

# Package ‘RPEIF’

April 23, 2020

**Type** Package

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

**Version** 1.0.8

**Date** 2020-04-22

**Author** Anthony Christidis <anthony.christidis@stat.ubc.ca>,  
Shengyu Zhang <syzhang@uw.edu>,  
Douglas Martin <doug@amath.washington.edu>

**Maintainer** Anthony Christidis <anthony.christidis@stat.ubc.ca>

**Description** Computes the influence functions time series of the returns for the risk and performance measures as mentioned in Zhang and Martin (2017) <<https://ssrn.com/abstract=2747179>> as well as Chen and Martin (2018) <<https://ssrn.com/abstract=3085672>>. 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** PerformanceAnalytics, xts, zoo, stats

**Depends**

**RoxygenNote** 7.0.2

**Suggests** R.rsp, testthat, RobStatTM

**VignetteBuilder** R.rsp

**LazyData** true

**NeedsCompilation** no

**Repository** CRAN

**Date/Publication** 2020-04-23 07:20:03 UTC

**R topics documented:**

IF	2
IF.ES	4
IF.ESratio	6
IF.LPM	8
IF.mean	10
IF.Omega	11
IF.RachR	13
IF.SD	15
IF.SemiSD	17
IF.SoR	19
IF.SR	21
IF.VaR	23
IF.VaRratio	25
nuisParsFn	27

<b>Index</b>	<b>28</b>
--------------	-----------

---

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", "Boudt")[1],
  eff = 0.99,
  alpha.robust = 0.05,
  ...
)
```



```

# 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.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", "Boudt")[1],
  eff = 0.99,
  alpha.robust = 0.05,
  ...
)

```

### 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.

<code>nuisPars</code>	Nuisance parameters used for the evaluation of the shape of the IF (if no returns are provided).
<code>k</code>	Range parameter for the shape of the IF (the SD gets multiplied <code>k</code> times).
<code>IFplot</code>	If TRUE, the plot of the IF shape or IF TS of the returns is produced.
<code>IFprint</code>	If TRUE, the data for the IF shape or the IF TS of the returns is returned.
<code>alpha.ES</code>	Tail Probability.
<code>prewhiten</code>	Boolean variable to indicate if the IF TS is pre-whitened (TRUE) or not (FALSE).
<code>ar.prewhiten.order</code>	Order of AR parameter for the pre-whitening. Default is AR(1).
<code>cleanOutliers</code>	Boolean variable to indicate whether outliers are cleaned with a robust location and scale estimator.
<code>cleanMethod</code>	Robust method used to clean outliers from the TS. The choices are "locScaleRob" (default) and "Boudt" for the function.
<code>eff</code>	Tuning parameter for the normal distribution efficiency for the "locScaleRob" robust data cleaning.
<code>alpha.robust</code>	Tuning parameter for the quantile of the "Boudt" robust data cleaning algorithm, using the minimum covariance determinant estimator (MCD).
<code>...</code>	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", "Boudt")[1],
  eff = 0.99,
  alpha.robust = 0.05,
  ...
)
```

### 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. The choices are "locScaleRob" (default) and "Boudt" for the function.
eff	Tuning parameter for the normal distribution efficiency for the "locScaleRob" robust data cleaning.
alpha.robust	Tuning parameter for the quantile of the "Boudt" robust data cleaning algorithm, using the minimum covariance determinant estimator (MCD).
...	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", "Boudt")[1],
  eff = 0.99,
  alpha.robust = 0.05,
  ...
)
```

### 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. The choices are "locScaleRob" (default) and "Boudt" for the function.
eff	Tuning parameter for the normal distribution efficiency for the "locScaleRob" robust data cleaning.
alpha.robust	Tuning parameter for the quantile of the "Boudt" robust data cleaning algorithm, using the minimum covariance determinant estimator (MCD).
...	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", "Boudt")[1],
  eff = 0.99,
  alpha.robust = 0.05,
  ...
)
```

**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. The choices are "locScaleRob" (default) and "Boudt" for the function.

