# Package 'Risk'

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**Type** Package

**Title** Computes 26 Financial Risk Measures for Any Continuous Distribution

**Version** 1.0

**Date** 2017-06-05

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**Depends** R (>= 3.0.1)

**Description** Computes 26 financial risk measures for any continuous distribution. The 26 financial risk measures include value at risk, expected shortfall due to Artzner et al. (1999) <DOI:10.1007/s10957-011-9968-2>, tail conditional median due to Kou et al. (2013) <DOI:10.1287/moor.1120.0577>, expectiles due to Newey and Powell (1987) <DOI:10.2307/1911031>, beyond value at risk due to Longin (2001) <DOI:10.3905/jod.2001.319161>, expected proportional shortfall due to Belzunce et al. (2012) <DOI:10.1016/j.insmatheco.2012.05.003>, elementary risk measure due to Ahmadi-Javid (2012) <DOI:10.1007/s10957-011-9968-2>, omega due to Shadwick and Keating (2002), sortino ratio due to Rollinger and Hoffman (2013), kappa due to Kaplan and Knowles (2004), Wang (1998)'s <DOI:10.1080/10920277.1998.10595708> risk measures, Stone (1973)'s <DOI:10.2307/2978638> risk measures, Luce (1980)'s <DOI:10.1007/BF00135033> risk measures, Sarin (1987)'s <DOI:10.1007/BF00126387> risk measures, Bronshtein and Kurelenkova (2009)'s risk measures.

**License** GPL (>= 2)

**NeedsCompilation** no

**Repository** CRAN

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## Contents

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`Risk-package` *Computes 26 Financial Risk Measures for Any Continuous Distribution*

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## Description

Computes 26 financial risk measures, including value at risk, expected shortfall due to Artzner et al. (1999) <DOI:10.1007/s10957-011-9968-2>, tail conditional median due to Kou et al. (2013) <DOI:10.1287/moor.1120.0577>, expectiles due to Newey and Powell (1987) <DOI:10.2307/1911031>, beyond value at risk due to Longin (2001) <DOI:10.3905/jod.2001.319161>, expected proportional shortfall due to Belzunce et al. (2012) <DOI:10.1016/j.insmatheco.2012.05.003>, elementary risk measure due to Ahmadi-Javid (2012) <DOI:10.1007/s10957-011-9968-2>, omega due to Shadwick and Keating (2002), sortino ratio due to Rollinger and Hoffman (2013), kappa due to Kaplan and Knowles (2004), Wang (1998)'s <DOI:10.1080/10920277.1998.10595708> risk measures, Stone (1973)'s <DOI:10.2307/2978638> risk measures, Luce (1980)'s <DOI:10.1007/BF00135033> risk measures, Sarin (1987)'s <DOI:10.1007/BF00126387> risk measures, Bronshtein and Kurelenkova (2009)'s risk measures.

## Details

| | |
|---|---|
| Package: | Risk |
| Type: | Package |
| Version: | 1.0 |
| Date: | 2017-06-05 |
| License: | GPL(>=2) |

financial risk measures

## Author(s)

Saralees Nadarajah, Stephen Chan

Maintainer: Saralees Nadarajah <Saralees.Nadarajah@manchester.ac.uk>

## References

A. Ahmadi-Javid, Entropic value-at-risk: A new coherent risk measure, Journal of Optimization Theory and Applications, 155, 2012, 1105-1123 <DOI:10.1007/s10957-011-9968-2>

P. Artzner, F. Delbaen, J. M. Eber and D. Heath, Coherent measures of risk, Mathematical Finance, 9, 1999, 203-228 <DOI:10.1007/s10957-011-9968-2>

F. Belzunce, J. F. Pinar, J. M. Ruiz and M. A. Sordo, Comparison of risks based on the expected proportional shortfall, Insurance: Mathematics and Economics, 51, 2012, 292-302 <DOI:10.1016/j.insmatheco.2012.05.003>

E. Bronshtein and J. Kurelenkova, Complex risk measures in portfolio optimization, Ufa State Aviation Technical University, Russia, 2009

