

# Package ‘cglm’

October 12, 2022

**Type** Package

**Title** Fits Conditional Generalized Linear Models

**Version** 1.1

**Date** 2019-12-06

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**Description** Estimates the ratio of the regression coefficients and the dispersion parameter in conditional generalized linear models for clustered data.

**License** GPL (>= 2)

**Imports** Rcpp (>= 0.12.18), stats, nleqslv, data.table

**LinkingTo** Rcpp, RcppArmadillo

**NeedsCompilation** yes

**Repository** CRAN

**Date/Publication** 2019-12-06 13:50:02 UTC

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cglm	<i>Estimates the ratio of the regression coefficients and the dispersion parameter in conditional generalized linear models for clustered data.</i>
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## Description

cglm estimates the ratio of the regression coefficients and the dispersion parameter in conditional generalized linear models. This is of particular interest in the so-called case-time-control design.

## Usage

```
cglm(method, formula, data, id, link, ...)
```

## Arguments

method	a string specifying the desired estimation method; either "ts" for two-step estimation, or "cml" for conditional maximum likelihood estimation.
formula	a symbolic description of the model to be fitted.
data	a data frame containing the variables in the model.
id	a string containing the name of the cluster identification variable.
link	a string specifying the desired link function. This argument is not used when method="cml".
...	optional arguments passed on to the nleqslv function or the optim function, which are used to solve the estimating equations when method="ts" and method="cml", respectively. See the help pages for nleqslv and optim.

## Details

Let  $y_{ij}$  and  $x_{ij}$  be the outcome and covariate(s) for subject  $j$  in cluster  $i$ , respectively. Consider the conditional generalized linear model

$$p(y_{ij}|i, x_{ij}) = \exp \left[ \frac{\theta_{ij}y_{ij} - A(\theta_{ij})}{\phi} + k(y_{ij}, \phi) \right]$$

where

$$\theta_{ij} = \eta\{E(y_{ij}|x_{ij})\} = b_i + \beta x_{ij}.$$

cglm estimates the ratio

$$\beta/\phi.$$

This ratio is of particular interest in so-called case-time-control designs; see Sjolander (2016) and Sjolander and Ning (2018) for details. Two estimation methods are allowed; the two-step method proposed by Sjolander (2016) and the conditional maximum likelihood method proposed by Sjolander and Ning (2018).

**Value**

An object of class "cglm" is a list containing

call	the matched call.
coefficients	the ratio of the estimated coefficients and the estimated dispersion parameter.
var	the variance-covariance matrix.
convergence	was a solution found to the estimating equations?

**Note**

Missing data are not allowed.

**Author(s)**

Arvid Sjolander.

**References**

Sjolander A. (2017). The case-time-control method for non-binary exposures. *Sociological Methodology* **47**(1), 182-211.

Sjolander A., Ning Y. (2018). A general and robust estimation method for the case-time-control design. *Sociological Methodology* **49**(1), 349-365.

**Examples**

```
data(teenpov)

fit.ide <- cglm(method="ts", formula=hours~nonpov+inschool+spouse+age+mother,
  data=teenpov, id="ID", link="identity")
summary(fit.ide)

fit.log <- cglm(method="ts", formula=hours~nonpov+inschool+spouse+age+mother,
  data=teenpov, id="ID", link="log")
summary(fit.log)

fit.cglm <- cglm(method="cml", formula=hours~nonpov+inschool+spouse+age+mother,
  data=teenpov, id="ID")
summary(fit.cglm)
```

---

```
print.summary.cglm      Prints summary of instrumental variable estimation
```

---

### Description

This is a print method for class "summary.cglm".

### Usage

```
## S3 method for class 'summary.cglm'
print(x, digits=max(3L, getOption("digits")-3L),
      signif.stars=getOption("show.signif.stars"), ...)
```

### Arguments

x	an object of class "summary.cglm".
digits	the number of significant digits to use.
signif.stars	logical. If TRUE, "significance stars" are printed for each coefficient.
...	not used.

### Author(s)

Arvid Sjolander

### Examples

```
##See documentation for cglm.
```

---

```
summary.cglm          Summarizes instrumental variable estimation
```

---

### Description

This is a summary method for class "cglm".

### Usage

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

### Arguments

object	an object of class "cglm".
...	not used.

**Author(s)**

Arvid Sjolander

**Examples**

##See documentation for cglm.

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teenpov*Data from the National Longitudinal Survey of Youth (NLSY).*

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**Description**

This dataset is a subset of a dataset described by Allison (2009). The original data by Allison (2009) comes from the National Longitudinal Survey of Youth (NLSY), and contains information on 1151 teenage girls who were interviewed annually for five years, starting in 1979. The teenpov dataset is constructed by first identifying, for each girl, the first interview at which the girl is not in poverty, then excluding all subsequent interviews for that girl. After this exclusion, the dataset contains 1342 interviews from 401 girls. This procedure is described in greater detail by Sjolander (2017).

**Usage**

data(teenpov)

**Format**

The dataset contains the following variables:

**ID** a unique subject-identifier.

**nonpov** 1 if the girl is currently not in poverty according to U.S. federal standards.

**hours** the number of hours that the girl currently works per week.

**inschool** 1 if the girl is currently enrolled in school, 0 otherwise.

**spouse** 1 if the girl is currently living with a spouse, 0 otherwise.

**age** the girl's current age.

**mother** 1 if the girl currently has at least 1 child, 0 otherwise.

**References**

Allison P. (2009). Fixed effects regression models: quantitative applications in the Social sciences. Thousand Oaks, CA: Sage.

Sjolander A. (2017). The case-time-control method for non-binary exposures. *Sociological Methodology* **47**(1), 182-211.

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