	logical. If `TRUE` (default) R squared is reported.
`include.adjrs`	logical. If `TRUE` (default) adjusted R squared is reported.
`include.nobs`	logical. If `TRUE` number of observations is reported.
`include.groups`	logical. If `TRUE` number of groups is reported.
`include.rmse`	logical. If `TRUE` RMSE is reported.
`...`	further arguments.

See Also

`texreg`, `screenreg`

Examples

```
library(texreg)

setMethod("extract", signature = className("feis", "feisr"),
definition = extract.feis)

data("Produc", package = "plm")
feis1.mod <- feis("log(gsp) ~ log(pcap) | year",
                  data = Produc, id = "state", robust = TRUE)
feis2.mod <- feis("log(gsp) ~ log(pcap) + log(pc) + log(emp) + unemp | year",
                  data = Produc, id = "state", robust = TRUE)
screenreg(list(feis1.mod, feis2.mod))
```

feis *Fixed Effects Individual Slope Estimator*

Description

Estimates fixed effects individual slope estimators by applying linear `lm` models to "detrended" data.

Usage

```
feis(formula, data, id, robust = FALSE, intercept = FALSE,
  dropgroups = FALSE, ...)
```

Arguments

`formula`	a symbolic description for the model to be fitted.
`data`	a `data.frame` containing the specified variables.
`id`	the name of a unique group / person identifier (as string).
`robust`	logical. If `TRUE` estimates cluster robust standard errors (default is `FALSE`).
`intercept`	logical. If `TRUE` estimates the model with an intercept (default is `FALSE`).
`dropgroups`	logical. If `TRUE` groups without any within variance on a slope variable are dropped , if `FALSE` those variables are omitted for the respective groups only (default is `FALSE`).
`...`	further arguments.

Details

`feis` is a special function to estimate linear fixed effects models with individual-specific slopes. In contrast to conventional fixed effects models, data are not person "demeaned", but "detrended" by the predicted indivdiual slope of each person (Bruederl and Ludwig 2015; Wooldridge 2010).

Estimation requires at least `q+1` observations per unit, where `q` is the number of slope parameters (including a constant). `feis` automatically selects only those groups from the current data set which have at least `q+1` observations. The function draws a warning if units with `<q+1` observations are dropped.

The function requires a two-part formula, in which the second part indicates the slope parameter(s). If, for example, the model is `y ~ x1 + x2`, with the slope variables `x3` and `x4`, the model can be estimated with:

- `formula = y ~ x1 + x2 | x3 + x4`

If the second part is not specified (and individual "slopes" are estimated only by an intercept), the model reduces to a conventional fixed effects (within) model. In this case please use the well-established `plm` (`model="within"`) instead of `feis`.

If specified, `feis` estimated panel-robust standard errors. Panel-robust standard errors are robust to arbitrary forms of serial correlation within groups formed by `id` as well as heteroscedasticity across groups (see Wooldridge 2010, pp. 379-381).

Value

An object of class "feis", containing the following elements:

coefficients	the vector of coefficients.
vcov	the variance-covariance matrix of the coefficients.
residuals	the vector of residuals (computed from the "detrended" data).
df.residual	degrees of freedom of the residuals.
formula	an object of class "Formula" describing the model.
model	the original model frame as a data.frame containing the original variables used for estimation.
modelhat	a constructed model frame as a data.frame containing the predicted values from the first stage regression using the slope variable as predictor.
modeltrans	a constructed model frame as a data.frame containing the "detrended" variables used for the final model estimation and the untransformed slope variables.
response	the vector of the "detrended" response variable.
fitted.values	the vector of fitted values (computed from the "detrended" data).
id	a vector containing the unique person identifier.
call	the matched call.
assign	assign attributes of the formula.
na.omit	(where relevant) a vector of the omitted observations. Only handling of NAs is "omit".
contrasts	(only where relevant) the contrasts used.
arg	a list containing the used methods. Only "feis" and "individual" effects available.
slopevars	a character vector containing the names of the slope variables.
r2	R squared of the "detrended" model.
adj.r2	adjusted R squared of the "detrended" model.
vcov_arg	a character containing the method used to compute the variance-covariance matrix.

References

Bruederl J, Ludwig V (2015). "Fixed-Effects Panel Regression." In Best H, Wolf C (eds.), *The Sage Handbook of Regression Analysis and Causal Inference*, 327–357. Sage, Los Angeles. ISBN 1446252442.