S. Chan and S. Nadarajah, Risk: An R package for risk measures, submitted

P. D. Kaplan and J. A. Knowles, Kappa: A generalized downside risk-adjusted performance measure, Miscellaneous Publication, Morningstar Associates and York Hedge Fund Strategies, 2004

S. Kou, X. Peng and C. C. Heyde, External risk measures and Basel accords, Mathematics of Operations Research, 38, 2013, 393-417 <DOI:10.1287/moor.1120.0577>

F. M. Longin, Beyond the VaR, Journal of Derivatives, 8, 2001, 36-48 <DOI:10.3905/jod.2001.319161>

R. D. Luce, Several possible measures of risk, Theory and Decision, 12, 1980, 217-228 <DOI:10.1007/BF00135033>

W. K. Newey and J. L. Powell, Asymmetric least squares estimation and testing, Econometrica, 55, 1987, 819-847 <DOI:10.2307/1911031>

T. Rollinger and S. Hoffman, Sortino ratio: A better measure of risk, Risk Management, 2013, 40-42

R. K. Sarin, Some extensions of Luce's measures of risk, Theory and Decision, 22, 1987, 125-141 <DOI:10.1007/BF00126387>

W. F. Shadwick and C. Keating, A universal performance measure, Journal of Performance Measurement, 2002

B. K. Stone, A general class of three-parameter risk measures, The Journal of Finance, 28, 1973, 675-685 <DOI:10.2307/2978638>

S. Wang, An actuarial index of the right-tail risk, North American Actuarial Journal, 2, 1988, 88-101 <DOI:10.1080/10920277.1998.10595708>

BKg1 *Bronshtein And Kurelenkova (2009)'s First Risk Measure*

## Description

Computes the first risk measure due to Bronshtein and Kurelenkova (2009)

## Usage

```
BKg1(spec, alpha, a, b, ...)
```

## Arguments

| | |
|---|---|
| spec | a character string specifying the distribution (for example, "norm" corresponds to the standard normal) |
| alpha | a real valued parameter taking values in (0, 1), see Chan and Nadarajah for details |
| a | the lower end point of the distribution specified by spec |
| b | the upper end point of the distribution specified by spec |
| ... | other parameters |

## Value

An object of the same length as alpha, giving Bronshtein and Kurelenkova (2009)'s first risk measure of the distribution specified by spec

## Author(s)

Stephen Chan, Saralees Nadarajah

## References

S. Chan and S. Nadarajah, Risk: An R package for risk measures, submitted

E. Bronshtein and J. Kurelenkova, Complex risk measures in portfolio optimization, Ufa State Aviation Technical University, Russia, 2009

## Examples

```
BKg1("norm", 0.9, -Inf, Inf)
```

BKg2 *Bronshtein And Kurelenkova (2009)'s Second Risk Measure*

## Description

Computes the second risk measure due to Bronshtein and Kurelenkova (2009)

## Usage

```
BKg2(spec, alpha, a, b, ...)
```

## Arguments

| | |
|---|---|
| spec | a character string specifying the distribution (for example, "norm" corresponds to the standard normal) |
| alpha | a real valued parameter taking values in (0, 1), see Chan and Nadarajah for details |
| a | the lower end point of the distribution specified by spec |
| b | the upper end point of the distribution specified by spec |
| ... | other parameters |

## Value

An object of the same length as alpha, giving Bronshtein and Kurelenkova (2009)'s second risk measure of the distribution specified by spec

## Author(s)

Stephen Chan, Saralees Nadarajah

## References

S. Chan and S. Nadarajah, Risk: An R package for risk measures, submitted

E. Bronshtein and J. Kurelenkova, Complex risk measures in portfolio optimization, Ufa State Aviation Technical University, Russia, 2009

## Examples

```
BKg2("norm", 0.9, -Inf, Inf)
```

BKg3 *Bronshtein And Kurelenkova (2009)'s Third Risk Measure*

## Description

Computes the third risk measure due to Bronshtein and Kurelenkova (2009)

