

Package 'CVCBasicVaR'

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Type Package

Title Basic Value at Risk with a Parametric Approach

Version 0.1.1

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Description The goal of this package is to provide some useful function for the computation of the Value at Risk with a parametric approach.

Depends quantmod

Imports quantmod

Licens GPL-2

Encoding UTF-8

LazyData true

RoxygenNote 6.1.1

Suggests: knitr
rmarkdown

VignetteBuilder knitr

Repository github

CVCBasicVaR *Caprari Varvus Cotugno Basic Value at Risk*

Description

Download Data Efficiently and Compute Value at Risk with Parametric Approach

Details

Package: CVCBasicVaR
Type: Package
Version: 0.1.1
Date: 2019-14-05
Depends: R (>= 3.2.0), quantmod (>=0.4-13)
Imports: quantmod

Lazyload: yes
License: GPL-2
URL: <https://github.com/usiproject2019/CVCBasicVaR>

The goal of this package is to provide the tools to download prices and returns of stocks from Yahoo finance, store them in a manageable way and, by using them, compute basic operations that concerns Value at Risk.

What CVCBasicVaR is

A useful tool to easy download prices and returns and organize them in a simple and efficient way, providing also a intuitive visulalization of the downloaded data. It provides also useful functions to compute with the Parametric Approach the Value at Risk for single stocks or for an entire portfolio.

What CVCBasicVaR is not

A replacement of quantmod, the package on which the download functions are based on, and a new Value at Risk approach. All the functions that provides the computation of the Value at Risk are based on the well known standard formula. Nothing new was added.

Author(s)

Massimo Caprari, Anastasiya Varvus, Michele Cotugno (CVC)

Portfolio_Component_VaR *Compute the Component Value at Risk of a Portfolio*

Description

Using the Asset Normal Approach, the function computes the Component Value at Risk of a portfolio for a given time series of returns and a vector of monetary positions. It reflects the contribution of each asset to the whole Portfolio VaR.

Usage

```
Portfolio_Component_VaR(return, confidence_level, wealth, T)
```

Arguments

- | | |
|-------------------------|--|
| return | a class "xts" element: time serie of returns. In order to get it, it is recommended to use Return_Download function . |
| confidence_level | a number between 0 and 1 that specifies what is the confidence level to use in the computation |
| wealth | a numeric vector that specifies the monetary exposure assumed in every stock/ index (note that the order of elements of the vector must reflect the order of the |

elements of the returns)

T a number that specifies the time interval (in days) based on which the Value at Risk is computed

Value

The function returns a class “matrix” object containing the Component VaR of every asset of the portfolio for its pre-specified monetary exposure. It also returns some inputs of the function itself (Confidence level, time interval).

Author(s)

Massimo Caprari, Anastasiya Varvus, Michele Cotugno (CVC)

References

[Yahoo Finance](#), [Investopedia](#)

See Also

[quantmod](#), [getSymbols.yahoo](#), [Price_Download](#), [dailyReturn](#)

Example

```
## Not run:
Stocks <- c("GE", "AAPL", "BA", "DB", "FORD", "^DJI")
Returns <- Return_Download(Stocks, 4, from = Sys.Date()-365.25*3, to = Sys.Date())
Wealth <- c(100000, 50000, 130000, 75000, 500000, 930000)
ComponentVaR <- Portfolio_Component_VaR>Returns, 0.99, Wealth, 10)

## End(Not run)
```

Portfolio_Marginal_VaR *Compute the Marginal Value at Risk of a Portfolio*

Description

Using the Asset Normal Approach, the function computes the Marginal Value at Risk of a portfolio for a given time series of returns and a vector of monetary positions.

Usage

```
Portfolio_Marginal_VaR(return, confidence_level, wealth, T)
```

Arguments

return	a class "xts" element: time serie of returns. In order to get it, it is recommended to use Return_Download function .
confidence_level	a number between 0 and 1 that specifies what is the confidence level to use in the computation
wealth	a numeric vector that specifies the monetary exposure assumed in every stock/index (note that the order of elements of the vector must reflect the order of the elements of the returns)
T	a number that specifies the time interval (in days) based on which the Value at Risk is computed

Value

The function returns a class “matrix” object containing the Marginal VaR of every asset of the portfolio for its pre-specified monetary exposure. It also returns some inputs of the function itself (Confidence level, time interval).

