Package ‘RPEIF’

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Type Package

Title Computation and Plots of Influence Functions for Risk and Performance Measures

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Description Computes the influence functions time series of the returns for the risk and performance measures as mentioned in Chen and Martin (2018) <https://www.ssrn.com/abstract=3085672>, as well as in Zhang et al. (2019) <https://www.ssrn.com/abstract=3415903>. Also evaluates estimators influence functions at a set of parameter values and plots them to display the shapes of the influence functions.

License GPL (>= 2)

Biarch true

Imports xts, zoo, stats, RobStatTM

Depends

RoxygenNote 7.1.1

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VignetteBuilder R.rsp

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R topics documented:

`IF` *Influence Function for Available Risk and Performance Measures*

Description

`IF` returns the data and plots the shape of either the IF or the IF TS for a specified estimator.

Usage

```
IF(
  estimator,
  returns = NULL,
  evalShape = FALSE,
  retVals = NULL,
  nuisPars = NULL,
  k = 4,
  IFplot = FALSE,
  IFprint = TRUE,
  prewhiten = FALSE,
  ar.prewhiten.order = 1,
  cleanOutliers = FALSE,
  cleanMethod = c("locScaleRob")[1],
  family = c("mopt", "opt", "bisquare")[1],
  eff = 0.99,
  ...
)
```

Arguments

`estimator`	The estimator of interest.
`returns`	Returns data of the asset or portfolio. This can be a numeric or an xts object.
`evalShape`	Evaluation of the shape of the IF risk or performance measure if TRUE. Otherwise, a TS of the IF of the provided returns is computed.
`retVals`	Values used to evaluate the shape of the IF.
`nuisPars`	Nuisance parameters used for the evaluation of the shape of the IF (if no returns are provided).
`k`	Range parameter for the shape of the IF (the SD gets multiplied k times).
`IFplot`	If TRUE, the plot of the IF shape or IF TS of the returns is produced.
`IFprint`	If TRUE, the data for the IF shape or the IF TS of the returns is returned.
`prewhiten`	Boolean variable to indicate if the IF TS is pre-whitened (TRUE) or not (FALSE).
`ar.prewhiten.order`	Order of AR parameter for the pre-whitening. Default is AR(1).
`cleanOutliers`	Boolean variable to indicate whether outliers are cleaned with a robust location and scale estimator.
`cleanMethod`	Robust method used to clean outliers from the TS. Default choice is "locScaleRob".
`family`	Family for robust m-estimator of location. Must be one of "mopt" (default), "opt" or "bisquare".
`eff`	Tuning parameter for the normal distribution efficiency for robust methods.
`...`	Additional parameters passed on to influence function of risk or performance measure.

Details

For further details on the usage of the `nuisPars` argument, please refer to Section 3.1 for the `RPEIF` vignette.

Author(s)

Anthony-Alexander Christidis, `<anthony.christidis@stat.ubc.ca>`

Examples

```
# Plot of IF using the wrapper function
outIF <- IF(estimator = "Mean",
           returns = NULL, evalShape = TRUE, retVals = NULL, nuisPars = list(mu = 0.005),
            IFplot = TRUE, IFprint = TRUE)

#' # Loading data (hedge funds returns)
data(edhec, package = "PerformanceAnalytics")
colnames(edhec) = c("CA", "CTAG", "DIS", "EM","EMN", "ED", "FIA",
                    "GM", "LS", "MA", "RV", "SS", "FoF")

# Plot of IF using wrapper function and with a specified TS
```

```
outIF <- IF(estimator = "Mean",
            returns = edhec[,"CA"], evalShape = TRUE,
            retVals = seq(-0.1, 0.1, by = 0.001), nuisPars = NULL,
            IFplot = TRUE, IFprint = TRUE)

# Computing the IF of the returns (with prewhitening) with a plot of IF TS
outIF <- IF(estimator = "Mean",
            returns = edhec[,"CA"], evalShape = FALSE, retVals = NULL, nuisPars  = NULL,
            IFplot = TRUE, IFprint = TRUE,
            compile = TRUE, prewhiten = FALSE)
```

IF.DSR *Influence Function - Downside Sharpe Ratio*

Description

IF.DSR returns the data and plots the shape of either the IF or the IF TS for the Downside Sharpe Ratio.

Usage

```
IF.DSR(
  returns = NULL,
  evalShape = FALSE,
  retVals = NULL,
  nuisPars = NULL,
  k = 4,
  IFplot = FALSE,
  IFprint = TRUE,
  rf = 0,
  prewhiten = FALSE,
  ar.prewhiten.order = 1,
  cleanOutliers = FALSE,
  cleanMethod = c("locScaleRob")[1],
  eff = 0.99,
  ...
)
```

Arguments

returns	Returns data of the asset or portfolio. This can be a numeric or an xts object.
evalShape	Evaluation of the shape of the IF risk or performance measure if TRUE. Otherwise, a TS of the IF of the provided returns is computed.
retVals	Values used to evaluate the shape of the IF.
nuisPars	Nuisance parameters used for the evaluation of the shape of the IF (if no returns are provided).

k	Range parameter for the shape of the IF (the SD gets multiplied k times).
IFplot	If TRUE, the plot of the IF shape or IF TS of the returns is produced.
IFprint	If TRUE, the data for the IF shape or the IF TS of the returns is returned.
rf	Risk-free interest rate.
prewhiten	Boolean variable to indicate if the IF TS is pre-whitened (TRUE) or not (FALSE).
ar.prewhiten.order	Order of AR parameter for the pre-whitening. Default is AR(1).
cleanOutliers	Boolean variable to indicate whether outliers are cleaned with a robust location and scale estimator.
cleanMethod	Robust method used to clean outliers from the TS. Default choice is "locScaleRob".
eff	Tuning parameter for the normal distribution efficiency for the "locScaleRob" robust data cleaning.
...	Addtional parameters.

Details

For further details on the usage of the nuisPars argument, please refer to Section 3.1 for the RPEIF vignette.

Value

Influence function of DSR.

