Package ‘censReg’

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             with cross-section and panel data
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CensReg (Tobit) Model

Description

Fitting a model with a censored dependent variable.

Usage

censReg(formula, left = 0, right = Inf, data = sys.frame(sys.parent()),
          start = NULL, nGHQ = 8, logLikOnly = FALSE, ...)

## S3 method for class 'censReg'
print(x, logSigma = TRUE, digits = 4, ...)

Arguments

formula an object of class "formula": a symbolic description of the model to be fitted.
left left limit for the censored dependent variable; if set to -Inf, the dependent variable is assumed to be not left-censored; defaults to zero (classical Tobit model).
right right limit for the censored dependent variable; if set to Inf, the dependent variable is assumed to be not right-censored; defaults to Inf (classical Tobit model).
data an optional data frame. If argument data is of class "pdata.frame", a panel model is estimated.
start an optional vector of initial parameters for the ML estimation (intercept, slope parameters, logarithm of the standard deviation of the individual effects (only for random-effects panel data models), and logarithm of the standard deviation of the general disturbance term); if start is not specified, initial values are taken from an OLS estimation or (uncensored) random-effects panel data estimation.
nGHQ number of points used in the Gauss-Hermite quadrature, which is used to compute the log-likelihood value in case of the random effects model for panel data.
logLikOnly logical. If TRUE, the model is not estimated but the log-likelihood contributions of all observations/individuals and the corresponding gradients calculated at the parameters specified by argument start are returned.
x object of class censReg (returned by censReg).
logSigma logical value indicating whether the variance(s) of the model should be printed logarithmized (see coef.censReg).
digits positive integer specifying the minimum number of significant digits to be printed (see print.default).
... additional arguments for censReg are passed to maxLik; additional arguments for print.censReg are currently ignored.
Details

The model is estimated by Maximum Likelihood (ML) assuming a Gaussian (normal) distribution of the error term. The maximization of the likelihood function is done by function `maxLik` of the `maxLik` package. An additional argument `method` can be used to specify the optimization method used by `maxLik`, e.g., "Newton-Raphson", "BHHH", "BFGS", "SANN" (for simulated annealing), or "NM" (for Nelder-Mead).

Value

If argument `logLikOnly` is FALSE (default), `censReg` returns an object of class "censReg" inheriting from class "maxLik". The returned object contains the same components as objects returned by `maxLik` and additionally the following components:

- `call`: the matched call.
- `terms`: the model terms.
- `nObs`: a vector containing 4 integer values: the total number of observations, the number of left-censored observations, the number of uncensored observations, and the number of right-censored observations.
- `df.residual`: degrees of freedom of the residuals.
- `start`: vector of starting values.
- `left`: left limit of the censored dependent variable.
- `right`: right limit of the censored dependent variable.
- `xMean`: vector of mean values of the explanatory variables.

In contrast, if argument `logLikOnly` is TRUE, `censReg` returns a vector of the log-likelihood contributions of all observations/individuals. This vector has an attribute "gradient", which is a matrix containing the gradients of the log-likelihood contributions with respect to the parameters.

Note

When the censored regression model is estimated, the log-likelihood function is maximized with respect to the coefficients and the logarithm(s) of the variance(s).

Author(s)

Arne Henningsen

References


See Also

`summary.censReg`, `coef.censReg`, `tobit`, `selection`
Examples

```r
# Kleiber & Zeileis (2008), page 142
data( "Affairs", package = "AER" )
estResult <- censReg( affairs ~ age + yearsmarried + religiousness + occupation + rating, data = Affairs )
print( estResult )

# Kleiber & Zeileis (2008), page 143
estResultBoth <- censReg( affairs ~ age + yearsmarried + religiousness + occupation + rating, data = Affairs, right = 4 )
print( estResultBoth )
```

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### coef.censReg

**Coefficients, their Covariances, and Log-Likelihood Values of Censored Regression Models**

**Description**

These functions extract the coefficient vectors, the corresponding covariance matrices, and log-likelihood values from censored regression models.

**Usage**

```r
# S3 method for class 'censReg'
coef( object, logSigma = TRUE, ... )

# S3 method for class 'censReg'
vcov( object, logSigma = TRUE, ... )

# S3 method for class 'censReg'
logLik( object, ... )
```

**Arguments**

- `object`: object of class "censReg" (returned by `censReg`).
- `logSigma`: logical value indicating whether the variance(s) of the model should be returned logarithmized.
- `...`: currently not used.

**Value**

- `coef.censReg` returns a vector of the estimated coefficients.
- `vcov.censReg` returns the covariance matrix of the estimated coefficients.
- `logLik.censReg` returns an object of class "logLik". This object is the log-likelihood value of the estimated model and has an attribute "df" that gives the degrees of freedom, i.e., the number of estimated parameters.
Note

When the censored regression model is estimated, the log-likelihood function is maximized with respect to the coefficients and the logarithm(s) of the variance(s). Hence, if argument logSigma is FALSE, the variance(s) of the model is/are calculated by applying the exponential function to the estimated logarithmized variance(s) and the covariance matrix of all parameters is calculated by the Delta method.

