

Package ‘vasicek’

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Title Miscellaneous Functions for Vasicek Distribution

Version 0.0.3

Description Provide a collection of miscellaneous R functions related to the Vasicek distribution with the intent to make the lives of risk modelers easier.

License GPL (>= 2)

URL <https://github.com/statcompute/vasicek>

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R topics documented:

gof_ks	2
vsk_cdf	2
vsk_dmm	3
vsk_imm	4
vsk_mle	4
vsk_pdf	5
vsk_ppf	6
vsk_qbe	6
vsk_Rho	7
vsk_rvs	8
Index	9

gof_ks	<i>Kolmogorov-Smirnov goodness-of-fit test for the Vasicek distribution</i>
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Description

The function `gof_ks` performs Kolmogorov-Smirnov goodness-of-fit test for the Vasicek distribution

Usage

```
gof_ks(x, Rho, P)
```

Arguments

x	A numeric vector in the (0, 1) interval that is supposed to follow the Vasicek distribution
Rho	The Rho parameter in the Vasicek distribution
P	The P parameter in the Vasicek distribution

Value

A list with statistical test result, including ks stat and p-value.

Examples

```
x <- vsk_rvs(100, Rho = 0.2, P = 0.1)
gof_ks(x, Rho = 0.2, P = 0.1)
```

vsk_cdf	<i>Calculating the cumulative distribution function of Vasicek</i>
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Description

The function `vsk_cdf` calculates the cumulative distribution function of Vasicek.

Usage

```
vsk_cdf(x, Rho, P)
```

Arguments

x	A numeric vector in the [0, 1] interval that is supposed to follow the Vasicek distribution
Rho	The Rho parameter in the Vasicek distribution
P	The P parameter in the Vasicek distribution

Value

A numeric vector with the corresponding cdf.

Examples

```
vsk_cdf(c(0.278837772815679, 0.5217229060260343), Rho = 0.2, P = 0.3)
# [1] 0.5 0.9
```

vsk_dmm

Estimating Vasicek parameters by using direct moment matching

Description

The function `vsk_mle` estimates parameters in the Vasicek distribution by using direct moment matching.

Usage

```
vsk_dmm(x)
```

Arguments

`x` A numeric vector in the (0, 1) interval that is supposed to follow the Vasicek distribution

Value

A list with Vasicek parameters, namely Rho and P.

Examples

```
vsk_dmm(vsk_rvs(1000, Rho = 0.2, P = 0.1))
# $Rho
# [1] 0.2135844
# $P
# [1] 0.1025469
```

vsk_imm	<i>Estimating Vasicek parameters by using indirect moment matching</i>
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Description

The function `vsk_imm` estimates parameters in the Vasicek distribution by using indirect moment matching.

Usage

```
vsk_imm(x)
```

Arguments

<code>x</code>	A numeric vector in the (0, 1) interval that is supposed to follow the Vasicek distribution
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Value

A list with Vasicek parameters, namely Rho and P.

Examples

```
vsk_imm(vsk_rvs(1000, Rho = 0.2, P = 0.1))
# $Rho
# [1] 0.2110422
# $P
# [1] 0.1024877
```

vsk_mle	<i>Estimating Vasicek parameters by using maximum likelihood estimator</i>
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Description

The function `vsk_mle` estimates parameters in the Vasicek distribution by using maximum likelihood estimator.

Usage

```
vsk_mle(x)
```

Arguments

<code>x</code>	A numeric vector in the (0, 1) interval that is supposed to follow the Vasicek distribution
----------------	---------------------------------------------------------------------------------------------

Value

A list with Vasicek parameters, namely Rho and P.

Examples

```
vsk mle(vsk_rvs(1000, Rho = 0.2, P = 0.1))
# $Rho
# [1] 0.2110976
# $P
# [1] 0.1025469
```

vsk_pdf

Calculating the probability density function of Vasicek

Description

The function vsk_pdf calculates the probability density function of Vasicek.

Usage

```
vsk_pdf(x, Rho, P)
```

Arguments

x	A numeric vector in the (0, 1) interval that is supposed to follow the Vasicek distribution
Rho	The Rho parameter in the Vasicek distribution
P	The P parameter in the Vasicek distribution

Value

A numeric vector with the corresponding pdf.

Examples

```
vsk_pdf(c(0.01, 0.02), Rho = 0.2, P = 0.3)
# [1] 0.07019659 0.22207564
```

`vsk_ppf`*Calculating the percentile point function of Vasicek*

Description

The function `vsk_ppf` calculates the percentile point function of Vasicek.

Usage

```
vsk_ppf(Alpha, Rho, P)
```

Arguments

Alpha	A numeric vector of probabilities
Rho	The Rho parameter in the Vasicek distribution
P	The P parameter in the Vasicek distribution

Value

A numeric vector with the corresponding ppf.

Examples

```
vsk_ppf(c(0.5, 0.9), Rho = 0.2, P = 0.3)
# [1] 0.2788378 0.5217229
```

`vsk_qbe`*Estimating Vasicek parameters by using quantile-based estimator*

Description

The function `vsk_qbe` estimates parameters in the Vasicek distribution by using quantile-based estimator. It is not recommended for small sample size.

Usage

```
vsk_qbe(x)
```

Arguments

x	A numeric vector in the (0, 1) interval that is supposed to follow the Vasicek distribution
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Value

A list with Vasicek parameters, namely Rho and P.

Examples

```
vsk_qbe(vsk_rvs(1000, Rho = 0.2, P = 0.1))
# $Rho
# [1] 0.1941091
# $P
# [1] 0.1019701
```

vsk_Rho

Estimating Vasicek Rho parameter by assuming the known P parameter

Description

The function `vsk_Rho` estimates Rho parameter in the Vasicek distribution by using maximum likelihood estimator, assuming the known P parameter.

Usage

```
vsk_Rho(x, p)
```

Arguments

`x` A numeric vector in the (0, 1) interval that is supposed to follow the Vasicek distribution

`p` A numeric vector in the (0, 1) interval. `p` has the same length as `x`. Each value of `p` can be a constant or varying.

Value

A scalar representing the Rho parameter in the Vasicek distribution.

Examples

```
x <- vsk_rvs(1000, Rho = 0.2, P = 0.1)
p <- rep(mean(x), length(x))
vsk_Rho(x, p)
# 0.2110976
```

`vsk_rvs`*Generating random numbers for the Vasicek distribution*

Description

The function `vsk_rvs` generates random numbers for the Vasicek distribution.

Usage

```
vsk_rvs(n, Rho, P, seed = 1)
```

Arguments

<code>n</code>	An integer for the number of observations.
<code>Rho</code>	The Rho parameter in the Vasicek distribution. It is in the range of (0, 1).
<code>P</code>	The P parameter in the Vasicek distribution. It is in the range of (0, 1).
<code>seed</code>	An integer that is used as the seed value to generate random numbers.

Value

A list of random number that follows the Vasicek distribution.

Examples

```
vsk_rvs(10, Rho = 0.2, P = 0.1)
```


Index

[gof_ks](#), [2](#)

[vsk_cdf](#), [2](#)

[vsk_dmm](#), [3](#)

[vsk_imm](#), [4](#)

[vsk_mle](#), [4](#)

[vsk_pdf](#), [5](#)

[vsk_ppf](#), [6](#)

[vsk_qbe](#), [6](#)

[vsk_Rho](#), [7](#)

[vsk_rvs](#), [8](#)