

# Package ‘mfGARCH’

May 24, 2018

**Title** Mixed-Frequency GARCH Models

**Version** 0.1.3

**Description** Estimating GARCH-MIDAS (MIXed-DAta-Sampling) models (Engle, Ghysels, Sohn, 2013, <doi:10.1162/REST\_a\_00300>) and related statistical inference, accompanying the paper “Two are better than one: volatility forecasting using multiplicative component GARCH models” by Conrad and Kleen (2018, Working Paper, <doi:10.2139/ssrn.2752354>). The GARCH-MIDAS model decomposes the conditional variance of (daily) stock returns into a short- and long-term component, where the latter may depend on an exogenous covariate sampled at a lower frequency.

**Depends** R (>= 3.3.0)

**License** MIT + file LICENSE

**Encoding** UTF-8

**LazyData** true

**RoxygenNote** 6.0.1

**Imports** Rcpp, graphics, stats, numDeriv, zoo

**LinkingTo** Rcpp

**URL** <https://github.com/onnoKleen/mfGARCH/>

**BugReports** <https://github.com/onnoKleen/mfGARCH/issues>

**Suggests** testthat, dplyr, ggplot2, covr, rmarkdown

**NeedsCompilation** yes

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**Repository** CRAN

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df_financial	<i>Stock returns and financial conditions.</i>
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## Description

A dataset containing the S&P 500 stock returns and the NFCI

## Usage

```
df_financial
```

## Format

A data frame with 11,306 rows and 5 variables:

**date** date

**return** daily S&P 500 log returns times 100

**rv** 5-minute realized variances

**week** a dummy for each year/week combination

**nfc** National Financial Conditions Index

## Source

<https://github.com/onnokleen/mfGARCH/>

<https://de.finance.yahoo.com/>

<https://fred.stlouisfed.org/series/NFCI>

<https://realized.oxford-man.ox.ac.uk>

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fit_mfgarch	<i>This function estimates a multiplicative mixed-frequency GARCH model</i>
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**Description**

This function estimates a multiplicative mixed-frequency GARCH model

**Usage**

```
fit_mfgarch(data, y, x = NULL, K = NULL, low.freq = "date",
            var.ratio.freq = NULL, gamma = TRUE, weighting = "beta.restricted")
```

**Arguments**

data	data frame containing a column named date of type 'Date'.
y	name of high frequency dependent variable in df.
x	covariate employed in mfGARCH.
K	an integer specifying lag length K in the long-term component.
low.freq	a string of the low frequency variable in the df.
var.ratio.freq	specify a frequency column on which the variance ratio should be calculated.
gamma	if TRUE, an asymmetric GJR-GARCH is used as the short-term component. If FALSE, a simple GARCH(1,1) is employed.
weighting	specifies the weighting scheme employed in the long-term component. Options are "beta.restricted" (default) or "beta.unrestricted"

**Examples**

```
## Not run: fit_mfgarch(data = df_financial, y = "return", x = "nfcf", low.freq = "week", K = 52)
```

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plot_weighting_scheme	<i>This function plots the weighting scheme of an estimated GARCH-MIDAS model</i>
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**Description**

This function plots the weighting scheme of an estimated GARCH-MIDAS model

**Usage**

```
plot_weighting_scheme(x)
```

**Arguments**

x	mfGARCH object obtained by fit_mfgarch
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simulate_mfgarch	<i>This function simulates a GARCH-MIDAS model</i>
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### Description

This function simulates a GARCH-MIDAS model

### Usage

```
simulate_mfgarch(n.days, mu, alpha, beta, gamma, m, theta, w1 = 1, w2, K, psi,
  sigma.psi, low.freq = 1, student.t = NULL)
```

### Arguments

n.days	number of days
mu	mu
alpha	alpha
beta	beta
gamma	gamma
m	m
theta	theta
w1	w1
w2	w2
K	K
psi	psi
sigma.psi	sigma.psi
low.freq	number of days per low-frequency period
student.t	student.t

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simulate_mfgarch_diffusion	
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*This function simulates a GARCH-MIDAS model where the short-term GARCH component is replaced by its diffusion limit, see Andersen (1998)*

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### Description

This function simulates a GARCH-MIDAS model where the short-term GARCH component is replaced by its diffusion limit, see Andersen (1998)

**Usage**

```
simulate_mfgarch_diffusion(n.days, mu, alpha, beta, gamma, m, theta, w1 = 1,  
  w2, K, psi, sigma.psi, low.freq = 1)
```

**Arguments**

n.days	number of days
mu	mu
alpha	alpha
beta	beta
gamma	gamma
m	m
theta	theta
w1	w1
w2	w2
K	K
psi	psi
sigma.psi	sigma.psi
low.freq	low.freq

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