Author(s)

Arne Henningsen

See Also

censReg, summary.censReg, and coef.summary.censReg

Examples

```r
## Kleiber & Zeileis (2008), page 142
data( "Affairs", package = "AER" )
estResult <- censReg( affairs ~ age + yearsmarried + religiousness + occupation + rating, data = Affairs )
coef( estResult )
coef( estResult, logSigma = FALSE )
vcov( estResult )
vcov( estResult, logSigma = FALSE )
logLik( estResult )
```

coef.summary.censReg  Coefficients of Censored Regression Models and their Statistical Properties

Description

This function returns the estimated coefficients of censored regression models as well as their standard errors, z-values, and P-values.

Usage

```r
## S3 method for class 'summary.censReg'
coef( object, logSigma = TRUE, ... )
```

Arguments

- `object`: object of class "summary.censReg" (returned by `summary.censReg`).
- `logSigma`: logical value indicating whether the variance(s) of the model should be returned logarithmized.
- `...`: currently not used.
Value

c coef.summary.censReg returns a matrix, where each row corresponds to one coefficient and the 4 rows contain the estimated coefficients, their standard errors, z-values, and p-values.

Author(s)

Arne Henningsen

See Also

censReg, summary.censReg and coef.censReg

Examples

```r
## Kleiber & Zeileis (2008), page 142
data( "Affairs", package = "AER" )
estResult <- censReg( affairs ~ age + yearsmarried + religiousness + occupation + rating, data = Affairs )
coef( summary( estResult ) )
```

---

**margEff.censReg**  Marginal Effects in Censored Regression Models

Description

The margEff method computes the marginal effects of the explanatory variables on the expected value of the dependent variable evaluated at the mean values of the explanatory variables. Please note that this functionality is currently not available for panel data models.

Usage

```r
## S3 method for class 'censReg'
margEff( object, calcVcov = TRUE, returnJacobian = FALSE, ... )

## S3 method for class 'margEff.censReg'
summary( object, ... )
```

Arguments

- **object**: argument object of the margEff method must be an object of class "censReg" (returned by censReg); argument object of the summary method must be an object of class "margEff.censReg" (returned by margEff.censReg).
- **calcVcov**: logical. If TRUE, the approximate variance covariance matrices of the marginal effects is calculated and returned as an attribute (see below).
- **returnJacobian**: logical. If TRUE, the Jacobian of the marginal effects with respect to the coefficients is returned as an attribute (see below).
- ... currently not used.
**Value**

`margEff.censReg` returns an object of class “margEff.censReg”, which is a vector of the marginal effects of the explanatory variables on the expected value of the dependent variable evaluated at the mean values of the explanatory variables. The returned object has an attribute `df.residual`, which is equal to the degrees of freedom of the residuals.

If argument `calcVCov` is `TRUE`, the object returned by `margEff.censReg` has an attribute `vcov`, which is the approximate variance covariance matrices of the marginal effects calculated with the Delta method.

If argument `returnJacobian` is `TRUE`, the object returned by `margEff.censReg` has an attribute `jacobian`, which is the Jacobian of the marginal effects with respect to the coefficients.

`summary.margEff.censReg` returns an object of class ”summary.margEff.censReg”, which is a matrix with four columns, where the first column contains the marginal effects, the second column contains the standard errors of the marginal effects, the third column contains the corresponding t-values, and the fourth columns contains the corresponding P values.

**Author(s)**

Arne Henningsen

**See Also**

censReg, coef.censReg, and summary.censReg

**Examples**

```r
## Kleiber & Zeileis (2008), page 142
data( "Affairs", package = "AER" )
estResult <- censReg( affairs ~ age + yearsmarried + religiousness +
                                    occupation + rating, data = Affairs )
margEff( estResult )
summary( margEff( estResult ) )
```

---

**summary.censReg**

**Summary Results of Censored Regression Models**

**Description**

These methods prepare and print summary results for censored regression models.

**Usage**

```r
## S3 method for class 'censReg'
summary( object, ... )

## S3 method for class 'summary.censReg'
print( x, logSigma = TRUE, digits = 4, ... )
```
Arguments

object object of class "censReg" (returned by \texttt{censReg}).
x object of class "summary.censReg" (returned by \texttt{summary.censReg}).
logSigma logical value indicating whether the variance(s) of the model should be printed logarithmized.
digits positive integer specifying the minimum number of significant digits to be printed (passed to \texttt{printCoefmat}).
... currently not used.

Value

\texttt{summary.censReg} returns an object of class "summary.censReg" inheriting from class "summary.maxLik". The returned object contains the same components as objects returned by \texttt{summary.maxLik} and additionally the following components:
call the matched call.
nObs a vector containing 4 integer values: the total number of observations, the number of left-censored observations, the number of uncensored observations, and the number of right-censored observations.

Author(s)

Arne Henningsen

See Also

c\texttt{ensReg}, \texttt{coef.summary.censReg}, and \texttt{coef.censReg}

Examples

```r
## Kleiber & Zeileis (2008), page 142
data("Affairs", package = "AER")
estResult <- censReg( affairs ~ age + yearsmarried + religiousness + occupation + rating, data = Affairs )
summary( estResult )
```
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