Author(s)

Anthony-Alexander Christidis, <anthony.christidis@stat.ubc.ca>

Examples

```
# Plot of IF with nuisance parameter with return value
outIF <- IF.DSR(returns = NULL, evalShape = TRUE,
                retVals = NULL, nuisPars = NULL,
                IFplot = TRUE, IFprint = TRUE)

data(edhec, package = "PerformanceAnalytics")
colnames(edhec) = c("CA", "CTAG", "DIS", "EM","EMN", "ED", "FIA",
                    "GM", "LS", "MA", "RV", "SS", "FoF")

# Plot of IF a specified TS
outIF <- IF.DSR(returns = edhec[,"CA"], evalShape = TRUE,
                retVals = seq(-0.1, 0.1, by = 0.001), nuisPars = NULL,
                IFplot = TRUE, IFprint = TRUE)

# Computing the IF of the returns (with prewhitening) with a plot of IF TS
outIF <- IF.DSR(returns = edhec[,"CA"], evalShape = FALSE,
                retVals = NULL, nuisPars = NULL,
                IFplot = TRUE, IFprint = TRUE,
                prewhiten = FALSE)
```

IF.ES *Influence Function - Expected Shortfall (ES)*

Description

`IF.ES` returns the data and plots the shape of either the IF or the IF TS for the ES

Usage

```
IF.ES(
  returns = NULL,
  evalShape = FALSE,
  retVals = NULL,
  nuisPars = NULL,
  k = 4,
  IFplot = FALSE,
  IFprint = TRUE,
  alpha.ES = 0.05,
  prewhiten = FALSE,
  ar.prewhiten.order = 1,
  cleanOutliers = FALSE,
  cleanMethod = c("locScaleRob")[1],
  eff = 0.99,
  ...
)
```

Arguments

`returns`	Returns data of the asset or portfolio. This can be a numeric or an xts object.
`evalShape`	Evaluation of the shape of the IF risk or performance measure if TRUE. Otherwise, a TS of the IF of the provided returns is computed.
`retVals`	Values used to evaluate the shape of the IF.
`nuisPars`	Nuisance parameters used for the evaluation of the shape of the IF (if no returns are provided).
`k`	Range parameter for the shape of the IF (the SD gets multiplied k times).
`IFplot`	If TRUE, the plot of the IF shape or IF TS of the returns is produced.
`IFprint`	If TRUE, the data for the IF shape or the IF TS of the returns is returned.
`alpha.ES`	Tail Probability.
`prewhiten`	Boolean variable to indicate if the IF TS is pre-whitened (TRUE) or not (FALSE).
`ar.prewhiten.order`	Order of AR parameter for the pre-whitening. Default is AR(1).
`cleanOutliers`	Boolean variable to indicate whether outliers are cleaned with a robust location and scale estimator.
`cleanMethod`	Robust method used to clean outliers from the TS. Default choice is "locScaleRob".

`eff`	Tuning parameter for the normal distribution efficiency for the "locScaleRob" robust data cleaning.
`...`	Additional parameters.

Details

For further details on the usage of the `nuisPars` argument, please refer to Section 3.1 for the `RPEIF` vignette.

Value

Influence function of the ES.

Author(s)

Anthony-Alexander Christidis, `<anthony.christidis@stat.ubc.ca>`

Examples

```
# Plot of IF with nuisance parameter with return value
outIF <- IF.ES(returns = NULL, evalShape = TRUE,
               retVals = NULL, nuisPars = NULL,
               IFplot = TRUE, IFprint = TRUE)

data(edhec, package = "PerformanceAnalytics")
colnames(edhec) = c("CA", "CTAG", "DIS", "EM","EMN", "ED", "FIA",
                    "GM", "LS", "MA", "RV", "SS", "FoF")

# Plot of IF a specified TS
outIF <- IF.ES(returns = edhec[,"CA"], evalShape = TRUE,
               retVals = seq(-0.1, 0.1, by = 0.001), nuisPars = NULL,
               IFplot = TRUE, IFprint = TRUE)

# Computing the IF of the returns (with prewhitening) with a plot of IF TS
outIF <- IF.ES(returns = edhec[,"CA"], evalShape = FALSE,
               retVals = NULL, nuisPars = NULL,
               IFplot = TRUE, IFprint = TRUE,
               prewhiten = FALSE)
```

`IF.ESratio` *Influence Function - Expected Shortfall (ES) Ratio*

Description

`IF.ESratio` returns the data and plots the shape of either the IF or the IF TS for the Expected Shortfall Ratio.

Usage

```
IF.ESratio(
  returns = NULL,
  evalShape = FALSE,
  retVals = NULL,
  nuisPars = NULL,
  k = 4,
  IFplot = FALSE,
  IFprint = TRUE,
  alpha = 0.1,
  rf = 0,
  prewhiten = FALSE,
  ar.prewhiten.order = 1,
  cleanOutliers = FALSE,
  cleanMethod = c("locScaleRob")[1],
  eff = 0.99,
  ...
)
```

Arguments

`returns`	Returns data of the asset or portfolio. This can be a numeric or an xts object.
`evalShape`	Evaluation of the shape of the IF risk or performance measure if TRUE. Otherwise, a TS of the IF of the provided returns is computed.
`retVals`	Values used to evaluate the shape of the IF.
`nuisPars`	Nuisance parameters used for the evaluation of the shape of the IF (if no returns are provided).
`k`	Range parameter for the shape of the IF (the SD gets multiplied k times).
`IFplot`	If TRUE, the plot of the IF shape or IF TS of the returns is produced.
`IFprint`	If TRUE, the data for the IF shape or the IF TS of the returns is returned.
`alpha`	Tail Probability.
`rf`	Risk-free interest rate.
`prewhiten`	Boolean variable to indicate if the IF TS is pre-whitened (TRUE) or not (FALSE).
`ar.prewhiten.order`	Order of AR parameter for the pre-whitening. Default is AR(1).
`cleanOutliers`	Boolean variable to indicate whether outliers are cleaned with a robust location and scale estimator.
`cleanMethod`	Robust method used to clean outliers from the TS. Default choice is "locScaleRob".
`eff`	Tuning parameter for the normal distribution efficiency for the "locScaleRob" robust data cleaning.
`...`	Additional parameters.