## Usage

```
BKg3(spec, alpha, a, b, beta, ...)
```

## Arguments

| | |
|---|---|
| spec | a character string specifying the distribution (for example, "norm" corresponds to the standard normal) |
| alpha | a real valued parameter taking values in (0, 1), see Chan and Nadarajah for details |
| a | the lower end point of the distribution specified by spec |
| b | the upper end point of the distribution specified by spec |
| beta | a non-negative real valued parameter, see Chan and Nadarajah for details |
| ... | other parameters |

## Value

An object of the same length as alpha, giving Bronshtein and Kurelenkova (2009)'s third risk measure of the distribution specified by spec

## Author(s)

Stephen Chan, Saralees Nadarajah

## References

S. Chan and S. Nadarajah, Risk: An R package for risk measures, submitted

E. Bronshtein and J. Kurelenkova, Complex risk measures in portfolio optimization, Ufa State Aviation Technical University, Russia, 2009

## Examples

```
BKg3("norm", 0.9, -Inf, Inf, 1)
```

BKg4 *Bronshtein And Kurelenkova (2009)'s Fourth Risk Measure*

## Description

Computes the fourth risk measure due to Bronshtein and Kurelenkova (2009)

## Usage

```
BKg4(spec, alpha, a, b, beta, ...)
```

## Arguments

| | |
|---|---|
| spec | a character string specifying the distribution (for example, "norm" corresponds to the standard normal) |
| alpha | a real valued parameter taking values in (0, 1), see Chan and Nadarajah for details |
| a | the lower end point of the distribution specified by spec |
| b | the upper end point of the distribution specified by spec |
| beta | a non-negative real valued parameter, see Chan and Nadarajah for details |
| ... | other parameters |

## Value

An object of the same length as alpha, giving Bronshtein and Kurelenkova (2009)'s fourth risk measure of the distribution specified by spec

## Author(s)

Stephen Chan, Saralees Nadarajah

## References

S. Chan and S. Nadarajah, Risk: An R package for risk measures, submitted

E. Bronshtein and J. Kurelenkova, Complex risk measures in portfolio optimization, Ufa State Aviation Technical University, Russia, 2009

## Examples

```
BKg4("norm", 0.9, -Inf, Inf, 1)
```

bvar *Beyond Value At Risk Due To Longin (2001)*

## Description

Computes beyond value at risk for a given ditribution

## Usage

```
bvar(spec, alpha, a, ...)
```

## Arguments

| | |
|---|---|
| spec | a character string specifying the distribution (for example, "norm" corresponds to the standard normal) |
| alpha | the probabilities associated with beyon values at risk |
| a | the lower end point of the distribution specified by spec |
| ... | other parameters |

## Value

An object of the same length as alpha, giving beyond values ar risk computed.

## Author(s)

Stephen Chan, Saralees Nadarajah

## References

S. Chan and S. Nadarajah, Risk: An R package for risk measures, submitted

F. M. Longin, Beyond the VaR, Journal of Derivatives, 8, 2001, 36-48 <DOI:10.3905/jod.2001.319161>

## Examples

```
bvar("norm", 0.9, a=-Inf)
```

epsg *Expected Proportional Shortfall Due To Belzunce et al. (2012)*

## Description

Computes expected proportional shortfall for a given ditribution

## Usage

```
epsg(spec, alpha, ...)
```

## Arguments

| | |
|---|---|
| spec | a character string specifying the distribution (for example, "norm" corresponds to the standard normal) |
| alpha | the probabilities associated with expected proportional shortfalls |
| ... | other parameters |

## Value

An object of the same length as alpha, giving expected proportional shortfalls computed.