Author(s)

Massimo Caprari, Anastasiya Varvus, Michele Cotugno (CVC)

References

[Yahoo Finance](#), [Investopedia](#)

See Also

[quantmod](#), [getSymbols.yahoo](#), [Price_Download](#), [dailyReturn](#)

Example

```
## Not run:
Stocks <- c("GE", "AAPL", "BA", "DB", "FORD", "^DJI")
Returns <- Return_Download(Stocks, 4, from = Sys.Date()-365.25*3, to = Sys.Date())
Wealth <- c(100000, 50000, 130000, 75000, 500000, 930000)
MarginalVaR <- Portfolio_Marginal_VaR>Returns, 0.99, Wealth, 10)

## End(Not run)
```

Portfolio_Relative_Component_VaR *Compute the Relative Component Value at Risk of a Portfolio*

Description

Using the Asset Normal Approach, the function computes the Relative Component Value at Risk of a portfolio for a given time series of returns and a vector of monetary positions. It reflects the contribution of each asset to the whole Portfolio VaR, as a fraction of the total Portfolio. The sum of all the fractions will be equal to 1.

Usage

```
Portfolio_Relative_Component_VaR(return, confidence_level, wealth, T))
```

Arguments

- | | |
|-------------------------|--|
| return | a class "xts" element: time serie of returns. In order to get it, it is recommended to use Return_Download function . |
| confidence_level | a number between 0 and 1 that specifies what is the confidence level to use in the computation |
| wealth | a numeric vector that specifies the monetary exposure assumed in every stock/index (note that the order of elements of the vector must reflect the order of the elements of the returns) |
| T | a number that specifies the time interval (in days) based on which the Value at Risk is computed |

Value

The function returns a class "matrix" object containing the Relative Component VaR of every asset of the portfolio for its pre-specified monetary exposure. It also returns some inputs of the function itself (Confidence level, time interval).

Author(s)

Massimo Caprari, Anastasiya Varvus, Michele Cotugno (CVC)

References

[Yahoo Finance](#), [Investopedia](#)

See Also

[quantmod](#), [getSymbols.yahoo](#), [Price_Download](#), [dailyReturn](#)

Example

Not run:

```
Stocks <- c("GE", "AAPL", "BA", "DB", "FORD", "^DJI")
```

```
Returns <- Return_Download(Stocks, 4, from = Sys.Date()-365.25*3, to = Sys.Date())
Wealth <- c(100000, 50000, 130000, 75000, 500000, 930000)
RelativeComponentVaR <- Portfolio_Relative_Component_VaR>Returns, 0.99, Wealth, 10)
```

```
'## End(Not run)
```

Portfolio_VaR *Compute the Value at Risk for a Portfolio*

Description

Using the Asset Normal Approach, the function computes the Value at Risk of a portfolio for a given time series of returns and a vector of monetary positions.

Usage

```
Portfolio_VaR(return, confidence_level, wealth, T
```

Arguments

- | | |
|-------------------------|---|
| return | a class "xts" element: time serie of returns. In order to get it, it is recommended to use Return_Download function . |
| confidence_level | a number between 0 and 1 that specifies what is the confidence level to use in the computation |
| wealth | a numeric vector that specifies the monetary exposure assumed in every stock/ index (note that the order of elements of the vector must reflect the order of the elements of the returns) |
| T | a number that specifies the time interval (in days) based on which the Value at Risk is computed |

Value

The function returns a class “matrix” object containing the VaR of the portfolio for the pre-specified monetary exposure. It also returns some inputs of the function itself (Confidence level, time interval).