Details

For further details on the usage of the `nuisPars` argument, please refer to Section 3.1 for the `RPEIF` vignette.

Value

Influence function of ESratio.

Author(s)

Anthony-Alexander Christidis, <anthony.christidis@stat.ubc.ca>

Examples

```
# Plot of IF with nuisance parameter with return value
outIF <- IF.ESratio(returns = NULL, evalShape = TRUE,
                    retVals = NULL, nuisPars = NULL,
                    IFplot = TRUE, IFprint = TRUE)

data(edhec, package = "PerformanceAnalytics")
colnames(edhec) = c("CA", "CTAG", "DIS", "EM","EMN", "ED", "FIA",
                    "GM", "LS", "MA", "RV", "SS", "FoF")

# Plot of IF a specified TS
outIF <- IF.ESratio(returns = edhec[,"CA"], evalShape = TRUE,
                    retVals = seq(-0.1, 0.1, by = 0.001), nuisPars = NULL,
                    IFplot = TRUE, IFprint = TRUE)

# Computing the IF of the returns (with prewhitening) with a plot of IF TS
outIF <- IF.ESratio(returns = edhec[,"CA"], evalShape = FALSE,
                    retVals = NULL, nuisPars = NULL,
                    IFplot = TRUE, IFprint = TRUE,
                    prewhiten = FALSE)
```

IF.LPM — *Influence Function - Lower Partial Moment (LPM)*

Description

`IF.LPM` returns the data and plots the shape of either the IF or the IF TS for the LPM

Usage

```
IF.LPM(
  returns = NULL,
  evalShape = FALSE,
  retVals = NULL,
  nuisPars = NULL,
  k = 4,
  IFplot = FALSE,
  IFprint = TRUE,
  const = 0,
```

```
  order = 1,
  prewhiten = FALSE,
  ar.prewhiten.order = 1,
  cleanOutliers = FALSE,
  cleanMethod = c("locScaleRob")[1],
  eff = 0.99,
  ...
)
```

Arguments

- `returns` Returns data of the asset or portfolio. This can be a numeric or an xts object.
- `evalShape` Evaluation of the shape of the IF risk or performance measure if TRUE. Otherwise, a TS of the IF of the provided returns is computed.
- `retVals` Values used to evaluate the shape of the IF.
- `nuisPars` Nuisance parameters used for the evaluation of the shape of the IF (if no returns are provided).
- `k` Range parameter for the shape of the IF (the SD gets multiplied k times).
- `IFplot` If TRUE, the plot of the IF shape or IF TS of the returns is produced.
- `IFprint` If TRUE, the data for the IF shape or the IF TS of the returns is returned.
- `const` Constant threshold.
- `order` Order of LPM. Can only take values 1 or 2.
- `prewhiten` Boolean variable to indicate if the IF TS is pre-whitened (TRUE) or not (FALSE).
- `ar.prewhiten.order` Order of AR parameter for the pre-whitening. Default is AR(1).
- `cleanOutliers` Boolean variable to indicate whether outliers are cleaned with a robust location and scale estimator.
- `cleanMethod` Robust method used to clean outliers from the TS. Default choice is "locScaleRob".
- `eff` Tuning parameter for the normal distribution efficiency for the "locScaleRob" robust data cleaning.
- `...` Additional parameters.

Details

For further details on the usage of the `nuisPars` argument, please refer to Section 3.1 for the `RPEIF` vignette.

Value

Influence function of LPM.

Author(s)

Anthony-Alexander Christidis, <anthony.christidis@stat.ubc.ca>

Examples

```
# Plot of IF with nuisance parameter with return value
outIF <- IF.LPM(returns = NULL, evalShape = TRUE,
                retVals = NULL, nuisPars = NULL,
                IFplot = TRUE, IFprint = TRUE)

data(edhec, package = "PerformanceAnalytics")
colnames(edhec) = c("CA", "CTAG", "DIS", "EM","EMN", "ED", "FIA",
                    "GM", "LS", "MA", "RV", "SS", "FoF")

# Plot of IF a specified TS
outIF <- IF.LPM(returns = edhec[,"CA"], evalShape = TRUE,
                retVals = seq(-0.1, 0.1, by = 0.001), nuisPars = NULL,
                IFplot = TRUE, IFprint = TRUE)

# Computing the IF of the returns (with prewhitening) with a plot of IF TS
outIF <- IF.LPM(returns = edhec[,"CA"], evalShape = FALSE,
                retVals = NULL, nuisPars = NULL,
                IFplot = TRUE, IFprint = TRUE,
                prewhiten = FALSE)
```

`IF.Mean` *Influence Function - Mean*

Description

`IF.Mean` returns the data and plots the shape of either the IF or the IF TS for the mean.

Usage

```
IF.Mean(
  returns = NULL,
  evalShape = FALSE,
  retVals = NULL,
  nuisPars = NULL,
  k = 4,
  IFplot = FALSE,
  IFprint = TRUE,
  prewhiten = FALSE,
  ar.prewhiten.order = 1,
  cleanOutliers = FALSE,
  cleanMethod = c("locScaleRob")[1],
  eff = 0.99,
  ...
)
```

Arguments

returns	Returns data of the asset or portfolio. This can be a numeric or an xts object.
evalShape	Evaluation of the shape of the IF risk or performance measure if TRUE. Otherwise, a TS of the IF of the provided returns is computed.
retVals	Values used to evaluate the shape of the IF.
nuisPars	Nuisance parameters used for the evaluation of the shape of the IF (if no returns are provided).
k	Range parameter for the shape of the IF (the SD gets multiplied k times).
IFplot	If TRUE, the plot of the IF shape or IF TS of the returns is produced.
IFprint	If TRUE, the data for the IF shape or the IF TS of the returns is returned.
prewhiten	Boolean variable to indicate if the IF TS is pre-whitened (TRUE) or not (FALSE).
ar.prewhiten.order	Order of AR parameter for the pre-whitening. Default is AR(1).
cleanOutliers	Boolean variable to indicate whether outliers are cleaned with a robust location and scale estimator.
cleanMethod	Robust method used to clean outliers from the TS. Default choice is "locScaleRob".
eff	Tuning parameter for the normal distribution efficiency for the "locScaleRob" robust data cleaning.
...	Additional parameters.