## Author(s)

Stephen Chan, Saralees Nadarajah

## References

S. Chan and S. Nadarajah, Risk: An R package for risk measures, submitted

F. Belzunce, J. F. Pinar, J. M. Ruiz and M. A. Sordo, Comparison of risks based on the expected proportional shortfall, Insurance: Mathematics and Economics, 51, 2012, 292-302 <DOI:10.1016/j.insmatheco.2012.05.003>

## Examples

```
epsg("norm", 0.9)
```

esg *Expected Shortfall Due To Artzner et al. (1999)*

## Description

Computes expected shortfall for a given ditribution

## Usage

```
esg(spec, alpha, ...)
```

## Arguments

| | |
|---|---|
| spec | a character string specifying the distribution (for example, "norm" corresponds to the standard normal) |
| alpha | the probabilities associated with expected shortfall |
| ... | other parameters |

## Value

An object of the same length as alpha, giving expected shortfall computed.

## Author(s)

Stephen Chan, Saralees Nadarajah

## References

S. Chan and S. Nadarajah, Risk: An R package for risk measures, submitted

P. Artzner, F. Delbaen, J. M. Eber and D. Heath, Coherent measures of risk, Mathematical Finance, 9, 1999, 203-228 <DOI:10.1111/1467-9965.00068>

## Examples

```
esg("norm", 0.9)
```

`expect` *Expectation*

## Description

Computes expectation for a given ditribution

## Usage

```
expect(spec, a, b, ...)
```

## Arguments

| | |
|---|---|
| `spec` | a character string specifying the distribution (for example, "norm" corresponds to the standard normal) |
| `a` | the lower end point of the distribution specified by `spec` |
| `b` | the upper end point of the distribution specified by `spec` |
| `...` | other parameters |

## Value

A scalar, giving the expected value of the distribution specified by `spec`

## Author(s)

Stephen Chan, Saralees Nadarajah

## References

S. Chan and S. Nadarajah, Risk: An R package for risk measures, submitted

## Examples

```
expect("norm", -Inf, Inf)
```

expp *Expectiles Due To Newey And Powell (1987)*

## Description

Computes expectiles for a given ditribution

## Usage

```
expp(spec, alpha, a, b, ...)
```

## Arguments

| | |
|---|---|
| spec | a character string specifying the distribution (for example, "norm" corresponds to the standard normal) |
| alpha | the probabilities associated with expectiles |
| a | the lower end point of the distribution specified by spec |
| b | the upper end point of the distribution specified by spec |
| ... | other parameters |

## Value

An object of the same length as alpha, giving expectiles computed.

## Author(s)

Stephen Chan, Saralees Nadarajah

## References

S. Chan and S. Nadarajah, Risk: An R package for risk measures, submitted

W. K. Newey and J. L. Powell, Asymmetric least squares estimation and testing. Econometrica, 55, 1987, 819-847 <DOI:10.2307/1911031>

## Examples

```
expp("norm", 0.9, a=-Inf, b=Inf)
```

expvar *An Elementary Risk Measure Due To Ahmadi-Javid (2012)*

## Description

Computes the elementary risk measure for a given ditribution

## Usage

```
expvar(spec, alpha, a, b, ...)
```

## Arguments

| | |
|---|---|
| spec | a character string specifying the distribution (for example, "norm" corresponds to the standard normal) |
| alpha | a positive valued parameter, see Chan and Nadarajah for details |
| a | the lower end point of the distribution specified by spec |
| b | the upper end point of the distribution specified by spec |
| ... | other parameters |

## Value

An object of the same length as alpha, giving the elementary risk measure of the distribution specified by spec

## Author(s)

Stephen Chan, Saralees Nadarajah

## References

S. Chan and S. Nadarajah, Risk: An R package for risk measures, submitted

A. Ahmadi-Javid, Entropic value-at-risk: A new coherent risk measure. Journal of Optimization Theory and Applications, 155, 2012, 1105-1123 <DOI:10.1007/s10957-011-9968-2>

## Examples

```
expvar("norm", 0.9, -Inf, Inf)
```

kappag *Kappa Risk Measure Due To Kaplan And Knowles (2004)*

## Description

Computes the Kappa risk measure for a given ditribution

## Usage

```
kappag(spec, alpha, n, a, b, ...)
```

## Arguments

| | |
|---|---|
| spec | a character string specifying the distribution (for example, "norm" corresponds to the standard normal) |
| alpha | a real valued parameter, see Chan and Nadarajah for details |
| n | a positive integer valued parameter, see Chan and Nadarajah for details |
| a | the lower end point of the distribution specified by spec |
| b | the upper end point of the distribution specified by spec |
| ... | other parameters |

