

# Package ‘distrMetrics’

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**Version** 2.8.3

**Date** 2025-01-11

**Title** Distribution Classes for Distributions from Rmetrics

**Description** S4-distribution classes based on package distr for distributions from packages 'fBasics' and 'fGarch'.

**Depends** R(>= 3.4), methods, distr(>= 2.4), fBasics(>= 270.73), fGarch(>= 270.73)

**Suggests** distrEx(>= 2.4), distrMod(>= 2.4)

**Imports** startupmsg(>= 1.0.0)

**ByteCompile** yes

**License** LGPL-3

**Encoding** UTF-8

**URL** <http://distr.r-forge.r-project.org/>

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distrRmetrics-package *distrRmetrics – Distribution Classes for Distributions from Rmetrics.*

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## Description

**distrRmetrics** provides infrastructure / (S4-)classes (based on package **distr**) for distributions contributed in the Rmetrics packages.

## Details

Package: distrRmetrics  
 Version: 2.8.3  
 Date: 2025-01-11  
 Depends: R(>= 3.4), methods, distr(>= 2.4), fBasics(>= 270.73), fGarch(>= 270.73)  
 Suggests: distrEx(>= 2.4), distrMod(>= 2.4)  
 Imports: startupmsg  
 ByteCompile: yes  
 License: LGPL-3  
 URL: <https://distr.r-forge.r-project.org/>  
 VCS/SVNRevision: 1495

## Classes

```
#####
Distribution Classes
#####
[*]: there is a generating function with the same name
"Distribution" (from distr)
|>"AbscontDistribution" (from distr)
|>|>"SNorm" [*]
|>|>"SSTd" [*]
```

## Functions

STd Functions to generate an "AbscontDistribution" object implementing a standardized T distribution

### Slot accessors / -replacement functions

All slots are inspected / modified by corresponding accessors / -replacement functions.

### Start-up-Banner

You may suppress the start-up banner/message completely by setting `options("StartupBanner"="off")` somewhere before loading this package by `library` or `require` in your R-code / R-session. If option "StartupBanner" is not defined (default) or setting `options("StartupBanner"=NULL)` or `options("StartupBanner"="complete")` the complete start-up banner is displayed. For any other value of option "StartupBanner" (i.e., not in `c(NULL, "off", "complete")`) only the version information is displayed. The same can be achieved by wrapping the `library` or `require` call into either `suppressStartupMessages()` or `onlytypeStartupMessages(. , atypes="version")`. As for general packageStartupMessage's, you may also suppress all the start-up banner by wrapping the `library` or `require` call into `suppressPackageStartupMessages()` from **startupmsg**-version 0.5 on.

### Package versions

Note: The first two numbers of package versions do not necessarily reflect package-individual development, but rather are chosen for the `distrXXX` family as a whole in order to ease updating "depends" information.

### Author(s)

Peter Ruckdeschel <peter.ruckdeschel@uni-oldenburg.de>,  
*Maintainer:* Peter Ruckdeschel <peter.ruckdeschel@uni-oldenburg.de>

### References

P. Ruckdeschel, M. Kohl, T. Stabla, F. Camphausen (2006): S4 Classes for Distributions, *R News*, 6(2), 2-6. [https://CRAN.R-project.org/doc/Rnews/Rnews\\_2006-2.pdf](https://CRAN.R-project.org/doc/Rnews/Rnews_2006-2.pdf) A vignette for packages **distr**, **distrSim**, **distrTEst**, **distrEx**, **distrTeach**, **distrMod**, and **distrRmetrics** is included into the mere documentation package **distrDoc** and may be called by `require("distrDoc");vignette("distr")`. A homepage to this package is available under <https://distr.r-forge.r-project.org/>.

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SNorm

*Generating function for skewed normal class*

---

### Description

Generates an object of class "SNorm".

### Usage

```
SNorm(mean = 0, sd = 1, xi = 1.5)
```

**Arguments**

mean            real number: location parameter of the SNorm distribution.  
 sd              positive real number: scale parameter of the SNorm distribution  
 xi              positive real number: shape parameter of the SSTd distribution.

**Value**

Object of class "SNorm"

**Note**

This class is based on the code provided by the package **fGarch** by Diethelm Wuertz

**Author(s)**

Peter Ruckdeschel <peter.ruckdeschel@uni-oldenburg.de>

**See Also**

[dsnrm](#), [AbscontDistribution-class](#)

**Examples**

```
(SN <- SNorm(mean = 1, sd = 1, xi = 0.5))
plot(SN)
```

---

SNorm-class

*SNorm distribution*

---

**Description**

The skew normal distribution.

**Objects from the Class**

Objects can be created by calls of the form `new("SNorm", mean, sd, xi)`. More frequently they are created via the generating function `SNorm`.

