

Package ‘lmmot’

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Type Package

Title Multiple Ordinal Tobit (MOT) Model

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

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Depends maxLik, MASS

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Immot

*Multiple Ordinal Tobit Model***Description**

Fit right censored Multiple Ordinal Tobit (MOT) model.

Usage

```
Immot(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

Immot object: [maxLik](#) object with additional fields:

- censoring: Number of observations 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

[Immot](#)

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

[Immot](#)

motHessian	<i>Hessian matrix of log-Likelihood for mot model</i>
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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

[lmot](#)

motLogLik	<i>log-likelihood for mot model</i>
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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](#)

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 of lmmot object*

Description

Print details about lmmot object.

Usage

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

Arguments

<code>object</code>	lmmot object to print.
<code>digits</code>	number of decimal digits to print.
<code>...</code>	further arguments passed to or from other methods.

Author(s)

Marvin Wright

See Also

[lm lmmot](#)

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