## Value

An object of the same length as alpha, giving the Kappa risk measure of the distribution specified by spec

## Author(s)

Stephen Chan, Saralees Nadarajah

## References

S. Chan and S. Nadarajah, Risk: An R package for risk measures, submitted

P. D. Kaplan and J. A. Knowles, Kappa: A generalized downside risk-adjusted performance measure, Miscellaneous Publication, Morningstar Associates and York Hedge Fund Strategies, 2004

## Examples

```
kappag("norm", 2, 5, -Inf, Inf)
```

luceg1 *Luce (1980)'s First Risk Measure*

## Description

Computes the first risk measure due to Luce (1980)

## Usage

```
luceg1(spec, a, b, aa, bb, ...)
```

## Arguments

| | |
|---|---|
| spec | a character string specifying the distribution (for example, "norm" corresponds to the standard normal) |
| aa | a positive valued parameter, see Chan and Nadarajah for details |
| bb | a non-negative valued parameter, see Chan and Nadarajah for details |
| a | the lower end point of the distribution specified by spec |
| b | the upper end point of the distribution specified by spec |
| ... | other parameters |

## Value

A scalar, giving Luce (1980)'s first risk measure of the distribution specified by spec

## Author(s)

Stephen Chan, Saralees Nadarajah

## References

S. Chan and S. Nadarajah, Risk: An R package for risk measures, submitted

R. D. Luce, Several possible measures of risk, Theory and Decision, 12, 1980, 217-228 <DOI:10.1007/BF00135033>

## Examples

```
luceg1("unif", 0, 1, 1, 0)
```

`luceg2` *Luce (1980)'s Second Risk Measure*

## Description

Computes the second risk measure due to Luce (1980)

## Usage

```
luceg2(spec, a, b, aa, bb, ...)
```

## Arguments

| | |
|---|---|
| `spec` | a character string specifying the distribution (for example, "norm" corresponds to the standard normal) |
| `aa` | a positive valued parameter, see Chan and Nadarajah for details |
| `bb` | a positive valued parameter, see Chan and Nadarajah for details |
| `a` | the lower end point of the distribution specified by `spec` |
| `b` | the upper end point of the distribution specified by `spec` |
| `...` | other parameters |

## Value

A scalar, giving Luce (1980)'s second risk measure of the distribution specified by `spec`

## Author(s)

Stephen Chan, Saralees Nadarajah

## References

S. Chan and S. Nadarajah, Risk: An R package for risk measures, submitted

R. D. Luce, Several possible measures of risk, Theory and Decision, 12, 1980, 217-228 <DOI:10.1007/BF00135033>

## Examples

```
luceg2("unif", 0, 1, 1, 0)
```

luceg3 *Luce (1980)'s Third Risk Measure*

## Description

Computes the third risk measure due to Luce (1980)

## Usage

```
luceg3(spec, a, b, aa, bb, ...)
```

## Arguments

| | |
|---|---|
| spec | a character string specifying the distribution (for example, "norm" corresponds to the standard normal) |
| aa | a positive valued parameter, see Chan and Nadarajah for details |
| bb | a non-negative valued parameter, see Chan and Nadarajah for details |
| a | the lower end point of the distribution specified by spec |
| b | the upper end point of the distribution specified by spec |
| ... | other parameters |

## Value

A scalar, giving Luce (1980)'s third risk measure of the distribution specified by spec

## Author(s)

Stephen Chan, Saralees Nadarajah

## References

S. Chan and S. Nadarajah, Risk: An R package for risk measures, submitted

R. D. Luce, Several possible measures of risk, Theory and Decision, 12, 1980, 217-228 <DOI:10.1007/BF00135033>

## Examples

```
luceg3("unif", 0, 1, 1, 0)
```

`luceg4` *Luce (1980)'s Fourth Risk Measure*

## Description

Computes the fourth risk measure due to Luce (1980)

