ivlewbel: Uses heteroscedasticity to estimate mismeasured and endogenous regressor models

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Package ‘ivlewbel’

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Type Package

Title Uses heteroscedasticity to estimate mismeasured and endogenous regressor models

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Author Alan Fernihough

Maintainer Alan Fernihough <alan.fernihough@gmail.com>

Description GMM estimation of triangular systems using heteroscedasticity based instrumental vari-
ables as in Lewbel (2012)

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Depends stats, gmm, plyr, lmtest

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Description

This function estimates the model parameters and associated standard errors for a linear regression model with one or more endogenous regressors. Identification is achieved through heteroscedastic covariance restrictions within the triangular system.

Usage

lewbel(formula, data, clustervar = NULL, robust = TRUE)

Arguments

- formula: an object of class "formula" (or one that can be coerced to that class).
- data: the data frame containing these data. This argument must be used.
- clustervar: a character value naming the cluster on which to adjust the standard errors and test statistics.
- robust: if TRUE the function reports standard errors and test statistics that have been corrected for the presence heteroscedasticity using White’s method.

Details

The formula follows a four-part specification. Each part is separated by a vertical bar character “|”. The following formula is an example: \( y_2 \sim y_1 \mid x_1 + x_2 + x_3 \mid x_1 + x_2 \mid z_1 \). Here, \( y_2 \) is the dependent variable and \( y_1 \) is the endogenous regressor. The code \( x_1 + x_2 + x_3 \) represents the exogenous regressors whereas the third part \( x_1 + x_2 \) specifies the exogenous heteroscedastic variables from which the instruments are derived. The final part \( z_1 \) is optional, allowing the user to include traditional instrumental variables. If both robust=TRUE and !is.null(clustervar) the function overrides the robust command and computes clustered standard errors and test statistics adjusted to account for clustering. This function computes partial F-statistics that indicate potentially weak identification. In cases where there is more than one endogenous regressor the Angrist-Pischke (2009) method for multivariate first-stage F-statistics is employed.

Value

- coef.est: a coefficient matrix with columns containing the estimates, associated standard errors, test statistics and p-values.
- call: the matched call.
- num.obs: the number of observations.
- j.test: J-test for overidentifying restrictions.
- f.test.stats: Partial F-test statistics for weak IV detection.
References


Examples

```r
set.seed(1234)
n = 1000
x1 = rnorm(n, 0, 1)
x2 = rnorm(n, 0, 1)
u = rnorm(n, 0, 1)
s1 = rnorm(n, 0, 1)
s2 = rnorm(n, 0, 1)
ow = rnorm(n, 0, 1)
z1 = rnorm(n, 0, 1)
e1 = u + exp(x1)*s1 + exp(x2)*s1
e2 = u + exp(-x1)*s2 + exp(-x2)*s2
y1 = 1 + x1 + x2 + ov + e2 + 2*z1
y2 = 1 + x1 + x2 + y1 + 2*ov + e1
data = data.frame(y2, y1, x1, x2, z1)
lewbel(formula = y2 ~ y1 | x1 + x2 | x1 + x2, data = data)
lewbel(formula = y2 ~ y1 | x1 + x2 | x1 + x2 | z1, data = data)
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