Author(s)

Massimo Caprari, Anastasiya Varvus, Michele Cotugno (CVC)

References

[Yahoo Finance](#), [Investopedia](#)

See Also

[quantmod](#), [getSymbols.yahoo](#), [Price_Download](#), [dailyReturn](#)

Example

```
## Not run:
Stocks <- c("GE", "AAPL", "BA", "DB", "FORD", "^DJI")
Returns <- Return_Download(Stocks, 4, from = Sys.Date()-365.25*3, to = Sys.Date())
Wealth <- c(100000, 50000, 130000, 75000, 500000, 930000)
PortfolioVaR <- Portfolio_VaR>Returns, 0.99, Wealth, 10)

## End(Not run)
```

////////////////////////////////////

Price_Download *Download Daily Price or Volume from Yahoo Finance*

////////////////////////////////////

Description

Download daily price or volume from Yahoo Finance for a single company or for a vector that contains the tickers of several companies. Note that this function is based on the [getSymbols](#) function of the [quantmod](#). Note that in order to have an omogeneous output all rows containing at least one missing observation will be deleted.

Usage

```
Price_Download (ticker, price_type = 4, from, to)
```

Arguments

- | | |
|-------------------|---|
| ticker | a character vector of the Yahoo Finance ticker of the companies/indices for which prices/volume should be downloaded |
| price_type | a number between 1 to 6 that specifies what is the base of the data that should be downloaded (default = 4). 1 = Daily price, 2 = Highest price, 3 = Lowest price, 4 = Closing price, 5 = Volume 6 = Adjusted price |
| from | a class "date" element. It specifies the starting date from which the data will be downloaded (date of the first observation) |
| to | a class "date" element. It specifies until when the data will be downloaded (date of the last observation) |

Value

The function returns a class "xts" object that contains the downloaded prices/volume of each specified company in the specified time-interval.

Author(s)

Massimo Caprari, Anastasiya Varvus, Michele Cotugno (CVC)

References

[Yahoo Finance](#)

See Also

[getSymbols.yahoo](#)

Examples

```
## Not run:
```

```
Price_Download ("^DJI", , "2019-05-01", "2019-05-10")
```

```
Stocks <- c("GE", "FORD", "BA", "^DJI", "DB")
```

```
Prices <- Price_Download(Stocks, 4, from = "2019-05-01", to = "2019-05-10")
```

```
## End(Not run)
```

Return_Download *Compute Daily Returns of Selected Stocks/Indices from Yahoo Finance*

Description

The function computes daily returns from Yahoo Finance for a single company or for a vector that contains the tickers of several companies. Note that this function is based on the functions [getSymbols](#) and [dailyReturn](#) of the [quantmod](#) package

Usage

```
Return_Download(ticker, price_type = 4, from, to)
```

Arguments

- | | |
|-------------------|---|
| ticker | a character vector of the Yahoo Finance ticker of the companies/indices for which the daily return will be computed. |
| price_type | a number that specifies what is the base of the data on which the returns will be computed (default = 4). 1 = Daily price, 2 = Highest price, 3 = Lowest price
4 = Closing price, 6 = Adjusted price |

from a class "date" element. It specifies the starting date on which the returns will be computed (date of the first observation). Note that, as the returns are calculated using the arithmetic approach, the first observation will be lost.

to a class "date" element. It specifies until when the returns will be computed (date of the last observation)

Value

The function returns a class "xts" object that contains the downloaded prices/volume of each specified company in the specified time-interval

Author(s)

Massimo Caprari, Anastasiya Varvus, Michele Cotugno (CVC)

References

[Yahoo Finance](#), [Investopedia](#)

See Also

[getSymbols.yahoo](#), [Price_Download](#), [dailyReturn](#)

Examples

Not run:

```
ReturnDownload("^DJI", pricetype = 4, from="2019-05-01", to="2019-05-10")
```

```
Stocks <- c("GE", "FORD", "BA", "^DJI", "DB")
```

```
Returns <- Return_Download(Stocks, 4, from = "2019-05-01", to = "2019-05-10")
```

End(Not run)

Rolling_Window_Volatility *Compute the Daily Volatility using a Rolling Window Approach*

Description

Using a rolling window approach, the function computes the daily volatility of a pre-specified vector of assets for given time series of returns.

Usage

```
Rolling_Window_Volatility(return, window)
```

Arguments

return a class "xts" element: time serie of returns. In order to get it, it is recommended to use Return_Download function .

window a class "numeric" element that specifies what is the time interval in days that will be used for the volatility computation

Value

The function returns a class "xts" object containing the volatility of the pre-specified assets for the pre-specified time window It also returns some inputs of the function itself (window).