Details

For further details on the usage of the `nuisPars` argument, please refer to Section 3.1 for the `RPEIF` vignette.

Value

Influence function for the specified risk or performance measure.

Author(s)

Anthony-Alexander Christidis, <anthony.christidis@stat.ubc.ca>

Examples

```
# Plot of IF with nuisance parameter with return value
outIF <- IF.Mean(returns = NULL, evalShape = TRUE, retVals = NULL, nuisPars = NULL,
                 IFplot = TRUE, IFprint = TRUE)

data(edhec, package = "PerformanceAnalytics")
colnames(edhec) = c("CA", "CTAG", "DIS", "EM","EMN", "ED", "FIA",
                    "GM", "LS", "MA", "RV", "SS", "FoF")

# Plot of IF a specified TS
outIF <- IF.Mean(estimator = "mean",
                 returns = edhec[,"CA"], evalShape = TRUE,
```

```
                  retVals = seq(-0.1, 0.1, by = 0.001), nuisPars = NULL,
                  IFplot = TRUE, IFprint = TRUE)

# Computing the IF of the returns (with prewhitening) with a plot of IF TS
outIF <- IF.Mean(returns = edhec[,"CA"], evalShape = FALSE,
                  retVals = NULL, nuisPars = NULL,
                  IFplot = TRUE, IFprint = TRUE,
                  prewhiten = FALSE)
```

IF.OmegaRatio *Influence Function - Omega Ratio*

Description

IF.OmegaRatio returns the data and plots the shape of either the IF or the IF TS for the Omega Ratio.

Usage

```
IF.OmegaRatio(
  returns = NULL,
  evalShape = FALSE,
  retVals = NULL,
  nuisPars = NULL,
  k = 4,
  IFplot = FALSE,
  IFprint = TRUE,
  const = 0,
  prewhiten = FALSE,
  ar.prewhiten.order = 1,
  cleanOutliers = FALSE,
  cleanMethod = c("locScaleRob")[1],
  eff = 0.99,
  ...
)
```

Arguments

returns	Returns data of the asset or portfolio. This can be a numeric or an xts object.
evalShape	Evaluation of the shape of the IF risk or performance measure if TRUE. Otherwise, a TS of the IF of the provided returns is computed.
retVals	Values used to evaluate the shape of the IF.
nuisPars	Nuisance parameters used for the evaluation of the shape of the IF (if no returns are provided).
k	Range parameter for the shape of the IF (the SD gets multiplied k times).

IFplot	If TRUE, the plot of the IF shape or IF TS of the returns is produced.
IFprint	If TRUE, the data for the IF shape or the IF TS of the returns is returned.
const	Constant threshold.
prewhiten	Boolean variable to indicate if the IF TS is pre-whitened (TRUE) or not (FALSE).
ar.prewhiten.order	Order of AR parameter for the pre-whitening. Default is AR(1).
cleanOutliers	Boolean variable to indicate whether outliers are cleaned with a robust location and scale estimator.
cleanMethod	Robust method used to clean outliers from the TS. Default choice is "locScaleRob".
eff	Tuning parameter for the normal distribution efficiency for the "locScaleRob" robust data cleaning.
...	Additional parameters.

Details

For further details on the usage of the nuisPars argument, please refer to Section 3.1 for the RPEIF vignette.

Value

Influence function of Omega Ratio.

Author(s)

Anthony-Alexander Christidis, <anthony.christidis@stat.ubc.ca>

Examples

```
# Plot of IF with nuisance parameter with return value
outIF <- IF.OmegaRatio(returns = NULL, evalShape = TRUE,
                       retVals = NULL, nuisPars = NULL,
                       IFplot = TRUE, IFprint = TRUE)

data(edhec, package = "PerformanceAnalytics")
colnames(edhec) = c("CA", "CTAG", "DIS", "EM","EMN", "ED", "FIA",
                    "GM", "LS", "MA", "RV", "SS", "FoF")

# Plot of IF a specified TS
outIF <- IF.OmegaRatio(returns = edhec[,"CA"], evalShape = TRUE,
                       retVals = seq(-0.1, 0.1, by = 0.001), nuisPars = NULL,
                       IFplot = TRUE, IFprint = TRUE)

# Computing the IF of the returns (with prewhitening) with a plot of IF TS
outIF <- IF.OmegaRatio(returns = edhec[,"CA"], evalShape = FALSE,
                       retVals = NULL, nuisPars = NULL,
                       IFplot = TRUE, IFprint = TRUE,
                       prewhiten = FALSE)
```

`IF.RachevRatio` *Influence Function - Rachev Ratio*

Description

`IF.RachevRatio` returns the data and plots the shape of either the IF or the IF TS for the Rachev Ratio.

Usage

```
IF.RachevRatio(
  returns = NULL,
  evalShape = FALSE,
  retVals = NULL,
  nuisPars = NULL,
  k = 4,
  IFplot = FALSE,
  IFprint = TRUE,
  alpha = 0.1,
  beta = 0.1,
  prewhiten = FALSE,
  ar.prewhiten.order = 1,
  cleanOutliers = FALSE,
  cleanMethod = c("locScaleRob")[1],
  eff = 0.99,
  ...
)
```

Arguments

`returns`	Returns data of the asset or portfolio. This can be a numeric or an xts object.
`evalShape`	Evaluation of the shape of the IF risk or performance measure if TRUE. Otherwise, a TS of the IF of the provided returns is computed.
`retVals`	Values used to evaluate the shape of the IF.
`nuisPars`	Nuisance parameters used for the evaluation of the shape of the IF (if no returns are provided).
`k`	Range parameter for the shape of the IF (the SD gets multiplied k times).
`IFplot`	If TRUE, the plot of the IF shape or IF TS of the returns is produced.
`IFprint`	If TRUE, the data for the IF shape or the IF TS of the returns is returned.
`alpha`	Lower tail probability.
`beta`	Upper tail probability.
`prewhiten`	Boolean variable to indicate if the IF TS is pre-whitened (TRUE) or not (FALSE).
`ar.prewhiten.order`	Order of AR parameter for the pre-whitening. Default is AR(1).

