Package 'betaDelta'

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Title Confidence Intervals for Standardized Regression Coefficients
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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=""> and Jones and Waller (2015) <doi:10.1007 s11336-013-9380-y="">.</doi:10.1007></doi:10.1007>
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BetaDelta coef.betadelta coef.difbetadelta coef.rsqbetadelta confint.betadelta confint.difbetadelta

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Description

Estimate Standardized Regression Coefficients and Sampling Covariance Matrix

Usage

```
BetaDelta(object, type = "mvn")
```

Arguments

object Object of class 1m.

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 1m.

lm_process Pre-processed object of class 1m.

type Standard error type.

gamma Asymptotic covariance matrix of the sample covariance matrix.

est Vector of standardized slopes.

vcov Sampling covariance matrix of the standardized slopes.

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acov Asymptotic covariance matrix of the standardized slopes.

- n Sample size.
- p Number of regressors.
- **df** n-p-1 degrees of freedom.

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

See Also

```
Other Beta Delta Functions: dif.betadelta(), dif(), rsq.betadelta(), rsq()
```

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)</pre>
```

coef.betadelta

Standardized Regression Slopes

Description

Standardized Regression Slopes

Usage

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

Arguments

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

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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)</pre>
```

coef.difbetadelta

Differences of Standardized Regression Slopes

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

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

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 ${\tt coef.rsqbetadelta}$

R-Squared and Adjusted R-Squared

Description

R-Squared and Adjusted R-Squared

Usage

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

Arguments

```
object Object of class rsqrdelta.
... additional arguments.
```

Value

Returns a vector of R-squared and adjusted R-squared.

Author(s)

Ivan Jacob Agaloos Pesigan

Examples

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

 ${\tt confint.betadelta}$

Confidence Intervals for Standardized Regression Slopes

Description

Confidence Intervals for Standardized Regression Slopes

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

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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 consid-

ered.

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)</pre>
```

 ${\it confint.difbetadelta} \quad {\it Confidence\ Intervals\ for\ Differences\ of\ Standardized\ Regression} \\ Slopes$

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 consid-

ered.

level the confidence level required.

... additional arguments.

Value

Returns a matrix of confidence intervals.

confint.rsqbetadelta 7

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)</pre>
```

Description

Confidence Intervals for R-Squared and Adjusted R-Squared

Usage

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

Arguments

object Object of class rsqrdelta.

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 consid-

ered.

level the confidence level required.

... additional arguments.

Value

Returns a matrix of confidence intervals.

Author(s)

Ivan Jacob Agaloos Pesigan

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

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dif

Differences of Standardized Regression Slopes

Description

Differences of Standardized Regression Slopes

Usage

```
dif(object)
```

Arguments

object

Object used to select a method.

Author(s)

Ivan Jacob Agaloos Pesigan

See Also

```
Other Beta Delta Functions: BetaDelta(), dif.betadelta(), rsq.betadelta(), rsq()
```

dif.betadelta

Differences of Standardized Regression Slopes

Description

Differences of Standardized Regression Slopes

Usage

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

Arguments

object

Object of class betadelta.

Value

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

call Function call.

betadelta Object of class betadelta.

est Vector of differences of standardized regression slopes.

vcov Sampling covariance matrix of differences of standardized slopes.

acov Asymptotic covariance matrix of differences of standardized slopes.

nas1982

Author(s)

Ivan Jacob Agaloos Pesigan

See Also

```
Other Beta Delta Functions: BetaDelta(), dif(), rsq.betadelta(), rsq()
```

Examples

```
object <- lm(QUALITY ~ NARTIC + PCTGRT + PCTSUPP, data = nas1982)
std <- BetaDelta(object)
out <- dif(std)
# Methods ------
print(out)
summary(out)
coef(out)
vcov(out)
confint(out, level = 0.95)</pre>
```

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.

NFACUL Number of faculty members in the program.

NGRADS 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.

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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

```
x 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)
print(std)</pre>
```

print.difbetadelta

Print Method for an Object of Class difbetadelta

Description

Print Method for an Object of Class difbetadelta

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

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Arguments

X	Object of class difbetadelta.
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)
out <- dif(std)
print(out)</pre>
```

print.rsqbetadelta

Print Method for an Object of Class rsqbetadelta

Description

Print Method for an Object of Class rsqbetadelta

Usage

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

Arguments

X	Object of class rsqbetadelta.
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.

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Author(s)

Ivan Jacob Agaloos Pesigan

Examples

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

rsq

Estimate Coefficient of Determination (R-Squared and Adjusted R-Squared) and Sampling Covariance Matrix

Description

Estimate Coefficient of Determination (R-Squared and Adjusted R-Squared) and Sampling Covariance Matrix

Usage

```
rsq(object)
```

Arguments

object

Object used to select a method.

Author(s)

Ivan Jacob Agaloos Pesigan

See Also

```
Other Beta Delta Functions: BetaDelta(), dif.betadelta(), dif(), rsq.betadelta()
```

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rsq.betadelta	Estimate Coefficient of Determination (R-Squared and Adjusted R-Squared) and Sampling Covariance Matrix
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Description

Estimate Coefficient of Determination (R-Squared and Adjusted R-Squared) and Sampling Covariance Matrix

Usage

```
## S3 method for class 'betadelta'
rsq(object)
```

Arguments

object

Object of class betadelta.

Value

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

```
betadelta Object of class betadelta. 
est R-squared (R^2) and adjusted R-squared (\bar{R}^2). 
vcov Sampling covariance matrix of R-squared (R^2) and adjusted R-squared (\bar{R}^2).
```

acov Asymptotic covariance matrix of R-squared (R^2) and adjusted R-squared (\bar{R}^2) .

Author(s)

Ivan Jacob Agaloos Pesigan

See Also

```
Other Beta Delta Functions: BetaDelta(), dif.betadelta(), dif(), rsq()
```

```
object <- lm(QUALITY ~ NARTIC + PCTGRT + PCTSUPP, data = nas1982)
std <- BetaDelta(object)
out <- rsq(std)
# Methods -------
print(out)
summary(out)
coef(out)
vcov(out)
confint(out, level = 0.95)</pre>
```

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summary.betadelta

Summary Method for an Object of Class betadelta

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)</pre>
```

summary.difbetadelta Summary Method for an Object of Class difbetadelta

Description

Summary Method for an Object of Class difbetadelta

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

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Arguments

object	Object of class difbetadelta.
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)
out <- dif(std)
summary(out)</pre>
```

summary.rsqbetadelta Summary Method for an Object of Class rsqbetadelta

Description

Summary Method for an Object of Class rsqbetadelta

Usage

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

Arguments

```
object Object of class rsqbetadelta.

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.

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Author(s)

Ivan Jacob Agaloos Pesigan

Examples

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

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

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

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vcov.difbetadelta	Sampling Covariance Matrix of Differences of Standardized Regression Slopes
-------------------	---

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)</pre>
```

vcov.rsqbetadelta

Sampling Covariance Matrix of R-Squared and Adjusted R-Squared

Description

Sampling Covariance Matrix of R-Squared and Adjusted R-Squared

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

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Arguments

object Object of class rsqbetadelta. ... additional arguments.

Value

Returns a matrix of the variance-covariance matrix of R-squared and adjusted R-squared.

Author(s)

Ivan Jacob Agaloos Pesigan

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

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