

Package ‘betaDelta’

February 7, 2023

Title Confidence Intervals for Standardized Regression Coefficients

Version 1.0.0.9000

Description Generates confidence intervals for standardized regression coefficients using delta method standard errors for models fitted by `lm()` as described in Yuan and Chan (2011) <[doi:10.1007/s11336-011-9224-6](https://doi.org/10.1007/s11336-011-9224-6)> and Jones and Waller (2015) <[doi:10.1007/s11336-013-9380-y](https://doi.org/10.1007/s11336-013-9380-y)>.

URL <https://github.com/jeksterslab/betaDelta>,
<https://jeksterslab.github.io/betaDelta/>

BugReports <https://github.com/jeksterslab/betaDelta/issues>

License MIT + file LICENSE

Encoding UTF-8

LazyData true

Roxygen list(markdown = TRUE)

Depends R (>= 3.5.0)

Imports methods

Suggests knitr, rmarkdown, testthat, betaSandwich

RoxygenNote 7.2.3

NeedsCompilation no

Author Ivan Jacob Agaloos Pesigan [aut, cre, cph]
(<<https://orcid.org/0000-0003-4818-8420>>)

Maintainer Ivan Jacob Agaloos Pesigan <r.jeksterslab@gmail.com>

R topics documented:

BetaDelta	2
coef.betadelta	3
coef.difbetadelta	4
confint.betadelta	5
confint.difbetadelta	5
dif	6

nas1982	7
print.betadelta	7
print.difbetadelta	8
summary.betadelta	9
summary.difbetadelta	10
vcov.betadelta	10
vcov.difbetadelta	11
Index	12

BetaDelta	<i>Estimate Standardized Regression Coefficients and Sampling Covariance Matrix</i>
-----------	---

Description

Estimate Standardized Regression Coefficients and Sampling Covariance Matrix

Usage

BetaDelta(object, type = "mvn")

Arguments

- object Object of class lm.
- type Character string. If type = "mvn", use the multivariate normal-theory approach. If type = "adf", use the asymptotic distribution-free approach.

Value

Returns an object of class betadelta which is a list with the following elements:

- call** Function call.
- lm** Object of class lm.
- lm_process** Pre-processed object of class lm.
- type** Standard error type.
- gamma** Asymptotic covariance matrix of the sample covariance matrix.
- acov** Asymptotic covariance matrix of the standardized slopes.
- vcov** Sampling covariance matrix of the standardized slopes.
- est** Vector of standardized slopes.

Author(s)

Ivan Jacob Agaloos Pesigan

References

- Jones, J. A., & Waller, N. G. (2015). The normal-theory and asymptotic distribution-free (ADF) covariance matrix of standardized regression coefficients: Theoretical extensions and finite sample behavior. *Psychometrika*, 80(2), 365–378. doi:10.1007/s113360139380y
- Yuan, K.-H., & Chan, W. (2011). Biases and standard errors of standardized regression coefficients. *Psychometrika*, 76(4), 670–690. doi:10.1007/s1133601192246

Examples

```
object <- lm(QUALITY ~ NARTIC + PCTGRT + PCTSUPP, data = nas1982)
std <- BetaDelta(object)
# Methods -----
print(std)
summary(std)
coef(std)
vcov(std)
confint(std, level = 0.95)
## Differences of standardized regression coefficients -----
out <- dif(std)
print(out)
summary(out)
coef(out)
vcov(out)
confint(out, level = 0.95)
```

coef.betadelta	<i>Standardized Regression Slopes</i>
----------------	---------------------------------------

Description

Standardized Regression Slopes

Usage

```
## S3 method for class 'betadelta'
coef(object, ...)
```

Arguments

object	Object of class betadelta.
...	additional arguments.

Value

Returns a vector of standardized regression slopes.

Author(s)

Ivan Jacob Agaloos Pesigan

Examples

```
object <- lm(QUALITY ~ NARTIC + PCTGRT + PCTSUPP, data = nas1982)
std <- BetaDelta(object)
coef(std)
```

coef.difbetadelta	<i>Differences of Standardized Regression Slopes</i>
-------------------	--

Description

Differences of Standardized Regression Slopes

Usage

```
## S3 method for class 'difbetadelta'
coef(object, ...)
```

Arguments

object	Object of class difbetadelta.
...	additional arguments.