`cleanOutliers`	Boolean variable to indicate whether outliers are cleaned with a robust location and scale estimator.
`cleanMethod`	Robust method used to clean outliers from the TS. Default choice is "locScaleRob".
`eff`	Tuning parameter for the normal distribution efficiency for the "locScaleRob" robust data cleaning.
`...`	Additional parameters.

Details

For further details on the usage of the `nuisPars` argument, please refer to Section 3.1 for the `RPEIF` vignette.

Value

Influence function of Rachev Ratio.

Author(s)

Anthony-Alexander Christidis, <anthony.christidis@stat.ubc.ca>

Examples

```
# Plot of IF with nuisance parameter with return value
outIF <- IF.RachevRatio(returns = NULL, evalShape = TRUE,
                        retVals = NULL, nuisPars = NULL,
                        IFplot = TRUE, IFprint = TRUE)

data(edhec, package = "PerformanceAnalytics")
colnames(edhec) = c("CA", "CTAG", "DIS", "EM","EMN", "ED", "FIA",
                    "GM", "LS", "MA", "RV", "SS", "FoF")

# Plot of IF a specified TS
outIF <- IF.RachevRatio(returns = edhec[,"CA"], evalShape = TRUE,
                        retVals = seq(-0.1, 0.1, by = 0.001), nuisPars = NULL,
                        IFplot = TRUE, IFprint = TRUE)

# Computing the IF of the returns (with prewhitening) with a plot of IF TS
outIF <- IF.RachevRatio(returns = edhec[,"CA"], evalShape = FALSE,
                        retVals = NULL, nuisPars = NULL,
                        IFplot = TRUE, IFprint = TRUE,
                        prewhiten = FALSE)
```

IF.robMean *Influence Function - Robust M-Estimator of Mean*

Description

IF.robMean returns the data and plots the shape of either the IF or the IF TS for the M-estimator of Mean.

Usage

```
IF.robMean(
  returns = NULL,
  family = c("mopt", "opt", "bisquare")[1],
  eff = 0.95,
  evalShape = FALSE,
  retVals = NULL,
  nuisPars = NULL,
  k = 4,
  IFplot = FALSE,
  IFprint = TRUE,
  prewhiten = FALSE,
  ar.prewhiten.order = 1,
  ...
)
```

Arguments

returns	Returns data of the asset or portfolio. This can be a numeric or an xts object.
family	Family for robust m-estimator of Mean. Must be one of "mopt" (default), "opt" or "bisquare".
eff	Tuning parameter for the normal distribution efficiency. Default is 0.99.
evalShape	Evaluation of the shape of the IF risk or performance measure if TRUE. Otherwise, a TS of the IF of the provided returns is computed.
retVals	Values used to evaluate the shape of the IF.
nuisPars	Nuisance parameters used for the evaluation of the shape of the IF (if no returns are provided).
k	Range parameter for the shape of the IF (the SD gets multiplied k times).
IFplot	If TRUE, the plot of the IF shape or IF TS of the returns is produced.
IFprint	If TRUE, the data for the IF shape or the IF TS of the returns is returned.
prewhiten	Boolean variable to indicate if the IF TS is pre-whitened (TRUE) or not (FALSE).
ar.prewhiten.order	Order of AR parameter for the pre-whitening. Default is AR(1).
...	Addtional parameters.

Details

For further details on the usage of the `nuisPars` argument, please refer to Section 3.1 for the `RPEIF` vignette.

Value

Influence function for M-estimator of Mean

Author(s)

Anthony-Alexander Christidis, <anthony.christidis@stat.ubc.ca>

Examples

```
data(edhec, package = "PerformanceAnalytics")
colnames(edhec) = c("CA", "CTAG", "DIS", "EM","EMN", "ED", "FIA",
                    "GM", "LS", "MA", "RV", "SS", "FoF")

# Plot of IF shape
outIF <- IF.robMean(returns = edhec[,"CA"], evalShape = TRUE,
                    retVals = NULL,
                    IFplot = TRUE, IFprint = TRUE)

# Plot of IF a specified TS
outIF <- IF.robMean(returns = edhec[,"CA"], evalShape = TRUE,
                    retVals = seq(-0.1, 0.1, by = 0.001),
                    IFplot = TRUE, IFprint = TRUE)

# Computing the IF of the returns (with prewhitening) with a plot of IF TS
outIF <- IF.robMean(returns = edhec[,"CA"], evalShape = FALSE,
                    retVals = NULL,
                    IFplot = TRUE, IFprint = TRUE,
                    prewhiten = FALSE)
```

IF.SD *Influence Function - Standard Deviation*

Description

`IF.SD` returns the data and plots the shape of either the IF or the IF TS for the standard deviation

Usage

```
IF.SD(
  returns = NULL,
  evalShape = FALSE,
  retVals = NULL,
  nuisPars = NULL,
```

```
    k = 4,
    IFplot = FALSE,
    IFprint = TRUE,
    prewhiten = FALSE,
    ar.prewhiten.order = 1,
    cleanOutliers = FALSE,
    cleanMethod = c("locScaleRob")[1],
    eff = 0.99,
    ...
  )
```

Arguments

returns	Vector of the returns of the asset or portfolio.
evalShape	Evaluation of the shape of the IF risk or performance measure if TRUE. Otherwise, a TS of the IF of the provided returns is computed.
retVals	Values used to evaluate the shape of the IF.
nuisPars	Nuisance parameters used for the evaluation of the shape of the IF (if no returns are provided).
k	Range parameter for the shape of the IF (the SD gets multiplied k times).
IFplot	If TRUE, the plot of the IF shape or IF TS of the returns is produced.
IFprint	If TRUE, the data for the IF shape or the IF TS of the returns is returned.
prewhiten	Boolean variable to indicate if the IF TS is pre-whitened (TRUE) or not (FALSE).
ar.prewhiten.order	Order of AR parameter for the pre-whitening. Default is AR(1).
cleanOutliers	Boolean variable to indicate whether outliers are cleaned with a robust location and scale estimator.
cleanMethod	Robust method used to clean outliers from the TS. Default choice is "locScaleRob".
eff	Tuning parameter for the normal distribution efficiency for the "locScaleRob" robust data cleaning.
...	Additional parameters.