## Usage

```
luceg4(spec, a, b, aa, bb, ...)
```

## Arguments

| | |
|---|---|
| `spec` | a character string specifying the distribution (for example, "norm" corresponds to the standard normal) |
| `aa` | a positive valued parameter, see Chan and Nadarajah for details |
| `bb` | a positive valued parameter, see Chan and Nadarajah for details |
| `a` | the lower end point of the distribution specified by `spec` |
| `b` | the upper end point of the distribution specified by `spec` |
| `...` | other parameters |

## Value

A scalar, giving Luce (1980)'s fourth risk measure of the distribution specified by `spec`

## Author(s)

Stephen Chan, Saralees Nadarajah

## References

S. Chan and S. Nadarajah, Risk: An R package for risk measures, submitted

R. D. Luce, Several possible measures of risk, Theory and Decision, 12, 1980, 217-228 <DOI:10.1007/BF00135033>

## Examples

```
luceg4("norm",-Inf, Inf, 1, 0)
```

omegag *Omega Risk Measure Due To Shadwick And Keating (2002)*

## Description

Computes the omega risk measure for a given ditribution

## Usage

```
omegag(spec, alpha, a, b, ...)
```

## Arguments

| | |
|---|---|
| spec | a character string specifying the distribution (for example, "norm" corresponds to the standard normal) |
| alpha | a real valued parameter, see Chan and Nadarajah for details |
| a | the lower end point of the distribution specified by spec |
| b | the upper end point of the distribution specified by spec |
| ... | other parameters |

## Value

An object of the same length as alpha, giving the omega risk measure of the distribution specified by spec

## Author(s)

Stephen Chan, Saralees Nadarajah

## References

S. Chan and S. Nadarajah, Risk: An R package for risk measures, submitted

W. F. Shadwick and C. Keating, A universal performance measure, Journal of Performance Measurement, 2002

## Examples

```
omegag("norm", 2, -Inf, Inf)
```

saring1 *Sarin (1987)'s First Risk Measure*

## Description

Computes the first risk measure due to Sarin (1987)

## Usage

```
saring1(spec, a, b, k, c, ...)
```

## Arguments

| | |
|---|---|
| spec | a character string specifying the distribution (for example, "norm" corresponds to the standard normal) |
| k | a non-zero real valued parameter, see Chan and Nadarajah for details |
| c | a non-zero real valued parameter, see Chan and Nadarajah for details |
| a | the lower end point of the distribution specified by spec |
| b | the upper end point of the distribution specified by spec |
| ... | other parameters |

## Value

A scalar, giving Sarin (1987)'s first risk measure of the distribution specified by spec

## Author(s)

Stephen Chan, Saralees Nadarajah

## References

S. Chan and S. Nadarajah, Risk: An R package for risk measures, submitted

R. K. Sarin, Some extensions of Luce's measures of risk, Theory and Decision, 22, 1987, 125-141 <DOI:10.1007/BF00126387>

## Examples

```
saring1("norm", -Inf, Inf, 1, 0)
```

saring2 *Sarin (1987)'s Second Risk Measure*

## Description

Computes the second risk measure due to Sarin (1987)

## Usage

```
saring2(spec, a, b, aa, bb1, bb2, ...)
```

## Arguments

| | |
|---|---|
| spec | a character string specifying the distribution (for example, "norm" corresponds to the standard normal) |
| aa | a positive real valued parameter, see Chan and Nadarajah for details |
| bb1 | a positive real valued parameter, see Chan and Nadarajah for details |
| bb2 | a positive real valued parameter, see Chan and Nadarajah for details |
| a | the lower end point of the distribution specified by spec |
| b | the upper end point of the distribution specified by spec |
| ... | other parameters |

## Value

A scalar, giving Sarin (1987)'s second risk measure of the distribution specified by spec

