

# Package ‘betaSandwich’

December 18, 2022

**Title** Robust Confidence Intervals for Standardized Regression Coefficients

**Version** 1.0.3.9000

**Description** Generates robust confidence intervals for standardized regression coefficients using heteroskedasticity-consistent standard errors for models fitted by `lm()` as described in Dudgeon (2017) <[doi:10.1007/s11336-017-9563-z](https://doi.org/10.1007/s11336-017-9563-z)>.

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

**BugReports** <https://github.com/jeksterslab/betaSandwich/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

**RoxygenNote** 7.2.3

**NeedsCompilation** no

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## R topics documented:

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|         |   |
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| BetaADF | <i>Estimate Standardized Regression Coefficients and Sampling Covariance Matrix Using the Asymptotic Distribution-Free Approach</i> |
|---------|---|

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**Description**

Estimate Standardized Regression Coefficients and Sampling Covariance Matrix Using the Asymptotic Distribution-Free Approach

**Usage**

BetaADF(object)

**Arguments**

object                      Object of class lm.

**Details**

BetaADF() is appropriate when sample sizes are moderate to large ( $n > 250$ ). BetaHC() is recommended in most situations.

**Value**

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

- call** Function call.
- type** Standard error type.
- beta** Vector of standardized slopes.
- vcov** Sampling 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

**See Also**

Other Beta Sandwich Functions: [BetaHC\(\)](#), [BetaN\(\)](#)

**Examples**

```

object <- lm(QUALITY ~ NARTIC + PCTGRT + PCTSUPP, data = nas1982)
std <- BetaADF(object)
# Methods -----
print(std)
summary(std)
coef(std)
vcov(std)
confint(std, level = 0.95)

```

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|        |  |
|--------|--|
| BetaHC | <i>Estimate Standardized Regression Coefficients and Robust Sampling Covariance Matrix</i> |
|--------|--|

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**Description**

Estimate Standardized Regression Coefficients and Robust Sampling Covariance Matrix

**Usage**

```
BetaHC(object, type = "hc3", g1 = 1, g2 = 1.5, k = 0.7)
```

**Arguments**

|               |  |
|---------------|--|
| <b>object</b> | Object of class <code>lm</code> .  |
| <b>type</b>   | Character string. Correction type. Possible values are "hc0", "hc1", "hc2", "hc3", "hc4", "hc4m", and "hc5". |
| <b>g1</b>     | Numeric. g1 value for type = "hc4m" or type = "hc5".   |
| <b>g2</b>     | Numeric. g2 value for type = "hc4m".   |
| <b>k</b>      | Numeric. Constant for type = "hc5"   |

**Value**

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

**call** Function call.

**type** Standard error type.

**beta** Vector of standardized slopes.

**vcov** Sampling 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

Dudgeon, P. (2017). Some improvements in confidence intervals for standardized regression coefficients. *Psychometrika*, 82(4), 928–951. doi:[10.1007/s113360179563z](https://doi.org/10.1007/s113360179563z)

## See Also

Other Beta Sandwich Functions: [BetaADF\(\)](#), [BetaN\(\)](#)

## Examples

```
object <- lm(QUALITY ~ NARTIC + PCTGRT + PCTSUPP, data = nas1982)
std <- BetaHC(object)
# Methods -----
print(std)
summary(std)
coef(std)
vcov(std)
confint(std, level = 0.95)
```

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|       |   |
|-------|---|
| BetaN | <i>Estimate Standardized Regression Coefficients and Sampling Covariance Matrix Assuming Multivariate Normality</i> |
|-------|---|

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## Description

Estimate Standardized Regression Coefficients and Sampling Covariance Matrix Assuming Multivariate Normality

## Usage

```
BetaN(object)
```

## Arguments

object            Object of class `lm`.

## Details

`BetaN()` assumes multivariate normality. `BetaHC()` is recommended in most situations.

## Value

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

**call** Function call.

**type** Standard error type.

**beta** Vector of standardized slopes.

**vcov** Sampling 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

**See Also**

Other Beta Sandwich Functions: [BetaADF\(\)](#), [BetaHC\(\)](#)

**Examples**

```
object <- lm(QUALITY ~ NARTIC + PCTGRT + PCTSUPP, data = nas1982)
std <- BetaN(object)
# Methods -----
print(std)
summary(std)
coef(std)
vcov(std)
confint(std, level = 0.95)
```

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|                   |                                       |
|-------------------|---------------------------------------|
| coef.betasandwich | <i>Standardized Regression Slopes</i> |
|-------------------|---------------------------------------|

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**Description**

Standardized Regression Slopes

**Usage**

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

**Arguments**

**object** Object of class betasandwich.  
**...** 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 <- BetaHC(object)
coef(std)
```

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confint.betasandwich    *Confidence Intervals for Standardized Regression Slopes*

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**Description**

Confidence Intervals for Standardized Regression Slopes

**Usage**

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

**Arguments**

|        |   |
|--------|---|
| object | Object of class betasandwich.   |
| 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 <- BetaHC(object)
confint(std, level = 0.95)
```

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.

print.betasandwich

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

Print Method for an Object of Class betasandwich

**Usage**

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

**Arguments**

|        |                               |
|--------|-------------------------------|
| x      | Object of class betasandwich. |
| 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 <- BetaHC(object)
print(std)
```

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summary.betasandwich    *Summary Method for an Object of Class betasandwich*

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**Description**

Summary Method for an Object of Class betasandwich

**Usage**

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

**Arguments**

|        |                               |
|--------|-------------------------------|
| object | Object of class betasandwich. |
| 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 <- BetaHC(object)
summary(std)
```

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|                   |   |
|-------------------|---|
| vcov.betasandwich | <i>Sampling Covariance Matrix of the Standardized Regression Slopes</i> |
|-------------------|---|

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**Description**

Sampling Covariance Matrix of the Standardized Regression Slopes

**Usage**

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

**Arguments**

|        |                               |
|--------|-------------------------------|
| object | Object of class betasandwich. |
| ...    | 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 <- BetaHC(object)
vcov(std)
```

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