

# Package ‘clarkeTest’

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**Type** Package

**Title** Distribution-Free Tests of Non-Nested Models

**Version** 0.2.0

**Description** Implementation of Clarke's distribution-free test of non-nested models. Currently supported model functions are: `lm()`, `glm()` ('binomial', 'poisson', 'negative binomial' links), `polr()` ('MASS'), `clm()` ('ordinal'), and `multinom()` ('nnet'). For more information on the test, see Clarke (2007)  [<doi:10.1093/pan/mpm004>](https://doi.org/10.1093/pan/mpm004).

**Depends** R (>= 3.5.0)

**Suggests** MASS, ordinal, nnet

**License** GPL (>= 2)

**Encoding** UTF-8

**LazyData** true

**RoxygenNote** 7.3.1

**NeedsCompilation** no

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**Repository** CRAN

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clarke\_test

*Clarke Test***Description**

'clarke\_test' returns results from Kevin Clarke's distribution-free test of non-nested models.

**Usage**

```
clarke_test(model1, model2, level=0.05, digits=2)
```

**Arguments**

model1	A fitted statistical model of a supported class
model2	A fitted statistical model of a supported class whose dependent variable is the same as that of model1
level	Numeric: significance level for the test.
digits	Integer: number of digits to print

**Details**

'clarke\_test' is a more modularized version of the [clarke()] function from the [games] package. The main innovation is that the 'nonnest' function calls a generic 'indivLogLiks' function, so additional methods can be easily written for different classes of models. The function currently supports binomial, poisson and negative binomial GLMs, ordinal models estimated with either polr from the MASS package or clm from the ordinal package and multinomial models estimated with either multinom from the nnet package. Users can also write new methods for both indivLogLiks and nparams that would get called by the generic function.

**Value**

Typical use will be to run the function interactively and examine the printed output. The functions return an object of class nonnest.test, which is a list containing:

- stat The test statistic
- level Significance level for the test
- digits Number of digits to print
- loglik1 Vector of observationwise log-likelihoods for model1
- loglik2 Vector of observationwise log-likelihoods for model2
- nparams Integer vector containing the number of parameters fitted in model1 and model2 respectively
- nobs Number of observations of the dependent variable being modeled

An object of class nonnest.test with the following values:

**stat** The number of times model 1 is better than model 2

**test** Will always be "clarke".

**level** The chosen confidence level for the test

**digits** The number of digits to print

**loglik1** Individual log-likelihoods for model 1

**loglik2** Individual log-likelihoods for model 2

**nparams** A vector giving the number of parameters in models 1 and 2, respectively

**nobs** Number of observations in the model

### Author(s)

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### References

Kevin Clarke. 2007. "A Simple Distribution-Free Test for Nonnested Hypotheses." *Political Analysis* 15(3): 347–363.

### Examples

```
data(conflictData)
## Linear Model
lm1 <- lm(riots ~ log(rgdpna_pc) + log(pop*1000) +
  polity2, data=conflictData)
lm2 <- lm(riots ~ rgdpna_pc + pop +
  polity2, data=conflictData)
clarke_test(lm1, lm2)

## Binomial GLM
glm1 <- glm(conflict_binary ~ log(rgdpna_pc) +
  log(pop*1000) + polity2, data=conflictData,
  family=binomial)
glm2 <- glm(conflict_binary ~ rgdpna_pc + pop +
  polity2, data=conflictData,
  family=binomial)
clarke_test(glm1, glm2)

## Poisson GLM
glm1a <- glm(riots ~ log(rgdpna_pc) +
  log(pop*1000) + polity2,
  data=conflictData,
  family=poisson)
glm2a <- glm(riots ~ rgdpna_pc + pop +
  polity2, data=conflictData,
  family=poisson)
clarke_test(glm1a, glm2a)

## Negative Binomial GLM
library(MASS)
glm1b <- glm.nb(riots ~ log(rgdpna_pc) +
  log(pop*1000) + polity2,
```

```

      data=conflictData)
glm2b <- glm.nb(riots ~ rgdpna_pc + pop +
               polity2, data=conflictData)
clarke_test(glm1b, glm2b)

## Ordered Logit: polr
library(MASS)
ol1 <- polr(as.factor(Amnesty) ~ log(rgdpna_pc) +
            log(pop*1000) + polity2,
            data=conflictData)
ol2 <- polr(as.factor(Amnesty) ~ scale(rgdpna_pc) +
            scale(pop) + polity2,
            data=conflictData)
clarke_test(ol1, ol2)

## Ordered Logit: clm
library(ordinal)
ol1a <- clm(as.factor(Amnesty) ~ log(rgdpna_pc) +
            log(pop*1000) + polity2,
            data=conflictData)
ol2a <- clm(as.factor(Amnesty) ~ scale(rgdpna_pc) +
            scale(pop) + polity2,
            data=conflictData)
clarke_test(ol1a, ol2a)

## Multinomial Logit: multinom

library(nnet)
m11 <- multinom(as.factor(Amnesty) ~ log(rgdpna_pc) +
                log(pop*1000) + polity2,
                data=conflictData)
m12 <- multinom(as.factor(Amnesty) ~ scale(rgdpna_pc) +
                scale(pop) + polity2,
                data=conflictData)
clarke_test(m11, m12)

## Multinomial Logit: multinom

