

Package ‘TSEtools’

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Type Package

Title Manage Data from Stock Exchange Markets

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Description Tools to perform some descriptive data analysis for assets. Manage the portfolio and capital of assets. It also downloads and organizes data from the Tehran Stock Exchange (TSE).

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| | |
|------|--|
| capm | <i>Capital assets pricing model including a risk-free asset.</i> |
|------|--|

Description

Compute the capital assets pricing model including a risk-free asset.

Usage

```
capm(x, Rf = 0.2/270, sh = FALSE, eRtn = NULL)
```

Arguments

x a numeric matrix of random returns per unit of price within some holding period.

Rf the return of the risk free, i.e. has variance 0.

sh a logical indicating whether shortsales on the risky securities are allowed. Default is FALSE.

eRtn a value of expected return of portfolio. The mean of whole data default.

Details

Let ξ_1, \dots, ξ_n be random asset returns and w_1, \dots, w_n the portfolio weights. The expected returns are $r_m = E\xi_m, m = 1, \dots, n$. In addition to these risky investments, there is a risk-free asset (a bond or bank account) available, which has return r_0 . Denoting the weights of w_0 for the risk-free asset. The return of portfolio given by

$$R_p = w^t r$$

where, $r = (r_1, \dots, r_n)^t$.

Risk is measure by a deviation functional Σ . It is a variance-covariance of asset returns. The risk-free component w_0 ignore in the objective. So, the standard deviation of portfolio is given by $\sigma_p = w^t \Sigma w$.

To obtain the optimum value of $w_i, i = 1, \dots, n$, we solve the following model:

$$\min w^t \Sigma w, \text{ s.t. : } w^t r + w_0 r_0 > \mu \text{ and } \sum w_i + w_0 = 1$$

Note that, the portfolio weights may be negative (selling short is allowed). Market portfolio is named MP where, the risk free weight w_0 is zero (see, the function of `prt f()`).

For any portfolio p ,

$$E(R_p) = r_0 + \beta(p)(r_{MP} - r_0)$$

where, r_{MP} is return of market portfolio and $\beta(p)$ is the beta coefficient of the portfolio p . It is given by $\beta(p) = Cov(r_{MP}, r_p) / SD(r_{MP})$.

Value

wCAPM weight of CAPM assets

wrF weight of risk free assets

sd.capm volatility of CAPM portfolio

rtn.capm return of CAPM portfolio

beta beta coefficient of portfolio

References

Pflug and Romisch (2007, ISBN: 9789812707406)

Examples

```
## Not run:
x <- rnorm(500,0.05,0.02)
y <- rnorm(500,0.01,0.03)
z<-cbind(x, y)
colnames(z) <- c("prt1","prt2")

capm( z, sh = FALSE, Rf= 0.2/270, eRtn=0.02 )

## End(Not run)
```

getTSE

Download Historical Dataset from Tehran Stock Exchange (TSE)

Description

getTSE function is an easy way to download and organize the historical dataset from websites of TSE and www.tsetmc.com. Since, the raw data are not recorded in a standard format, we provide the function for organize the data in user friendly way. Daily data updated after 13:30 UTC. The market is closed on Friday and Wednesday and national holidays.

Usage

```
getTSE(file, symbols=NA)
```

Arguments

| | |
|---------|--|
| file | the path and name of external file which include the name of symbol and company and a specific code. |
| symbols | a vector of character given the name of assets to download. The name of assets has to be included in the first column of file. The default value is NA which consider all assets at source file to download. |

Details

The list of symbols or assets can be named, and the list names will be used as names for the variables. Component data is an array with **xts** time series object. The name for dimensions are: Open, High, Low, Close, Volume, Last. The value of symbols are appear in Global Environment.

Value

The output is an object of the "assets" name which get all the name of assets list to download.

Examples

```
## Not run:
fpath<-system.file("extdata", "sample.dat", package="TSEtools")
getTSE(fpath)

## End(Not run)
```

 mcPrt

Matrix Conversion in Portfolio

Description

mcPrt function compound the vector of assets in matrix form to using the multivariate data analysis. The assets must be included the items of Open, Close, High, Low and Volumn. The function also calculate the rate of return and Sharpe ratio for portfolio selection.