Author(s)

Massimo Caprari, Anastasiya Varvus, Michele Cotugno (CVC)

References

[Yahoo Finance](#), [Investopedia](#)

See Also

[quantmod](#), [getSymbols.yahoo](#), [Price_Download](#), [dailyReturn](#)

Example

```
## Not run:
Ticker <- c("GE","BA")
Return <- Return_Download(myticker, 4, "2008-01-01", "2018-01-01")
Window <- c(10000)
Window_Volatility <- Rolling_Window_Volatility(Return, Window)

## End(Not run)
```

Single_VaR *Compute the Value at Risk for Single Positions*

Description

Using the Asset Normal Approach, the function computes the Value at Risk for a given time series of return and vector of positions.

Usage

```
Single_VaR(return, confidence_level, wealth, T)
```

Arguments

- return** a class "xts" element: time serie of returns. In order to get it, it is recommended to use Return_Download function .
- confidence_level** a number between 0 and 1 that specifies what is the confidence level to use in the computation
- wealth** a numeric vector that specifies the monetary exposure assumed in every stock/ index (note that the order of elements of the vector must reflect the order of the elements of the returns)
- T** a number that specifies the time interval (in days) based on which the Value at Risk is computed

Value

The function returns a class "data.frame" object containing the VaR of every assets for its relative monetary exposure specified. It also returns some inputs of the function itself (Confidence level, time interval).

Author(s)

Massimo Caprari, Anastasiya Varvus, Michele Cotugno (CVC)

References

[Yahoo Finance](#)

See Also

[quantmod](#), [getSymbols.yahoo](#), [Price_Download](#), [dailyReturn](#)

Example

```
## Not run:
Stocks <- c("GE", "AAPL", "BA", "DB", "FORD", "^DJI")
Returns <- Return_Download(Stocks, 4, from = Sys.Date()-365.25*3, to = Sys.Date())
Wealth <- c(100000, 50000, 130000, 75000, 500000, 930000)
IndividualVaR <- SingleVaR>Returns, 0.99, Wealth, 10)

## End(Not run)
```

Single_VaR_Rolling_Window *Compute the Value at Risk for Single Positions
using a Rolling Window Approach*

////////////////////////////////////

Description

Using the Asset Normal Approach, the function computes the Value at Risk each day for different assets using a pre-specified time window for the volatility computation and a certain vector of monetary exposure in each stock/index in a given day.

Usage

```
Single_VaR_Rolling_Window(price, wealth, reference_date, window, confidence_level, T)
```

Arguments

- price** a class "xts" element: time serie of prices In order to get it, it is recommended to use Price_Download function
- wealth** a numeric vector that specifies the monetary exposure assumed in every stock/index (note that the order of elementsof the vector must reflect the order of the elements of the prices)
- reference_date** a class "date" element, it is the date on which the wealth is referred. It is used to compute the number of stocks for each assets.
- window** a class "numeric" element that specifies what is the time interval in days that will be used for the volatility computation.
- confidence_level** a number between 0 and 1 that specifies what is the confidence level to use in the computation
- T** a number that specifies the time interval (in days) based on which the Value at Risk is computed

Value

The function returns a class "xts" object that contains the daily VaRs of every assets for the its relative monetary exposure in a certain date and for a chosen window of observation. It also returns some inputs of the function itself (Confidence level, time interval).

Author(s)

Massimo Caprari, Anastasiya Varvus, Michele Cotugno (CVC)

References

[Yahoo Finance](#), [Investopedia](#)

See Also

[quantmod](#), [getSymbols.yahoo](#), [Price_Download](#), [RollingWindowVolatility](#)

Example

```
'## Not run:
```

```
Stocks <- c("GE", "AAPL")
```

```
Price <- Price_Download(Stocks, 6, from = "2010-01-04", to = "2018-01-01")
```

```
Wealth <- c(100000, 50000)
```

```
RollingVaR <- Single_VaR_Rolling_Window(Price, Wealth, "2010-01-02", 250, 0.99, 1)
```

```
'## End(Not run)
```