eff	Tuning parameter for the normal distribution efficiency for the "locScaleRob" robust data cleaning.
alpha.robust	Tuning parameter for the quantile of the "Boudt" robust data cleaning algorithm, using the minimum covariance determinant estimator (MCD).
...	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.Omega

*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.Omega(
  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", "Boudt")[1],
  eff = 0.99,
  alpha.robust = 0.05,
  ...
)

```

**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. The choices are "locScaleRob" (default) and "Boudt" for the function.
eff	Tuning parameter for the normal distribution efficiency for the "locScaleRob" robust data cleaning.
alpha.robust	Tuning parameter for the quantile of the "Boudt" robust data cleaning algorithm, using the minimum covariance determinant estimator (MCD).
...	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.Omega(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.Omega(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.Omega(returns=edhec[, "CA"], evalShape=FALSE,
                 retVals=NULL, nuisPars=NULL,
                 IFplot=TRUE, IFprint=TRUE,
                 prewhiten=FALSE)
```

---

IF.RachR

*Influence Function - Rachev Ratio*

---

**Description**

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

**Usage**

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

```

k = 4,
IFplot = FALSE,
IFprint = TRUE,
alpha = 0.1,
beta = 0.1,
rf = 0,
prewhiten = FALSE,
ar.prewhiten.order = 1,
cleanOutliers = FALSE,
cleanMethod = c("locScaleRob", "Boudt")[1],
eff = 0.99,
alpha.robust = 0.05,
...
)

```

### 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.
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. The choices are "locScaleRob" (default) and "Boudt" for the function.
eff	Tuning parameter for the normal distribution efficiency for the "locScaleRob" robust data cleaning.
alpha.robust	Tuning parameter for the quantile of the "Boudt" robust data cleaning algorithm, using the minimum covariance determinant estimator (MCD).
...	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.RachR(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.RachR(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.RachR(returns=edhec[, "CA"], evalShape=FALSE,
                 retVals=NULL, nuisPars=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.prewhten.order = 1,
    cleanOutliers = FALSE,
    cleanMethod = c("locScaleRob", "Boudt")[1],
    eff = 0.99,
    alpha.robust = 0.05,
    ...
)

```

### 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.prewhten.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. The choices are "locScaleRob" (default) and "Boudt" for the function.
eff	Tuning parameter for the normal distribution efficiency for the "locScaleRob" robust data cleaning.
alpha.robust	Tuning parameter for the quantile of the "Boudt" robust data cleaning algorithm, using the minimum covariance determinant estimator (MCD).
...	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,
  rf = 0,
  prewhiten = FALSE,
  ar.prewhiten.order = 1,
  cleanOutliers = FALSE,
  cleanMethod = c("locScaleRob", "Boudt")[1],
  eff = 0.99,
  alpha.robust = 0.05,
  ...
)

```

**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. The choices are "locScaleRob" (default) and "Boudt" for the function.
eff	Tuning parameter for the normal distribution efficiency for the "locScaleRob" robust data cleaning.
alpha.robust	Tuning parameter for the quantile of the "Boudt" robust data cleaning algorithm, using the minimum covariance determinant estimator (MCD).
...	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("mean", "const")[1],
  const = 0,
  rf = 0,
  prewhiten = FALSE,
  ar.prewhiten.order = 1,
  cleanOutliers = FALSE,
  cleanMethod = c("locScaleRob", "Boudt")[1],
  eff = 0.99,
  alpha.robust = 0.05,
  ...
)

```

### Arguments

`returns` Returns data of the asset or portfolio. This can be a numeric or an xts object.

<code>evalShape</code>	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.
<code>retVals</code>	Values used to evaluate the shape of the IF.
<code>nuisPars</code>	Nuisance parameters used for the evaluation of the shape of the IF (if no returns are provided).
<code>k</code>	Range parameter for the shape of the IF (the SD gets multiplied k times).
<code>IFplot</code>	If TRUE, the plot of the IF shape or IF TS of the returns is produced.
<code>IFprint</code>	If TRUE, the data for the IF shape or the IF TS of the returns is returned.
<code>threshold</code>	Parameter of threshold is either "mean" or "const". Default is "mean".
<code>const</code>	The threshold if threshold is "const".
<code>rf</code>	Risk-free interest rate.
<code>prewhiten</code>	Boolean variable to indicate if the IF TS is pre-whitened (TRUE) or not (FALSE).
<code>ar.prewhiten.order</code>	Order of AR parameter for the pre-whitening. Default is AR(1).
<code>cleanOutliers</code>	Boolean variable to indicate whether outliers are cleaned with a robust location and scale estimator.
<code>cleanMethod</code>	Robust method used to clean outliers from the TS. The choices are "locScaleRob" (default) and "Boudt" for the function.
<code>eff</code>	Tuning parameter for the normal distribution efficiency for the "locScaleRob" robust data cleaning.
<code>alpha.robust</code>	Tuning parameter for the quantile of the "Boudt" robust data cleaning algorithm.
<code>...</code>	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 `SoR_C`.

### 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", "Boudt")[1],
  eff = 0.99,
  alpha.robust = 0.05,
  ...
)