Value

Returns a vector of differences of standardized regression slopes.

Author(s)

Ivan Jacob Agaloos Pesigan

Examples

```
object <- lm(QUALITY ~ NARTIC + PCTGRT + PCTSUPP, data = nas1982)
std <- BetaDelta(object)
out <- dif(std)
coef(out)
```

confint.betadelta	<i>Confidence Intervals for Standardized Regression Slopes</i>
-------------------	--

Description

Confidence Intervals for Standardized Regression Slopes

Usage

```
## S3 method for class 'betadelta'
confint(object, parm = NULL, level = 0.95, ...)
```

Arguments

object	Object of class betadelta.
parm	a specification of which parameters are to be given confidence intervals, either a vector of numbers or a vector of names. If missing, all parameters are considered.
level	the confidence level required.
...	additional arguments.

Value

Returns a matrix of confidence intervals.

Author(s)

Ivan Jacob Agaloos Pesigan

Examples

```
object <- lm(QUALITY ~ NARTIC + PCTGRT + PCTSUPP, data = nas1982)
std <- BetaDelta(object)
confint(std, level = 0.95)
```

confint.difbetadelta	<i>Confidence Intervals for Differences of Standardized Regression Slopes</i>
----------------------	---

Description

Confidence Intervals for Differences of Standardized Regression Slopes

Usage

```
## S3 method for class 'difbetadelta'
confint(object, parm = NULL, level = 0.95, ...)
```

Arguments

object	Object of class difbetadelta.
parm	a specification of which parameters are to be given confidence intervals, either a vector of numbers or a vector of names. If missing, all parameters are considered.
level	the confidence level required.
...	additional arguments.

Value

Returns a matrix of confidence intervals.

Author(s)

Ivan Jacob Agaloos Pesigan

Examples

```
object <- lm(QUALITY ~ NARTIC + PCTGRT + PCTSUPP, data = nas1982)
std <- BetaDelta(object)
out <- dif(std)
confint(out, level = 0.95)
```

dif	<i>Differences of Regression Slopes</i>
-----	---

Description

Differences of Regression Slopes

Usage

```
dif(object, ...)

## S3 method for class 'betadelta'
dif(object, ...)
```

Arguments

object	Object used to select a method.
...	additional arguments.

Author(s)

Ivan Jacob Agaloos Pesigan

nas1982

*1982 National Academy of Sciences Doctoral Programs Data***Description**

1982 National Academy of Sciences Doctoral Programs Data

Usage

nas1982

Format

Ratings of 46 doctoral programs in psychology in the USA with the following variables:

QUALITY Program quality ratings.**NEACUL** Number of faculty members in the program.**NGRADES** Number of program graduates.**PCTSUPP** Percentage of program graduates who received support.**PCTGRT** Percent of faculty members holding research grants.**NARTIC** Number of published articles attributed to program faculty member.**PCTPUB** Percent of faculty with one or more published article.**References**

National Research Council. (1982). *An assessment of research-doctorate programs in the United States: Social and behavioral sciences*. doi:10.17226/9781. Reproduced with permission from the National Academy of Sciences, Courtesy of the National Academies Press, Washington, D.C.

print.betadelta

*Print Method for an Object of Class betadelta***Description**

Print Method for an Object of Class betadelta

Usage

```
## S3 method for class 'betadelta'
print(x, alpha = c(0.05, 0.01, 0.001), digits = 4, ...)
```

Arguments

<code>x</code>	Object of class <code>betadelta</code> .
<code>alpha</code>	Significance level.
<code>digits</code>	Digits to print.
<code>...</code>	additional arguments.

Value

Returns a matrix of standardized regression slopes, standard errors, test statistics, p-values, and confidence intervals.

Author(s)

Ivan Jacob Agaloos Pesigan

Examples

```
object <- lm(QUALITY ~ NARTIC + PCTGRT + PCTSUPP, data = nas1982)
std <- BetaDelta(object)
print(std)
```

<code>print.difbetadelta</code>	<i>Print Method for an Object of Class difbetadelta</i>
---------------------------------	---

Description

Print Method for an Object of Class `difbetadelta`

Usage

```
## S3 method for class 'difbetadelta'
print(x, alpha = c(0.05, 0.01, 0.001), digits = 4, ...)
```

Arguments

<code>x</code>	Object of class <code>difbetadelta</code> .
<code>alpha</code>	Significance level.
<code>digits</code>	Digits to print.
<code>...</code>	additional arguments.

