Package 'dfadjust'

December 17, 2024

Title Degrees of Freedom Adjustment for Robust Standard Errors

Version 1.1.0

Description Computes small-sample degrees of freedom adjustment for heteroskedasticity robust standard errors, and for clustered standard errors in linear regression. See Imbens and Kolesár (2016) <doi:10.1162/REST_a_00552> for a discussion of these adjustments.

Depends R (>= 3.6.0)

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Encoding UTF-8

Imports collapse

Suggests testthat (>= 2.1.0),
sandwich,
knitr,
rmarkdown,
spelling,
formatR

Roxygen list(markdown = TRUE)

RoxygenNote 7.3.2

URL https://github.com/kolesarm/Robust-Small-Sample-Standard-Errors

BugReports https://github.com/kolesarm/Robust-Small-Sample-Standard-Errors/issues

Language en-US

VignetteBuilder knitr

R topics documented:

dfadjustSE *Standard Errors with adjusted degrees of freedom*

Description

Standard Errors with adjusted degrees of freedom

Usage

```
dfadjustSE(
  model,
  clustervar = NULL,
  ell = NULL,
  IK = TRUE,
  tol = 1e-09,
  rho0 = FALSE
)
```

Arguments

model	Fitted model returned by the lm function
clustervar	Factor variable that defines clusters. If NULL (or not supplied), the command computes heteroscedasticity-robust standard errors, rather than cluster-robust standard errors.
ell	A vector specifying for which coefficients to compute the standard errors. If NULL, compute standard errors for each regressor coefficient. If ell consists of integers and its length is smaller than the number of regressors, compute standard errors for those coefficients. If the vector has the same length as the dimension of regressors, compute standard error for the linear combination $\ell'\beta$ of coefficients β.
IK	Only relevant for cluster-robust standard errors. Specifies whether to compute the degrees-of-freedom adjustment using the Imbens-Kolesár (2016) method (if TRUE), or the Bell-McCaffrey (2002) method (if FALSE).
tol	Numerical tolerance for determining whether an eigenvalue equals zero.
rho0	Impose positive ρ when estimating the Moulton (1986) model when implementing the IK method?

Value

Returns a list with the following components

vcov Variance-covariance matrix estimator. For independent errors, it corresponds to the HC2 estimator (see MacKinnon and White, 1985, or the reference manual for the sandwich package). For clustered errors, it corresponds to a version the generalization of the HC2 estimator, called LZ2 in Imbens and Kolesár.

coefficients Matrix of estimated coefficients, along with HC1, and HC2 standard errors, Adjusted standard errors, and effective degrees of freedom. Adjusted standard error is HC2 standard error multiplied by `qt(0.975,df=dof)/qnorm(0.975)` so that one can construct 95% confidence intervals by adding and subtracting 1.96 times the adjusted standard error.

rho, sig Estimates of ρ and σ of the Moulton (1986) model for the regression errors. Only computed if `IK` method is used

References

Robert M. Bell and Daniel F. McCaffrey. Bias reduction in standard errors for linear regression with multi-stage samples. Survey Methodology, 28(2):169–181, December 2002.

Guido W. Imbens and Michal Kolesár. Robust standard errors in small samples: Some practical advice. Review of Economics and Statistics, 98(4):701–712, October 2016. doi:10.1162/REST_a_00552

James G. MacKinnon and Halbert White. Some Heteroskedasticity-Consistent Covariance Matrix Estimators with Improved Finite Sample Properties. Journal of Econometrics, (29)3:305–325, September 1985. doi:10.1016/03044076(85)901587

Brent R. Moulton. Random group effects and the precision of regression estimates. Journal of Econometrics, 32(3):385–397, August 1986. doi:10.1016/03044076(86)900217.

Examples

```
## No clustering:
x <- sin(1:100)
y <- 1:100
fm <- lm(y ~ x + I(x^2))
dfadjustSE(fm)
## Clustering, with 5 clusters
clustervar <- as.factor(c(rep(1, 40), rep(5, 20),
                          rep(2, 20), rep(3, 10), rep(4, 10)))
dfadjustSE(fm, clustervar)
## Only compute standard errors for the second coefficient
dfadjustSE(fm, clustervar, ell=2)
## Compute standard error for the sum of second and third coefficient
dfadjustSE(fm, clustervar, ell=c(0, 1, 1))
```

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