Usage

```
mcPrt(asset, sub = ":", pstvRtn = FALSE, pr = "daily", Rf = 0.0)
```

Arguments

| | |
|---------|---|
| asset | a character vector of symbols. |
| sub | The character string in the form of "start date :: end date". The date format is "%Y-%M-%D". Since, the data is time series format, the rules of xts satisfied. |
| pstvRtn | logical flag to determine, if the symbols with mean of return (see, details) should be positive/negative. Missing value is taken as false. By setting pstvRtn=TRUE, only a check the symbols that the mean of return is not negative and symbols with negative returns will be vanished from the list of calculation. |
| pr | a character specifying the desired period time of return. Default value is daily. The values get "daily", "weekly" and "monthly". |
| Rf | an integer value to give risk free. |

Details

The values of function contain Sharpe ratio and rate of return. Sharpe ratio is defined as:

$$SR = \frac{\bar{R} - R_f}{\sigma_R}$$

where \bar{R} is the mean asset return, R_f is the risk free rate of return and σ_R is the standard deviation (volatility) of the asset.

Let X_t is the closing price of the asset at time t and its value after a period of length Δt , say $X_{t+\Delta t}$. The return over that period is defined as:

$$R_t = \frac{X_{t+\Delta t}}{X_t} - 1$$

Note that the return equation is equivalent to log return asset when the ratio value of the asset is close to 1 (see, Carmona 2003). To check the goodness of fit test on return value, maximum and minimum of prices, suggested to use the package of **gnFit**.

Value

The values of function involve close, return, max and min as a matrix and xts format. The columns are a value of assets which is ordered by date. The mean return, volatility and Sharpe ratio are assigned in the out. The plot of return vs volatility and also the graph of Sharpe ratio are outputs of function.

References

Carmona (2003, ISBN:0387202862)

Examples

```
## Not run:
fpath<-system.file("extdata", "sample.dat", package="TSEtools")
getTSE(fpath)
rtn<-mcPrt(asset0, sub="2016::", pstvRtn=TRUE, pr="weekly")$return

## End(Not run)
```

 prtf

Design the Portfolio of assets

Description

Compute the efficient frontier function for some selected risk functionals in a portfolio optimization setting.

Usage

```
prtf (x, Rf = 0.0, sh = FALSE ,eRtn = NULL)
```

Arguments

| | |
|------|--|
| x | a numeric matrix of random returns per unit of price within some holding period. |
| sh | a logical indicating whether shortsales on the risky securities are allowed. Default is FALSE. |
| Rf | the return of the risk free, i.e. has variance 0. |
| eRtn | a value of expected return of portfolio. The mean of whole data default. |

Details

Let ξ_1, \dots, ξ_n be random asset returns and w_1, \dots, w_n the portfolio weights. The expected returns are $r_m = E\xi_m, m = 1, \dots, n$. In addition to these risky investments, there is a risk-free asset (a bond or bank account) available, which has return r_0 . Denoting the weights of w_0 for the risk-free asset. The return of portfolio given by

$$R_p = w^t r$$

where, $r = (r_1, \dots, r_n)^t$.

Risk is measure by a deviation functional Σ . It is a variance-covariance of asset returns. The risk-free component w_0 ignore in the objective. So, the standard deviation of portfolio is given by $\sigma_p = w^t \Sigma w$.

To obtain the optimum value of $w_i, i = 1, \dots, n$, we solve the following model:

$$\min w^t \Sigma w \quad s.t : \quad w^t r > \mu \quad \text{and} \quad \sum w_i = 1.$$

where, μ is a constant value. Note that, the portfolio weights may be negative (selling short is allowed).

Value

The minimum weights show with MIN which is the portfolio with the minimum volatility. Market portfolio is given by MP where, the risk free weight w_0 is zero. MP is the tangency point between the market line and efficient frontiers curve. A list containing the following components:

| | |
|-------|---|
| prt | list the name of assests in the portfolio |
| obs.p | return and volatiliy of overall portfolio |
| vol | volatility of portfolio |
| rtn | return of portfolio |
| w | weigthts of portfolio |

References

Pflug and Romisch (2007, ISBN: 9789812707406)

See Also

[portfolio.optimization](#), [portfolio.optim](#)

Examples

```
## Not run:
x <- rnorm(500,0.05,0.02)
y <- rnorm(500,0.01,0.03)
z<-cbind(x, y)
colnames(z) <- c("prt1","prt2")

prtf (z, sh = FALSE)

## End(Not run)
```

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