

# Package ‘Mmcsd’

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**Title** Modeling Complex Longitudinal Data in a Quick and Easy Way

**Version** 1.0.0

**Description** Matching longitudinal methodology models with complex sampling design. It fits fixed and random effects models and covariance structured models so far. It also provides tools to perform statistical tests considering these specifications as described in : Pacheco, P. H. (2021). ``Modeling complex longitudinal data in R: development of a statistical package." <<https://repositorio.ufjf.br/jspui/bitstream/ufjf/13437/1/pedrohenriquedemesquitapacheco.pdf>>.

**License** GPL (>= 3)

**Encoding** UTF-8

**LazyData** true

**RoxygenNote** 7.2.3

**Imports** dplyr, knitr, magrittr, methods, purrr, rlist, stats, tibble, tidyrr

**Depends** R (>= 2.10)

**Suggests** rmarkdown, simstudy, kableExtra, tidyverse

**VignetteBuilder** knitr

**NeedsCompilation** no

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cov_mmcsd	<i>Fit covariance structured longitudinal model.</i>
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## Description

Responsible for performing the modeling of the model's covariance matrix through the use of covariance structures.

## Usage

```
cov_mmcsd(fit, fittingType, sigmaThetaExpr, optimParams)
```

## Arguments

<code>fit</code>	A fit model with class 'mmcsd'
<code>fittingType</code>	A character with the fitting function type. See options above
<code>sigmaThetaExpr</code>	A character with the covariance structure type or a list of expressions
<code>optimParams</code>	A list with configuration for optim function. 'Par' is required.

## Value

The fit model with class 'mmcsd.theta'.

## Examples

```
fit <- mmcsd(
  score ~ wave + ageg + ecacg + qualifg,
  waves = wave, ids = id,
  weights = weight, stratum = strata, cluster = cluster,
  data = example_data, sigma = "exchangeable"
)
fitTheta_ucm <- cov_mmcsd(fit,
  fittingType = "PML", sigmaThetaExpr = "UCM",
  optimParams = list(par = c(7, 5))
)
```

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example_data	<i>A longitudinal example dataset.</i>
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**Description**

An example dataset containing the individuals scores for certain subject.

**Usage**

```
example_data
```

**Format**

A data frame with 6700 rows and 9 variables:

**id** respondent id  
**wave** wave number  
**score** respondent score  
**weight** sampling weight  
**strata** strata variable  
**cluster** cluster variable  
**ageg** categorical age  
**ecacg** educational level  
**qualifg** economic activity

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mmcsd	<i>Fit fixed and random effects longitudinal model.</i>
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**Description**

Estimate the fixed effects of the model, also known as B parameters of the regression, taking into account the sampling plan of the research, and also estimating the covariance matrix of the model considering the estimates of B

**Usage**

```
mmcsd(formula, waves, ids, weights, stratum, cluster, data, sigma = "identity")
```

**Arguments**

formula	A formula
waves	a dataframe column or an array
ids	a dataframe column or an array
weights	a dataframe column or an array
stratum	a dataframe column or an array
cluster	a dataframe column or an array
data	A dataframe or tibble
sigma	A character or a square matrix

**Value**

The fit model with class 'mmcsd'.

**Examples**

```
fit <- mmcsd(
  score ~ wave + ageg + ecacg + qualifg,
  waves = wave, ids = id,
  weights = weight, stratum = strata, cluster = cluster,
  data = example_data, sigma = "exchangeable"
)
```

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sigmaThetaExpr\_viewer *covariance structure viewer to preview sigmaThetaExpr to be used in 'cov\_mmcsd'.*

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**Description**

Knowing the difficulty of visualizing the covariance structure, especially when the user chooses to determine his own structure. This function was developed, that allows the user to view the provided structure even before it is evaluated, that is, through mathematics symbolic.

**Usage**

```
sigmaThetaExpr_viewer(sigmaThetaExpr, numWaves = NULL)
```

**Arguments**

sigmaThetaExpr	A character with the covariance structure type or a list of expressions
numWaves	An integer with the size of the square matrix to be printed.

**Value**

Return NULL and print in terminal the sigmaThetaExpr.

**Examples**

```
sigmaThetaExpr_viewer("UCM", 5)
```

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summary.mmcsd	<i>Summarise the results of 'mmcsd' fit.</i>
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**Description**

Summarise the results of 'mmcsd' fit.

**Usage**

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

**Arguments**

object	A mmcsd fitted model
...	Additional params passed to summary

**Value**

Return NULL and print in terminal the results.

**Examples**

```
fit <- mmcsd(  
  score ~ wave + ageg + ecacg + qualifg,  
  waves = wave, ids = id,  
  weights = weight, stratum = strata, cluster = cluster,  
  data = example_data, sigma = "exchangeable"  
)  
summary(fit)
```

summary.mmcsd.theta    *Summarise the results of 'cov\_mmcsd' fit.*

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**Description**

Summarise the results of 'cov\_mmcsd' fit.

**Usage**

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

**Arguments**

object	A mmcsd.theta fitted model
...	Additional params passed to summary

**Value**

Return NULL and print in terminal the results.

**Examples**

```
fit <- mmcsd(  
  score ~ wave + ageg + ecacg + qualifg,  
  waves = wave, ids = id,  
  weights = weight, stratum = strata, cluster = cluster,  
  data = example_data, sigma = "exchangeable"  
)  
fitTheta_ucm <- cov_mmcsd(fit,  
  fittingType = "PML", sigmaThetaExpr = "UCM",  
  optimParams = list(par = c(7, 5))  
)  
summary(fitTheta_ucm)
```

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