Details

For further details on the usage of the `nuisPars` argument, please refer to Section 3.1 for the `RPEIF` vignette.

Value

Influence function of the standard deviation.

Author(s)

Anthony-Alexander Christidis, <anthony.christidis@stat.ubc.ca>

Examples

```
# Plot of IF with nuisance parameter with return value
outIF <- IF.SD(returns = NULL, evalShape = TRUE, retVals = NULL, nuisPars = NULL,
               IFplot = TRUE, IFprint = TRUE)

data(edhec, package = "PerformanceAnalytics")
colnames(edhec) = c("CA", "CTAG", "DIS", "EM","EMN", "ED", "FIA",
                    "GM", "LS", "MA", "RV", "SS", "FoF")

# Plot of IF a specified TS
outIF <- IF.SD(returns = edhec[,"CA"], evalShape = TRUE,
               retVals = seq(-0.1, 0.1, by = 0.001), nuisPars = NULL,
               IFplot = TRUE, IFprint = TRUE)

# Computing the IF of the returns (with prewhitening) with a plot of IF TS
outIF <- IF.SD(returns = edhec[,"CA"], evalShape = FALSE,
               retVals = NULL, nuisPars = NULL,
               IFplot = TRUE, IFprint = TRUE,
               prewhiten = FALSE)
```

IF.SemiSD — *Influence Function - Semi-Standard Deviation (SemiSD)*

Description

`IF.SemiSD` returns the data and plots the shape of either the IF or the IF TS for the SemiSD

Usage

```
IF.SemiSD(
  returns = NULL,
  evalShape = FALSE,
  retVals = NULL,
  nuisPars = NULL,
  k = 4,
  IFplot = FALSE,
  IFprint = TRUE,
  prewhiten = FALSE,
  ar.prewhiten.order = 1,
  cleanOutliers = FALSE,
  cleanMethod = c("locScaleRob")[1],
  eff = 0.99,
  ...
)
```

Arguments

`returns`	Returns data of the asset or portfolio. This can be a numeric or an xts object.
`evalShape`	Evaluation of the shape of the IF risk or performance measure if TRUE. Otherwise, a TS of the IF of the provided returns is computed.
`retVals`	Values used to evaluate the shape of the IF.
`nuisPars`	Nuisance parameters used for the evaluation of the shape of the IF (if no returns are provided).
`k`	Range parameter for the shape of the IF (the SD gets multiplied k times).
`IFplot`	If TRUE, the plot of the IF shape or IF TS of the returns is produced.
`IFprint`	If TRUE, the data for the IF shape or the IF TS of the returns is returned.
`prewhiten`	Boolean variable to indicate if the IF TS is pre-whitened (TRUE) or not (FALSE).
`ar.prewhiten.order`	Order of AR parameter for the pre-whitening. Default is AR(1).
`cleanOutliers`	Boolean variable to indicate whether outliers are cleaned with a robust location and scale estimator.
`cleanMethod`	Robust method used to clean outliers from the TS. Default choice is "locScaleRob".
`eff`	Tuning parameter for the normal distribution efficiency for the "locScaleRob" robust data cleaning.
`...`	Additional parameters.

Details

For further details on the usage of the `nuisPars` argument, please refer to Section 3.1 for the `RPEIF` vignette.

Value

Influence function of SemiSD.

Author(s)

Anthony-Alexander Christidis, <anthony.christidis@stat.ubc.ca>

Examples

```
# Plot of IF with nuisance parameter with return value
outIF <- IF.SemiSD(returns = NULL, evalShape = TRUE,
                   retVals = NULL, nuisPars = NULL,
                   IFplot = TRUE, IFprint = TRUE)

data(edhec, package = "PerformanceAnalytics")
colnames(edhec) = c("CA", "CTAG", "DIS", "EM","EMN", "ED", "FIA",
                    "GM", "LS", "MA", "RV", "SS", "FoF")

# Plot of IF a specified TS
outIF <- IF.SemiSD(returns = edhec[,"CA"], evalShape = TRUE,
```

```
                    retVals = seq(-0.1, 0.1, by = 0.001), nuisPars = NULL,
                    IFplot = TRUE, IFprint = TRUE)

# Computing the IF of the returns (with prewhitening) with a plot of IF TS
outIF <- IF.SemiSD(returns = edhec[,"CA"], evalShape = FALSE,
                    retVals = NULL, nuisPars = NULL,
                    IFplot = TRUE, IFprint = TRUE,
                    prewhiten = FALSE)
```

IF.SoR *Influence Function - Sortino Ratio*

Description

IF.SoR returns the data and plots the shape of either the IF or the IF TS for the Sortino Ratio.

Usage

```
IF.SoR(
  returns = NULL,
  evalShape = FALSE,
  retVals = NULL,
  nuisPars = NULL,
  k = 4,
  IFplot = FALSE,
  IFprint = TRUE,
  threshold = c("const", "mean")[1],
  const = 0,
  rf = 0,
  prewhiten = FALSE,
  ar.prewhiten.order = 1,
  cleanOutliers = FALSE,
  cleanMethod = c("locScaleRob")[1],
  eff = 0.99,
  ...
)
```

Arguments

returns	Returns data of the asset or portfolio. This can be a numeric or an xts object.
evalShape	Evaluation of the shape of the IF risk or performance measure if TRUE. Otherwise, a TS of the IF of the provided returns is computed.
retVals	Values used to evaluate the shape of the IF.
nuisPars	Nuisance parameters used for the evaluation of the shape of the IF (if no returns are provided).
k	Range parameter for the shape of the IF (the SD gets multiplied k times).