## Author(s)

Stephen Chan, Saralees Nadarajah

## References

S. Chan and S. Nadarajah, Risk: An R package for risk measures, submitted

R. K. Sarin, Some extensions of Luce's measures of risk, Theory and Decision, 22, 1987, 125-141 <DOI:10.1007/BF00126387>

## Examples

```
saring2("norm",-Inf, Inf, 1, 1, 1)
```

saring3 *Sarin (1987)'s Third Risk Measure*

## Description

Computes the third risk measure due to Sarin (1987)

## Usage

```
saring3(spec, a, b, aa, bb1, bb2, ...)
```

## Arguments

| | |
|---|---|
| spec | a character string specifying the distribution (for example, "norm" corresponds to the standard normal) |
| aa | a positive real valued parameter, see Chan and Nadarajah for details |
| bb1 | a positive real valued parameter, see Chan and Nadarajah for details |
| bb2 | a positive real valued parameter, see Chan and Nadarajah for details |
| a | the lower end point of the distribution specified by spec |
| b | the upper end point of the distribution specified by spec |
| ... | other parameters |

## Value

A scalar, giving Sarin (1987)'s third risk measure of the distribution specified by spec

## Author(s)

Stephen Chan, Saralees Nadarajah

## References

S. Chan and S. Nadarajah, Risk: An R package for risk measures, submitted

R. K. Sarin, Some extensions of Luce's measures of risk, Theory and Decision, 22, 1987, 125-141 <DOI:10.1007/BF00126387>

## Examples

```
saring3("norm",-Inf, Inf, 1, 1, 1)
```

sortinog *Sortino Ratio Due To Rollinger And Hoffman (2013)*

## Description

Computes the Sortino ratio for a given ditribution

## Usage

```
sortinog(spec, alpha, a, b, ...)
```

## Arguments

| | |
|---|---|
| spec | a character string specifying the distribution (for example, "norm" corresponds to the standard normal) |
| alpha | a real valued parameter, see Chan and Nadarajah for details |
| a | the lower end point of the distribution specified by spec |
| b | the upper end point of the distribution specified by spec |
| ... | other parameters |

## Value

An object of the same length as alpha, giving the Sortino ratio of the distribution specified by spec

## Author(s)

Stephen Chan, Saralees Nadarajah

## References

S. Chan and S. Nadarajah, Risk: An R package for risk measures, submitted

T. Rollinger and S. Hoffman, Sortino ratio: A better measure of risk, Risk Management, 40-42, 2013

## Examples

```
sortinog("norm", 2, -Inf, Inf)
```

stoneg1 *Stone (1973)'s First Risk Measure*

## Description

Computes the first risk measure due to Stone (1973)

## Usage

```
stoneg1(spec, x0, k, a, b, ...)
```

## Arguments

| | |
|---|---|
| spec | a character string specifying the distribution (for example, "norm" corresponds to the standard normal) |
| x0 | a real valued parameter, see Chan and Nadarajah for details |
| k | a positive valued parameter, see Chan and Nadarajah for details |
| a | the lower end point of the distribution specified by spec |
| b | the upper end point of the distribution specified by spec |
| ... | other parameters |

## Value

A scalar, giving Stone (1973)'s first risk measure of the distribution specified by spec

## Author(s)

Stephen Chan, Saralees Nadarajah

## References

S. Chan and S. Nadarajah, Risk: An R package for risk measures, submitted

B. K. Stone, A general class of three-parameter risk measuresm, The Journal of Finance, 28, 1973, 675-685 <DOI:10.2307/2978638>

## Examples

```
stoneg1("norm", 8, 3, -Inf, Inf)
```

stoneg2 *Stone (1973)'s Second Risk Measure*

## Description

Computes the second risk measure due to Stone (1973)

## Usage

```
stoneg2(spec, x0, k, a, b, ...)
```

## Arguments

| | |
|---|---|
| spec | a character string specifying the distribution (for example, "norm" corresponds to the standard normal) |
| x0 | a real valued parameter, see Chan and Nadarajah for details |
| k | a positive valued parameter, see Chan and Nadarajah for details |
| a | the lower end point of the distribution specified by spec |
| b | the upper end point of the distribution specified by spec |
| ... | other parameters |