Value

Returns a matrix of standardized regression slopes, standard errors, test statistics, p-values, and confidence intervals.

Author(s)

Ivan Jacob Agaloos Pesigan

Examples

```
object <- lm(QUALITY ~ NARTIC + PCTGRT + PCTSUPP, data = nas1982)
std <- BetaDelta(object)
out <- dif(std)
print(out)
```

summary.betadelta	<i>Summary Method for an Object of Class betadelta</i>
-------------------	--

Description

Summary Method for an Object of Class betadelta

Usage

```
## S3 method for class 'betadelta'
summary(object, alpha = c(0.05, 0.01, 0.001), digits = 4, ...)
```

Arguments

object	Object of class betadelta.
alpha	Significance level.
digits	Digits to print.
...	additional arguments.

Value

Returns a matrix of standardized regression slopes, standard errors, test statistics, p-values, and confidence intervals.

Author(s)

Ivan Jacob Agaloos Pesigan

Examples

```
object <- lm(QUALITY ~ NARTIC + PCTGRT + PCTSUPP, data = nas1982)
std <- BetaDelta(object)
summary(std)
```

`summary.difbetadelta` *Summary Method for an Object of Class difbetadelta*

Description

Summary Method for an Object of Class difbetadelta

Usage

```
## S3 method for class 'difbetadelta'
summary(object, alpha = c(0.05, 0.01, 0.001), digits = 4, ...)
```

Arguments

<code>object</code>	Object of class difbetadelta.
<code>alpha</code>	Significance level.
<code>digits</code>	Digits to print.
<code>...</code>	additional arguments.

Value

Returns a matrix of standardized regression slopes, standard errors, test statistics, p-values, and confidence intervals.

Author(s)

Ivan Jacob Agaloos Pesigan

Examples

```
object <- lm(QUALITY ~ NARTIC + PCTGRT + PCTSUPP, data = nas1982)
std <- BetaDelta(object)
out <- dif(std)
summary(out)
```

`vcov.betadelta` *Sampling Covariance Matrix of the Standardized Regression Slopes*

Description

Sampling Covariance Matrix of the Standardized Regression Slopes

Usage

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

Arguments

object Object of class betadelta.
 ... additional arguments.

Value

Returns a matrix of the variance-covariance matrix of standardized slopes.

Author(s)

Ivan Jacob Agaloos Pesigan

Examples

```
object <- lm(QUALITY ~ NARTIC + PCTGRT + PCTSUPP, data = nas1982)
std <- BetaDelta(object)
vcov(std)
```

vcov.difbetadelta	<i>Sampling Covariance Matrix of Differences of Standardized Regression Slopes</i>
-------------------	--

Description

Sampling Covariance Matrix of Differences of Standardized Regression Slopes

Usage

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

Arguments

object Object of class difbetadelta.
 ... additional arguments.

Value

Returns a matrix of the variance-covariance matrix of differences of standardized regression slopes.

Author(s)

Ivan Jacob Agaloos Pesigan

Examples

```
object <- lm(QUALITY ~ NARTIC + PCTGRT + PCTSUPP, data = nas1982)
std <- BetaDelta(object)
out <- dif(std)
vcov(out)
```

Index

* **Beta Delta Functions**

BetaDelta, [2](#)

* **betaDelta**

BetaDelta, [2](#)

* **data**

nas1982, [7](#)

* **methods**

coef.betadelta, [3](#)

coef.difbetadelta, [4](#)

confint.betadelta, [5](#)

confint.difbetadelta, [5](#)

dif, [6](#)

print.betadelta, [7](#)

print.difbetadelta, [8](#)

summary.betadelta, [9](#)

summary.difbetadelta, [10](#)

vcov.betadelta, [10](#)

vcov.difbetadelta, [11](#)

BetaDelta, [2](#)

coef.betadelta, [3](#)

coef.difbetadelta, [4](#)

confint.betadelta, [5](#)

confint.difbetadelta, [5](#)

dif, [6](#)

nas1982, [7](#)

print.betadelta, [7](#)

print.difbetadelta, [8](#)

summary.betadelta, [9](#)

summary.difbetadelta, [10](#)

vcov.betadelta, [10](#)

vcov.difbetadelta, [11](#)