

# Package ‘clpm’

May 5, 2023

**Type** Package

**Title** Constrained Estimation of Linear Probability Model

**Version** 1.0

**Description** Estimation of linear model with predictions inside the (0,1) interval. Standard least squares criterion is minimized subjected to a penalty term that enforces the constraints. The estimator is suitable for binary responses, or any response between 0 and 1.

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**Imports** stats

**License** GPL-2

**RoxygenNote** 7.1.2

**NeedsCompilation** no

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`clpm-package`*Constrained Estimation of the Linear Probability Model*

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**Description**

Implementation of a method to estimate the linear probability model, ensuring that the predicted probabilities are inside the (0,1) interval. The same method can be applied to any variable for which predictions between 0 and 1 are required.

**Details**

Package: `clpm`  
Type: `Package`  
Version: `1.0`  
Date: `2023-04-30`  
License: `GPL-2`

The function `clpm`

**Author(s)**

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**Examples**

```
x <- runif(100)
y <- rbinom(100, 1, x)
clpm(y~x)
```

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`clpm`*Constrained Estimation of the Linear Probability Model*

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**Description**

`clpm` is used to fit the linear probability model while ensuring that the predicted probabilities are in the (0,1) interval. The function can also be applied to any variable for which predictions between 0 and 1 are required.

**Usage**

```
clpm(formula , data, subset, na.action, weights, contrasts = NULL,
      lambda = NULL, control = clpm.control(), ...)
```

## Arguments

formula	a two-sided formula of the form $y \sim x_1 + x_2 + \dots$ : a symbolic description of the linear probability model. The <code>y</code> argument must be a variable (binary or continuous) for which we want predictions to be inside the (0,1) interval. The model specification is exactly as in <a href="#">lm</a> .
data	an optional data frame, list or environment (or object coercible by <a href="#">as.data.frame</a> to a data frame) containing the variables in the model. If not found in data, the variables are taken from <code>environment(formula)</code> , typically the environment from which <code>clpm</code> is called.
subset	an optional vector specifying a subset of observations to be used in the fitting process.
na.action	a function which indicates what should happen when the data contain NAs. See <a href="#">lm</a> for details.
weights	an optional vector of weights to be used in the fitting process. Should be NULL or a numeric vector. See <a href="#">lm</a> .
contrasts	an optional list. See the <code>contrasts.arg</code> of <a href="#">model.matrix.default</a> .
lambda	a tuning constant that defines how important it is to obtain predictions in the (0,1) interval. If <code>lambda</code> is too small, the constraints may not be respected. On the other hand, if <code>lambda</code> is too large, the objective function might lose its convexity. If no value is supplied, an optimal value will be selected iteratively.
control	see <a href="#">clpm.control</a> .
...	for future arguments.

## Details

For more details, see [lm](#).

## Value

`clpm` returns an object of class "clpm".

The functions `summary` and `predict` are used to obtain and print a summary and estimate model predictions.

An object of class "clpm", a list containing the following items:

coefficients	a named vector of coefficients.
covar	the estimated variance-covariance matrix.
residuals	the residuals, that is the response minus the fitted values.
rank	the numeric rank of the fitted linear model.
fitted.values	the fitted values, that represent conditional means or, for a binary response, conditional probabilities.
weights	(only for weighted fits) the specified weights.
df.residuals	the residual degrees of freedom.
obj.function	the value of the minimized loss function.

gradient	the value of the gradient.
convergence	logical. The convergence status.
n.it	the number of iterations.
control	the values from <code>clpm.control</code> .
lambda	the lambda value applied for model estimation.
contrasts	(only where relevant) the contrasts used.
xlevels	(only where relevant) a record of the levels of the factors used in fitting.
call	the matched call.
terms	the <code>terms</code> object used.
model	if requested (the default), the model frame used.

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**Examples**

```
x <- runif(100)
y <- rbinom(100, 1, x)
fit <- clpm(y~x)

summary(fit)
predict(fit)
```

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clpm.control	<i>Control Parameters for Constrained Estimation of Linear Probability Model</i>
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**Description**

This function generates default values for the tolerance (`tol`) and maximum number of iterations (`maxit`) for `clpm`, as well as an option to print the progress.

**Usage**

```
clpm.control(tol = 1e-10, maxit, trace = FALSE)
```

**Arguments**

<code>tol</code>	tolerance value for the steps of the algorithm.
<code>maxit</code>	maximum number of attempts of the algorithm.
<code>trace</code>	logical: should the progress be printed on screen?

**Value**

The function performs a sanity check and returns its arguments.

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predict.clpm

*Predict method for Constrained Linear Probability Model*

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**Description**

Predicted values based on constrained linear probability model object.

**Usage**

```
## S3 method for class 'clpm'  
predict(object, newdata, se.fit = FALSE, ...)
```

**Arguments**

object	Object of class inheriting from "clpm"
newdata	An optional data frame in which to look for variables with which to predict. If omitted, the fitted values are used.
se.fit	A switch indicating if standard errors are required.
...	further arguments passed to or from other methods.

**Details**

See [predict.lm](#).

**Value**

The function returns the same object returned by [predict.lm](#).

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summary.clpm

*Summary After Constrained Estimation of Linear Probability Model*


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**Description**

Summary of an object of class 'clpm'.

**Usage**

```
## S3 method for class 'clpm'
summary(object, correlation = FALSE, symbolic.cor = FALSE, ...)
```

**Arguments**

object	an object of class "lm", usually, a result of a call to <a href="#">clpm</a> .
correlation	logical; if TRUE, the correlation matrix of the estimated parameters is returned and printed.
symbolic.cor	logical. If TRUE, print the correlations in a symbolic form (see <a href="#">symnum</a> ) rather than as numbers.
...	further arguments passed to or from other methods.

**Details**

See [summary.lm](#).

**Value**

The function returns the same object returned by [summary.lm](#).

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vcov.clpm

*Calculate Variance-Covariance Matrix for a Fitted Constrained Linear Probability Model Object*


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**Description**

Returns the variance-covariance matrix of the main parameters of a fitted constrained linear probability model object.

**Usage**

```
## S3 method for class 'clpm'
vcov(object, ...)
```

**Arguments**

object            a fitted model object, typically.  
...                additional arguments for method functions.

**Details**

See [vcov.lm](#).

**Value**

The function returns the same object returned by [vcov.lm](#).

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