Package 'lmmot'

July 22, 2025

Type Package

Title Multiple Ordinal Tobit (MOT) Model

Version 0.1.4

Date 2017-05-10

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Description Fit right censored Multiple Ordinal Tobit (MOT) model.

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Depends maxLik, MASS

RoxygenNote 5.0.1

NeedsCompilation no

Repository CRAN

Date/Publication 2017-05-10 15:37:47 UTC

Contents

`lmmot` *Multiple Ordinal Tobit Model*

Description

Fit right censored Multiple Ordinal Tobit (MOT) model.

Usage

```
lmmot(formula, data = sys.frame(sys.parent()), threshold, stdEr = "fisher",
  ...)
```

Arguments

`formula`	Object of class formula describing the model.
`data`	Optional data frame or environment containing the variables in the model.
`threshold`	Vector of thresholds in the model.
`stdEr`	Method for standard error estimation. Use "fisher" for estimation using the inverse of the Fisher information matrix or "hessian" for estimation using the Hessian matrix.
`...`	Further arguments passed to the maximum likelihood estimation function maxLik.

Details

Fit right censored Multiple Ordinal Tobit (MOT) model. The model is a right censored Tobit model with multiple ordinal categories for latent values above the threshold, the threshold is therefore replaced by a threshold vector.

For the latent variable a linear model with independent and identically distributed non-systematic and homoscedastic errors is assumed.

If the threshold is of length 1, the model is equivalent to the standard right censored Tobit model.

The data is fitted with the Maximum Likelihood method.

Value

lmmot object: maxLik object with additional fields:

- censoring: Number of obeservations in the censoring intervals.
- fisherInfo: Fisher information matrix.
- stdEr: Standard errors for estimated coefficients.
- tval: Value for t statistic in Wald test.
- pval: p-value in Wald test.
- fitted.values: Fitted values of the estimated model.
- residuals: Residuals of the estimated model.

Author(s)

Marvin N. Wright

See Also

lm maxLik

Examples

```
# Random data for x
N <- 100
x <- rnorm(N, 25, 10)

# Simulate data for latent variable ystar with simple linear model
beta_0 <- 60
beta_1 <- 1
sigma <- 8
ystar <- beta_0 + beta_1*x + rnorm(N, 0, sigma)

# Simulate censoring for observed variable y
y <- ystar
y[y >= 100] <- 100
y[(y >= 90) & (y < 100)] <- 90
y[(y >= 80) & (y < 90)] <- 80

# MOT regression with observed variable y
mot.fit <- lmmot(y ~ x, threshold = c(80, 90, 100))

# Show details
summary(mot.fit)

# Compare real data with model fit
plot(x, ystar)
abline(coefficients(mot.fit)[1:2])
```

`motFisher` *Fisher information for mot model*

Description

Fisher information matrix for right censored Multiple Ordinal Tobit (MOT) model.

Usage

```
motFisher(param, xx, tau)
```

Arguments

`param`	parameter vector: (beta_0, beta_1, ... , beta_m, sigma).
`xx`	design matrix of the model.
`tau`	threshold vector from tau_1 to tau_K.

Value

fisher information matrix, summarized over all observations.

Author(s)

Marvin Wright

See Also

lmmot

`motGradient` *Gradient of log-Likelihood for mot model*

Description

Gradient of log-Likelihood for right censored Multiple Ordinal Tobit (MOT) model.

Usage

```
motGradient(param, xx, y, tau)
```

Arguments

`param`	parameter vector: (beta_0, beta_1, ... , beta_m, sigma).
`xx`	design matrix of the model.
`y`	observation vector.
`tau`	threshold vector from tau_1 to tau_K.

Value

gradient of log-likelihood, vector with all observations.

Author(s)

Marvin Wright

See Also

lmmot

motHessian *Hessian matrix of log-Likelihood for mot model*

Description

Hessian matrix of log-Likelihood for right censored Multiple Ordinal Tobit (MOT) model.

Usage

```
motHessian(param, xx, y, tau)
```

Arguments

param	parameter vector: (beta_0, beta_1, ... , beta_m, sigma).
xx	design matrix of the model.
y	observation vector.
tau	threshold vector from tau_1 to tau_K.

Value

hessian matrix, summarized over all observations.

Author(s)

Marvin Wright

See Also

lmmot

motLogLik *log-likelihood for mot model*

Description

Log-Likelihood for multiple ordinal right censored Multiple Ordinal Tobit (MOT) model.

Usage

```
motLogLik(param, xx, y, tau)
```

Arguments

param	parameter vector: (beta_0, beta_1, ... , beta_m, sigma).
xx	design matrix of the model.
y	observation vector.
tau	threshold vector from tau_1 to tau_K.

Value

log-likelihood, vector with all observations.

Author(s)

Marvin Wright

See Also

lmmot

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print.lmmot *Print lmmot object*

Description

Print lmmot object.

Usage

```
## S3 method for class 'lmmot'
print(x, digits = max(3, getOption("digits") - 3), ...)
```

Arguments

x	lmmot object to print.
digits	number of decimal digits to print.
...	further arguments passed to or from other methods.

Author(s)

Marvin Wright

See Also

lm lmmot

`summary.lmmot` *Summary if lmmot object*

Description

Print details about lmmot object.

Usage

```
## S3 method for class 'lmmot'
summary(object, digits = max(3, getOption("digits") - 3), ...)
```

Arguments

`object`	lmmot object to print.
`digits`	number of decimal digits to print.
`...`	further arguments passed to or from other methods.

Author(s)

Marvin Wright

See Also

lm lmmot

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