**Slots**

img Object of class "Reals".  
 param Object of class "SNormParameter".  
 r rgpd  
 d dgpd  
 p pgpd, but vectorized and with special treatment of arguments `lower.tail` and `log.p`  
 q qgpd, but vectorized and with special treatment of arguments `lower.tail` and `log.p`

**gaps** (numeric) matrix or NULL  
**.withArith** logical: used internally to issue warnings as to interpretation of arithmetics  
**.withSim** logical: used internally to issue warnings as to accuracy  
**.logExact** logical: used internally to flag the case where there are explicit formulae for the log version of density, cdf, and quantile function  
**.lowerExact** logical: used internally to flag the case where there are explicit formulae for the lower tail version of cdf and quantile function

### Extends

Class "AbscontDistribution", directly.  
 Class "UnivariateDistribution", by class "AbscontDistribution".  
 Class "Distribution", by class "AbscontDistribution".

### Methods

**xi** signature(object = "SNorm"): wrapped access method for slot xi of slot param.  
**mean** signature(object = "SNorm"): wrapped access method for slot mean of slot param.  
**nu** signature(object = "SNorm"): wrapped access method for slot nu of slot param.  
**sd** signature(x = "SNorm"): wrapped access method for slot sd of slot param.  
**xi<-** signature(object = "SNorm"): wrapped replace method for slot xi of slot param.  
**mean<-** signature(object = "SNorm"): wrapped replace method for slot mean of slot param.  
**nu<-** signature(object = "SNorm"): wrapped replace method for slot nu of slot param.  
**sd<-** signature(x = "SNorm"): wrapped replace method for slot sd of slot param.

### Note

This class is based on the code provided by the package **fGarch** by Diethelm Wuertz

### Author(s)

Peter Ruckdeschel <peter.ruckdeschel@uni-oldenburg.de>

### See Also

[dsnrm](#), [AbscontDistribution-class](#)

### Examples

```

(SN <- SNorm(xi=2)) # SN is a skewed normal distribution with nu = 3.
set.seed(1)
r(SN)(1) # one random number generated from this distribution, e.g. -0.4037723
d(SN)(1) # Density of this distribution is 0.1914826 for x = 1.
p(SN)(1) # Probability that x < 1 is 0.8374454.
q(SN)(.1) # Probability that x < -1.137878 is 0.1.
## in RStudio or Jupyter IRKernel, use q.l(.)(.) instead of q(.)(.)
xi(SN) # shape of this distribution is 2.
xi(SN) <- 2.5 # shape of this distribution is now 2.5.
plot(SN)

```

SNormParameter-class *Parameter of an SNorm distributions*

---

### Description

The class of the parameter of an SNorm distribution.

### Objects from the Class

Objects can be created by calls of the form `new("SNormParameter", ...)`.

### Slots

**mean** real number: location parameter of a SNorm distribution.

**sd** real number: scale parameter of a SNorm distribution.

**name** default name is "parameter of a SNorm distribution".

**xi** real number: shape parameter of a SNorm distribution.

### Extends

Class "Parameter", directly.

Class "OptionalParameter", by class "Parameter".

### Methods

**mean** signature(object = "SNormParameter"): access method for slot mean.

**sd** signature(object = "SNormParameter"): access method for slot sd.

**xi** signature(object = "SNormParameter"): access method for slot xi.

### Author(s)

Peter Ruckdeschel <peter.ruckdeschel@uni-oldenburg.de>

### See Also

[SNorm-class](#), [Parameter-class](#)

### Examples

```
P <- new("SNormParameter")
mean(P)
sd(P)
xi(P)
P
```

---

**SSTd***Generating function for SSTd-class*

---

**Description**

Generates an object of class "SSTd".

**Usage**

```
SSTd(mean = 0, sd = 1, nu = 5, xi = 1.5)
```

**Arguments**

mean	real number: location parameter of the SSTd distribution.
sd	positive real number: scale parameter of the SSTd distribution
xi	positive real number: shape parameter of the SSTd distribution.
nu	real number larger than 2: degree of freedom parameter of the SSTd distribution.

**Value**

Object of class "SSTd"

**Note**

This class is based on the code provided by the package **fGarch** by Diethelm Wuertz

**Author(s)**

Peter Ruckdeschel <peter.ruckdeschel@uni-oldenburg.de>

**See Also**

[dsstd](#), [AbscontDistribution-class](#)

**Examples**

```
(ST <- SSTd(mean = 1, sd = 1, xi = 0.5))  
plot(ST)
```

---

SSTd-class

*SSTd distribution*


---

### Description

The standardized skew Student-t distribution.

### Objects from the Class

Objects can be created by calls of the form `new("SSTd", mean, sd, xi)`. More frequently they are created via the generating function `SSTd`.