## Value

A scalar, giving Stone (1973)'s second risk measure of the distribution specified by spec

## Author(s)

Stephen Chan, Saralees Nadarajah

## References

S. Chan and S. Nadarajah, Risk: An R package for risk measures, submitted

B. K. Stone, A general class of three-parameter risk measuresm, The Journal of Finance, 28, 1973, 675-685 <DOI:10.2307/2978638>

## Examples

```
stoneg2("norm", 8, 3, -Inf, Inf)
```

tcm *Tail Conditional Mean Due To Kou et al. (2013)*

## Description

Computes tail conditional median for a given ditribution

## Usage

```
tcm(spec, alpha, ...)
```

## Arguments

| | |
|---|---|
| spec | a character string specifying the distribution (for example, "norm" corresponds to the standard normal) |
| alpha | the probabilities associated with tail conditional median |
| ... | other parameters |

## Value

An object of the same length as alpha, giving tail conditional medians computed.

## Author(s)

Stephen Chan, Saralees Nadarajah

## References

S. Chan and S. Nadarajah, Risk: An R package for risk measures, submitted

S. Kou, X. Peng and C. C. Heyde, External risk measures and Basel accords, Mathematics of Operations Research, 38, 2013, 393-417 <DOI:10.1287/moor.1120.0577>

## Examples

```
tcm("norm", 0.9)
```

## varg *Value At Risk*

### Description

Computes value at risk for a given ditribution

### Usage

```
varg(spec, alpha, ...)
```

### Arguments

| | |
|---|---|
| spec | a character string specifying the distribution (for example, "norm" corresponds to the standard normal) |
| alpha | the probabilities associated with values at risk |
| ... | other parameters |

### Value

An object of the same length as alpha, giving values at risk computed.

### Author(s)

Stephen Chan, Saralees Nadarajah

### References

S. Chan and S. Nadarajah, Risk: An R package for risk measures, submitted

### Examples

```
varg("norm", 0.9)
```

## wangg1 *Wang (1998)'s First Risk Measure*

### Description

Computes the first risk measure due to Wang (1998)

### Usage

```
wangg1(spec, alpha, a, b, ...)
```

### Arguments

| | |
|---|---|
| spec | a character string specifying the distribution (for example, "norm" corresponds to the standard normal) |
| alpha | a real valued parameter taking values in (0, 1), see Chan and Nadarajah for details |
| a | the lower end point of the distribution specified by spec |
| b | the upper end point of the distribution specified by spec |
| ... | other parameters |

### Value

An object of the same length as alpha, giving Wang (1998)'s first risk measure of the distribution specified by spec

### Author(s)

Stephen Chan, Saralees Nadarajah

### References

S. Chan and S. Nadarajah, Risk: An R package for risk measures, submitted

S. Wang, An actuarial index of the right-tail risk, North American Actuarial Journal, 2, 1998, 88-101 <DOI:10.1080/10920277.1998.10595708>

### Examples

```
wangg1("lnorm", 0.9, 0, Inf)
```

---

## wangg2 *Wang (1998)'s Second Risk Measure*

---

### Description

Computes the second risk measure due to Wang (1998)

### Usage

```
wangg2(spec, alpha, a, b, ...)
```

### Arguments

| | |
|---|---|
| spec | a character string specifying the distribution (for example, "norm" corresponds to the standard normal) |
| alpha | a real valued parameter taking values in (0, 1), see Chan and Nadarajah for details |
| a | the lower end point of the distribution specified by spec |
| b | the upper end point of the distribution specified by spec |
| ... | other parameters |

## Value

An object of the same length as `alpha`, giving Wang (1998)'s second risk measure of the distribution specified by `spec`

## Author(s)

Stephen Chan, Saralees Nadarajah

## References

S. Chan and S. Nadarajah, Risk: An R package for risk measures, submitted

S. Wang, An actuarial index of the right-tail risk, North American Actuarial Journal, 2, 1998, 88-101 <DOI:10.1080/10920277.1998.10595708>

## Examples

```
wangg2("lnorm", 0.9, 0, Inf)
```

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