IFplot	If TRUE, the plot of the IF shape or IF TS of the returns is produced.
IFprint	If TRUE, the data for the IF shape or the IF TS of the returns is returned.
threshold	Parameter of threshold is either "mean" or "const". Default is "mean".
const	The threshold if threshold is "const".
rf	Risk-free interest rate.
prewhiten	Boolean variable to indicate if the IF TS is pre-whitened (TRUE) or not (FALSE).
ar.prewhiten.order	Order of AR parameter for the pre-whitening. Default is AR(1).
cleanOutliers	Boolean variable to indicate whether outliers are cleaned with a robust location and scale estimator.
cleanMethod	Robust method used to clean outliers from the TS. Default choice is "locScaleRob".
eff	Tuning parameter for the normal distribution efficiency for the "locScaleRob" robust data cleaning.
...	Addtional parameters.

Details

For further details on the usage of the nuisPars argument, please refer to Section 3.1 for the RPEIF vignette.

Value

Influence function of SoR.

Author(s)

Anthony-Alexander Christidis, <anthony.christidis@stat.ubc.ca>

Examples

```
# Plot of IF with nuisance parameter with return value
outIF <- IF.SoR(returns = NULL, evalShape = TRUE,
                retVals = NULL, nuisPars = NULL,
                 IFplot = TRUE, IFprint = TRUE)

data(edhec, package = "PerformanceAnalytics")
colnames(edhec) = c("CA", "CTAG", "DIS", "EM","EMN", "ED", "FIA",
                    "GM", "LS", "MA", "RV", "SS", "FoF")

# Plot of IF a specified TS
outIF <- IF.SoR(returns = edhec[,"CA"], evalShape = TRUE,
                retVals = seq(-0.1, 0.1, by = 0.001), nuisPars = NULL,
                IFplot = TRUE, IFprint = TRUE)

# Computing the IF of the returns (with prewhitening) with a plot of IF TS
outIF <- IF.SoR(returns = edhec[,"CA"], evalShape = FALSE,
                retVals = NULL, nuisPars = NULL,
                IFplot = TRUE, IFprint = TRUE,
```

```
prewhiten = FALSE)
```

IF.SR *Influence Function - Sharpe Ratio (SR)*

Description

IF.SR returns the data and plots the shape of either the IF or the IF TS for the SR

Usage

```
IF.SR(
  returns = NULL,
  evalShape = FALSE,
  retVals = NULL,
  nuisPars = NULL,
  k = 4,
  IFplot = FALSE,
  IFprint = TRUE,
  rf = 0,
  prewhiten = FALSE,
  ar.prewhiten.order = 1,
  cleanOutliers = FALSE,
  cleanMethod = c("locScaleRob")[1],
  eff = 0.99,
  ...
)
```

Arguments

returns	Returns data of the asset or portfolio. This can be a numeric or an xts object.
evalShape	Evaluation of the shape of the IF risk or performance measure if TRUE. Otherwise, a TS of the IF of the provided returns is computed.
retVals	Values used to evaluate the shape of the IF.
nuisPars	Nuisance parameters used for the evaluation of the shape of the IF (if no returns are provided).
k	Range parameter for the shape of the IF (the SD gets multiplied k times).
IFplot	If TRUE, the plot of the IF shape or IF TS of the returns is produced.
IFprint	If TRUE, the data for the IF shape or the IF TS of the returns is returned.
rf	Risk-free interest rate.
prewhiten	Boolean variable to indicate if the IF TS is pre-whitened (TRUE) or not (FALSE).
ar.prewhiten.order	Order of AR parameter for the pre-whitening. Default is AR(1).

`cleanOutliers` Boolean variable to indicate whether outliers are cleaned with a robust location and scale estimator.

`cleanMethod` Robust method used to clean outliers from the TS. Default choice is "locScaleRob".

`eff` Tuning parameter for the normal distribution efficiency for the "locScaleRob" robust data cleaning.

`...` Additional parameters.

Details

For further details on the usage of the `nuisPars` argument, please refer to Section 3.1 for the `RPEIF` vignette.

Value

Influence function of the SR.

Author(s)

Anthony-Alexander Christidis, <anthony.christidis@stat.ubc.ca>

Examples

```
# Plot of IF with nuisance parameter with return value
outIF <- IF.SR(returns = NULL, evalShape = TRUE,
               retVals = NULL, nuisPars = NULL,
               IFplot = TRUE, IFprint = TRUE)

data(edhec, package = "PerformanceAnalytics")
colnames(edhec) = c("CA", "CTAG", "DIS", "EM","EMN", "ED", "FIA",
                    "GM", "LS", "MA", "RV", "SS", "FoF")

# Plot of IF a specified TS
outIF <- IF.SR(returns = edhec[,"CA"], evalShape = TRUE,
               retVals = seq(-0.1, 0.1, by = 0.001), nuisPars = NULL,
               IFplot = TRUE, IFprint = TRUE)

# Computing the IF of the returns (with prewhitening) with a plot of IF TS
outIF <- IF.SR(returns = edhec[,"CA"], evalShape = FALSE,
               retVals = NULL, nuisPars = NULL,
               IFplot = TRUE, IFprint = TRUE,
               prewhiten = FALSE)
```

IF.VaR *Influence Function - Value at Risk (VaR)*

Description

IF.VaR returns the data and plots the shape of either the IF or the IF TS for the Value at Risk

Usage

```
IF.VaR(
  returns = NULL,
  evalShape = FALSE,
  retVals = NULL,
  nuisPars = NULL,
  k = 4,
  IFplot = FALSE,
  IFprint = TRUE,
  alpha = 0.05,
  prewhiten = FALSE,
  ar.prewhiten.order = 1,
  cleanOutliers = FALSE,
  cleanMethod = c("locScaleRob")[1],
  eff = 0.99,
  ...
)
```

Arguments

returns	Returns data of the asset or portfolio. This can be a numeric or an xts object.
evalShape	Evaluation of the shape of the IF risk or performance measure if TRUE. Otherwise, a TS of the IF of the provided returns is computed.
retVals	Values used to evaluate the shape of the IF.
nuisPars	Nuisance parameters used for the evaluation of the shape of the IF (if no returns are provided).
k	Range parameter for the shape of the IF (the SD gets multiplied k times).
IFplot	If TRUE, the plot of the IF shape or IF TS of the returns is produced.
IFprint	If TRUE, the data for the IF shape or the IF TS of the returns is returned.
alpha	The tail probability of interest.
prewhiten	Boolean variable to indicate if the IF TS is pre-whitened (TRUE) or not (FALSE).
ar.prewhiten.order	Order of AR parameter for the pre-whitening. Default is AR(1).
cleanOutliers	Boolean variable to indicate whether outliers are cleaned with a robust location and scale estimator.
cleanMethod	Robust method used to clean outliers from the TS. Default choice is "locScaleRob".

eff	Tuning parameter for the normal distribution efficiency for the "locScaleRob" robust data cleaning.
...	Additional parameters.