```

### 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.

<code>nuisPars</code>	Nuisance parameters used for the evaluation of the shape of the IF (if no returns are provided).
<code>k</code>	Range parameter for the shape of the IF (the SD gets multiplied $k$ times).
<code>IFplot</code>	If TRUE, the plot of the IF shape or IF TS of the returns is produced.
<code>IFprint</code>	If TRUE, the data for the IF shape or the IF TS of the returns is returned.
<code>rf</code>	Risk-free interest rate.
<code>prewhiten</code>	Boolean variable to indicate if the IF TS is pre-whitened (TRUE) or not (FALSE).
<code>ar.prewhiten.order</code>	Order of AR parameter for the pre-whitening. Default is AR(1).
<code>cleanOutliers</code>	Boolean variable to indicate whether outliers are cleaned with a robust location and scale estimator.
<code>cleanMethod</code>	Robust method used to clean outliers from the TS. The choices are "locScaleRob" (default) and "Boudt" for the function.
<code>eff</code>	Tuning parameter for the normal distribution efficiency for the "locScaleRob" robust data cleaning.
<code>alpha.robust</code>	Tuning parameter for the quantile of the "Boudt" robust data cleaning algorithm, using the minimum covariance determinant estimator (MCD).
<code>...</code>	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", "Boudt")[1],
  eff = 0.99,
  alpha.robust = 0.05,
  ...
)
```

**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. The choices are "locScaleRob" (default) and "Boudt" for the function.
eff	Tuning parameter for the normal distribution efficiency for the "locScaleRob" robust data cleaning.
alpha.robust	Tuning parameter for the quantile of the "Boudt" robust data cleaning algorithm, using the minimum covariance determinant estimator (MCD).
...	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", "Boudt")[1],
  eff = 0.99,
  alpha.robust = 0.05,
  ...
)
```

**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).

<code>cleanOutliers</code>	Boolean variable to indicate whether outliers are cleaned with a robust location and scale estimator.
<code>cleanMethod</code>	Robust method used to clean outliers from the TS. The choices are "locScaleRob" (default) and "Boudt" for the function.
<code>eff</code>	Tuning parameter for the normal distribution efficiency for the "locScaleRob" robust data cleaning.
<code>alpha.robust</code>	Tuning parameter for the quantile of the "Boudt" robust data cleaning algorithm, using the minimum covariance determinant estimator (MCD).
<code>...</code>	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	<i>Nuisance Parameters Computation</i>
------------	--

---

**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)
```

# Index

IF, [2](#)  
IF.ES, [4](#)  
IF.ESratio, [6](#)  
IF.LPM, [8](#)  
IF.mean, [10](#)  
IF.Omega, [11](#)  
IF.RachR, [13](#)  
IF.SD, [15](#)  
IF.SemiSD, [17](#)  
IF.SoR, [19](#)  
IF.SR, [21](#)  
IF.VaR, [23](#)  
IF.VaRatio, [25](#)  
  
nuisParsFn, [27](#)