### Slots

`img` Object of class "Reals".  
`param` Object of class "SSTdParameter".  
`r` `rgpd`  
`d` `dgpd`  
`p` `pgpd`, but vectorized and with special treatment of arguments `lower.tail` and `log.p`  
`q` `qgpd`, but vectorized and with special treatment of arguments `lower.tail` and `log.p`  
`gaps` (numeric) matrix or NULL  
`.withArith` logical: used internally to issue warnings as to interpretation of arithmetics  
`.withSim` logical: used internally to issue warnings as to accuracy  
`.logExact` logical: used internally to flag the case where there are explicit formulae for the log version of density, cdf, and quantile function  
`.lowerExact` logical: used internally to flag the case where there are explicit formulae for the lower tail version of cdf and quantile function

### Extends

Class "AbscontDistribution", directly.  
Class "UnivariateDistribution", by class "AbscontDistribution".  
Class "Distribution", by class "AbscontDistribution".

### Methods

**xi** signature(object = "SSTd"): wrapped access method for slot xi of slot param.  
**mean** signature(object = "SSTd"): wrapped access method for slot mean of slot param.  
**nu** signature(object = "SSTd"): wrapped access method for slot nu of slot param.  
**sd** signature(x = "SSTd"): wrapped access method for slot sd of slot param.  
**xi<-** signature(object = "SSTd"): wrapped replace method for slot xi of slot param.  
**mean<-** signature(object = "SSTd"): wrapped replace method for slot mean of slot param.  
**nu<-** signature(object = "SSTd"): wrapped replace method for slot nu of slot param.  
**sd<-** signature(x = "SSTd"): wrapped replace method for slot sd of slot param.

**Note**

This class is based on the code provided by the package **fGarch** by Diethelm Wuertz

**Author(s)**

Peter Ruckdeschel <peter.ruckdeschel@uni-oldenburg.de>

**See Also**

[dsstd](#), [AbscontDistribution-class](#)

**Examples**

```
(ST <- SSTd(xi=2, nu = 3)) # ST is a skewed t distribution with xi = 2 and nu = 3.
set.seed(1)
r(ST)(1) # one random number generated from this distribution, e.g. -0.4432824
d(ST)(1) # Density of this distribution is 0.1204624 for x = 1.
p(ST)(1) # Probability that x < 1 is 0.9035449.
q(ST)(.1) # Probability that x < -0.4432824 is 0.1.
## in RStudio or Jupyter IRKernel, use q.l(.) instead of q(.)
nu(ST) # df of this distribution is 3.
nu(ST) <- 4 # df of this distribution is now 4.
plot(ST)
```

---

SSTdParameter-class     *Parameter of an SSTd distributions*

---

**Description**

The class of the parameter of an SSTd distribution.

**Objects from the Class**

Objects can be created by calls of the form `new("SSTdParameter", ...)`.

**Slots**

`mean` real number: location parameter of a SSTd distribution.  
`sd` real number: scale parameter of a SSTd distribution.  
`xi` real number: shape parameter of a SSTd distribution.  
`nu` positive number: the degree of freedom parameter of a SSTd distribution.  
`name` default name is "parameter of a SSTd distribution".

**Extends**

Class "Parameter", directly.  
 Class "OptionalParameter", by class "Parameter".

**Methods**

**mean** signature(object = "SSTdParameter"): access method for slot mean.  
**sd** signature(object = "SSTdParameter"): access method for slot sd.  
**xi** signature(object = "SSTdParameter"): access method for slot xi.  
**nu** signature(object = "SSTdParameter"): access method for slot nu.

**Author(s)**

Peter Ruckdeschel <peter.ruckdeschel@uni-oldenburg.de>

**See Also**

[SSTd-class](#), [Parameter-class](#)

**Examples**

```
P <- new("SSTdParameter")
mean(P)
sd(P)
xi(P)
nu(P)
P
```

---

 STd

*Generating function for standardized T distribution class*

---

**Description**

Generates a scaled object of class "Td"; the scale (sd) is chosen such that STd(nu=3, sd=1) has variance 1 independently from the degrees of freedom nu. This object is of class "AffLinAbscontDistribution".

**Usage**

```
STd(mean = 0, sd = 1, nu = 5)
```

**Arguments**

**mean** real number: location parameter of the STd distribution.  
**sd** positive real number: scale parameter of the STd distribution  
**nu** real number larger than 2: degree of freedom parameter of the STd distribution.

**Value**

Object of class "STd"

**Note**

This class is based on the code provided by the package **fGarch** by Diethelm Wuertz

**Author(s)**

Peter Ruckdeschel <peter.ruckdeschel@uni-oldenburg.de>

**See Also**

[dstd](#), [AbscontDistribution-class](#)

**Examples**

```
(ST <- STd(mean = 1, sd = 1, nu = 3))  
plot(ST)
```

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