```

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conflictData

*Conflict Data*

---

### Description

A country-year dataset containing information on conflict and other country attributes. These data come from multiple sources and are simply for the purposes of demonstrating how the functions in the package work. The data contain the following variables

**Usage**

```
conflictData
```

**Format**

A data frame with 4381 rows and 9 variables

**GWNo** Gleditsch and Ward country number

**Year** year

**StateName** Country name

**conflict\_binary** Binary indicator of conflict

**polity2** Polity IV indicator of regime type

**Amnesty** Amnesty International Political Terror Scale Rating

**riots** Number of riots in each country-year

**pop** Population in country (in thousands)

**rgdpna\_pc** PWT measure of GDP/capita

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indivLogLiks

*Calculate individual log-likelihood values*


---

**Description**

Calculate individual log-likelihood values

**Usage**

```
indivLogLiks(model)
```

```
## S3 method for class 'glm'
```

```
indivLogLiks(model)
```

```
## S3 method for class 'lm'
```

```
indivLogLiks(model)
```

```
## S3 method for class 'orlm'
```

```
indivLogLiks(model)
```

```
## S3 method for class 'polr'
```

```
indivLogLiks(model)
```

```
## S3 method for class 'clm'
```

```
indivLogLiks(model)
```

```
## S3 method for class 'multinom'
```

```

indivLogLiks(model)

## S3 method for class 'negbin'
indivLogLiks(model)

```

### Arguments

`model`            A statistical model object.

### Details

The `indivLogLiks` function calls the appropriate method for calculating individual log likelihood values for the model. The function currently supports binomial, poisson and negative binomial GLMs, ordinal models estimated with either `polr` from the `MASS` package or `clm` from the `ordinal` package and multinomial models estimated with either `multinom` from the `nnet` package. Users can also write new methods for both `indivLogLiks` and `nparams` that would get called by the generic function.

For the purposes of the `clarke_test` function, the `indivLogLiks` functions are not intended to be called directly by the user.

### Value

A vector of individual log-likelihood values for the model.

---

<code>nparams</code>	<i>Find number of parameters in model</i>
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### Description

Finds the number of parameters that were estimated in each model.

### Usage

```

nparams(model)

## S3 method for class 'glm'
nparams(model)

## S3 method for class 'lm'
nparams(model)

## S3 method for class 'orlm'
nparams(model)

## S3 method for class 'polr'
nparams(model)

```

```
## S3 method for class 'glm'
nparams(model)

## S3 method for class 'multinom'
nparams(model)

## S3 method for class 'negbin'
nparams(model)
```

### Arguments

model            A statistical model object.

### Details

The function funds the number of parameters generally by counting the number of estimated parameters in the model's output.

For the purposes of the `clarke_test` function, the `nparams` functions are not intended to be called directly by the user.

### Value

A scalar giving the number of parameters estimated in the model.

---

`print.nonnest.test`     *Print non-nested test results*

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### Description

Prints results of the `clarke_test` function.

### Usage

```
## S3 method for class 'nonnest.test'
print(x, digits = x$digits, ...)
```

### Arguments

x                A result from the 'nonnest' function  
 digits          Number of digits to print in the output  
 ...             Other arguments passed down to print

### Value

Printed output that summarises the results of the `clarke_test` function.

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