Wooldridge JM (2010). *Econometric Analysis of Cross Section and Panel Data*. MIT Press, Cambridge, Mass. ISBN 0262294354.

See Also

plm, feistest

Examples

```
data("Produc", package = "plm")
feis.mod <- feis("log(gsp) ~ log(pcap) + log(pc) + log(emp) + unemp | year",
                 data = Produc, id = "state", robust = TRUE)
summary(feis.mod)
```

feistest *Augmented Regression Test*

Description

Estimates a regression-based Hausmann test for fixed effects individual slope models.

Usage

```
feistest(model = NA, robust = FALSE, type = c("both", "art1", "art2"),
  ...)
```

Arguments

model	an object of class "feis".
robust	logical. If TRUE uses cluster robust standard errors (Default is FALSE).
type	one of "both" (the Default), "art1", "art2".
...	further arguments.

Details

The Hausmann test can be computed by estimating a correlated random effects model (see Wooldridge 2010, pp. 328-334). This is achieved by estimating a Mundlak (Mundlak 1978) specification using random effects models with plm. Subsequently, feistest tests whether the time-constant variables / slope variables are correlated with the unobserved heterogeneity by using a Wald-test with wald.test.

While type="art2" estimates the conventional regression-based Hausmann test (as described in Wooldridge 2010, pp. 328-334) comparing conventional fixed effects models against random effects models, type="art1" estimates an extended regression-based Hausmann test comparing fixed effects individual slope models and conventional fixed effects model. For "art1 the Mundlak-specification includes the person-specific averages, but additionally the person-specific slope estimates used for "detrending" in feis. The Wald test of type="art1" is applied to the slope variables only.

If specified, feistest uses panel-robust standard errors.

Value

An object of class "feistest", containing the following elements:

wald_feis	an object of class "wald.test" testing the fixed effects individual slopes model against the conventional fixed effects model (see wald.test).
wald_fe	an object of class "wald.test" testing the fixed effects model against the random effects model (see wald.test).
vcov1	the variance-covariance matrix of CREIS.
vcov2	the variance-covariance matrix of CRE.
CREIS	an object of class "plm" estimating a Correlated Random Effect Individual Slope model (see plm).
CRE	an object of class "plm" estimating a Correlated Random Effect model (see plm).

call	the matched call.
robust	logical. If TRUE cluster robust standard errors were used.
formula	an object of class "Formula" describing the model.
type	the type of performed test(s).

References

Mundlak Y (1978). "On the Pooling of Time Series and Cross Section Data." *Econometrica*, **46**(1), 69. ISSN 00129682, doi: 10.2307/1913646.

Wooldridge JM (2010). *Econometric Analysis of Cross Section and Panel Data*. MIT Press, Cambridge, Mass. ISBN 0262294354.

See Also

feis, plm, wald.test, phtest

Examples

```
data("Produc", package = "plm")
feis.mod <- feis(log(gsp) ~ log(pcap) + log(pc) + log(emp) + unemp | year,
                 data = Produc, id = "state", robust = TRUE)
ht <- feistest(feis.mod, robust = TRUE, type = "both")
summary(ht)
```

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slopes *Extract individual slopes*

Description

Extracts the individual slopes alpha_i from a feis object created by feis

Usage

```
slopes(model = NA, ...)
```

Arguments

model	an object of class "feis".
...	further arguments.

Details

If slope variables are perfectly collinear within a cluster, one variable is dropped and the function returns 0 for the respective slope and cluster.

Value

A N x J matrix containing the individual slopes for each cluster unit N and slope variable J. Rownames indicate the cluster id.

Examples

```
data("Produc", package = "plm")
feis.mod <- feis("log(gsp) ~ log(pcap) + log(pc) + log(emp) + unemp | year",
                 data = Produc, id = "state", robust = TRUE)
slps <- slopes(feis.mod)
```

`summary.feis` *Summary for feis objects*

Description

The summary method for feis objects generates some more information about estimated feis models

Usage

```
## S3 method for class 'feis'
summary(object, vcov = NULL, ...)
```

Arguments

`object`	an object of class "`plm`".
`vcov`	a variance-covariance matrix furnished by the user or a function to calculate one.
`...`	further arguments.

Value

An object of class "`summary.feis`", containing the elements of the feis object (see `feis`). The following objects are modified:

`coefficients`	a matrix with the estimated coefficients, standard errors, t-values, and p-values, if argument vcov was set to non-NULL the standard errors are calculated by the `vcov` in the input object.
`r.squared`	a vector containing R squared and adjusted R squared.

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