Details

For further details on the usage of the nuisPars argument, please refer to Section 3.1 for the RPEIF vignette.

Value

Influence function of the VaR.

Author(s)

Anthony-Alexander Christidis, <anthony.christidis@stat.ubc.ca>

Examples

```
# Plot of IF with nuisance parameter with return value
outIF <- IF.VaR(returns = NULL, evalShape = TRUE,
                retVals = NULL, nuisPars = NULL,
                IFplot = TRUE, IFprint = TRUE)

data(edhec, package = "PerformanceAnalytics")
colnames(edhec) = c("CA", "CTAG", "DIS", "EM","EMN", "ED", "FIA",
                    "GM", "LS", "MA", "RV", "SS", "FoF")

# Plot of IF a specified TS
outIF <- IF.VaR(returns = edhec[,"CA"], evalShape = TRUE,
                retVals = seq(-0.1, 0.1, by = 0.001), nuisPars = NULL,
                IFplot = TRUE, IFprint = TRUE)

# Computing the IF of the returns (with prewhitening) with a plot of IF TS
outIF <- IF.VaR(returns = edhec[,"CA"], evalShape = FALSE,
                retVals = NULL, nuisPars = NULL,
                IFplot = TRUE, IFprint = TRUE,
                prewhiten = FALSE)
```

IF.VaRratio *Influence Function - Value at Risk (VaR) Ratio*

Description

IF.VaRratio returns the data and plots the shape of either the IF or the IF TS for the VaR Ratio.

Usage

```
IF.VaRratio(
  returns = NULL,
  evalShape = FALSE,
  retVals = NULL,
  nuisPars = NULL,
  k = 4,
  IFplot = FALSE,
  IFprint = TRUE,
  alpha = 0.05,
  rf = 0,
  prewhiten = FALSE,
  ar.prewhiten.order = 1,
  cleanOutliers = FALSE,
  cleanMethod = c("locScaleRob")[1],
  eff = 0.99,
  ...
)
```

Arguments

returns	Returns data of the asset or portfolio. This can be a numeric or an xts object.
evalShape	Evaluation of the shape of the IF risk or performance measure if TRUE. Otherwise, a TS of the IF of the provided returns is computed.
retVals	Values used to evaluate the shape of the IF.
nuisPars	Nuisance parameters used for the evaluation of the shape of the IF (if no returns are provided).
k	Range parameter for the shape of the IF (the SD gets multiplied k times).
IFplot	If TRUE, the plot of the IF shape or IF TS of the returns is produced.
IFprint	If TRUE, the data for the IF shape or the IF TS of the returns is returned.
alpha	The tail probability of interest.
rf	Risk-free interest rate.
prewhiten	Boolean variable to indicate if the IF TS is pre-whitened (TRUE) or not (FALSE).
ar.prewhiten.order	Order of AR parameter for the pre-whitening. Default is AR(1).
cleanOutliers	Boolean variable to indicate whether outliers are cleaned with a robust location and scale estimator.
cleanMethod	Robust method used to clean outliers from the TS. Default choice is "locScaleRob".
eff	Tuning parameter for the normal distribution efficiency for the "locScaleRob" robust data cleaning.
...	Additional parameters.

Details

For further details on the usage of the `nuisPars` argument, please refer to Section 3.1 for the `RPEIF` vignette.

Value

Influence function of the VaRratio.

Author(s)

Anthony-Alexander Christidis, <anthony.christidis@stat.ubc.ca>

Examples

```
# Plot of IF with nuisance parameter with return value
outIF <- IF.VaRratio(returns = NULL, evalShape = TRUE,
                     retVals = NULL, nuisPars = NULL,
                     IFplot = TRUE, IFprint = TRUE)

data(edhec, package = "PerformanceAnalytics")
colnames(edhec) = c("CA", "CTAG", "DIS", "EM","EMN", "ED", "FIA",
                    "GM", "LS", "MA", "RV", "SS", "FoF")

# Plot of IF a specified TS
outIF <- IF.VaRratio(returns = edhec[,"CA"], evalShape = TRUE,
                     retVals = seq(-0.1, 0.1, by = 0.001), nuisPars = NULL,
                     IFplot = TRUE, IFprint = TRUE)

# Computing the IF of the returns (with prewhitening) with a plot of IF TS
outIF <- IF.VaRratio(returns = edhec[,"CA"], evalShape = FALSE,
                     retVals = NULL, nuisPars = NULL,
                     IFplot = TRUE, IFprint = TRUE,
                     prewhiten = FALSE)
```

---

nuisParsFn *Nuisance Parameters Computation*

Description

nuis.pars returns the value of the nuisance parameters used in the evaluation of the shape of influence functions for risk and performance measures.

Usage

```
nuisParsFn(mu = 0.01, sd = 0.05, c = 0, alpha = 0.1, beta = 0.1)
```

Arguments

mu	Mean parameter.
sd	Standard deviation parameter.
c	Constant value for threshold.
alpha	Parameters for the lower tail quantile.
beta	Parameter for the upper tail quantile.

Details

For further details on the usage of the `nuisParsFn` function, please refer to Section 3.1 for the `RPEIF` vignette.

Value

List of nuisance parameters.

Author(s)

Anthony-Alexander Christidis, <anthony.christidis@stat.ubc.ca>

Examples

```
# Nuisance parameters using default values
defaultNuisance <- nuisParsFn()

# Nuisance parameters using specified values
specifiedNuisance <- nuisParsFn(mu=0.02, sd=0.1, c=0.01, alpha=0.05, beta=0.1)
```

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