Package 'CPHazard'

September 27, 2026

Title Hazard Change Point Models for Different Lifetime Distributions

Version 0.1.0

Description Estimates the parameters of models with a single change-point in the hazard rate for time-to-event data. Supported models include the exponential (Gijbels & Gürler (2003) <doi:10.1023/B:LIDA.0000012424.71723.9d>, Matthews & Farewell (1982) <doi:10.2307/2530460>), Exponential-Lindley (Joshi & Rattihalli (2020) <doi:10.1007/978-981-15-5414-8_29>), Lindley (Joshi, Jose, & Bhati (2016) <doi:10.1080/03610918.2015.1096381>), log-logistic (Nadar, Upadhyay, & Joshi (2025) <doi:10.3390/math13091457>), and Weibull (Williams & Kim (2013) <doi:10.1080/03610926.2011.600505>) hazard change-point models. Provides functions for generating random variates and evaluating the probability density function (PDF) and the cumulative distribution function (CDF) of the fitted change-point models. Includes Kaplan-Meier and Nelson-Aalen diagnostic plots, together with goodness-of-fit measures such as the Akaike Information Criterion (AIC), the Bayesian Information Criterion (BIC), distance metrics such as the L1-norm and L2-norm, and the Kolmogorov-Smirnov (K-S) statistic for model evaluation.

License MIT + file LICENSE

Encoding UTF-8

RoxygenNote 7.3.3

Depends R (>= 4.1.0)

Imports lamW, survival, EnvStats

Maintainer Vasudha Upadhyay <vasudhyay@gmail.com>

Suggests spelling

Language en-US

NeedsCompilation no

Author Vasudha Upadhyay [aut, cre],
Dr. Savitri Joshi [aut, cph],
Keerthan Aithal [aut]

Repository CRAN

Date/Publication 2026-09-27 16:30:29 UTC

Contents

`dee` *Density for the Exponential Hazard Change-Point Model*

Description

Computes the PDF of the exponential hazard change-point model with parameters `theta1`, `theta2`, and `tau`.

Usage

```
dee(x, theta1, theta2, tau)
```

Arguments

`x`	Numeric vector of survival times (must be >= 0).
`theta1`	Rate parameter of the pre-change-point exponential regime; must be > 0.
`theta2`	Rate parameter of the post-change-point exponential regime; must be > 0.
`tau`	Change-point parameter; must be > 0.

Value

A numeric vector of densities, the same length as `x`.

References

Gijbels, I., & Gürler, Ü. (2003). Estimation of a change point in a Hazard Function Based on Censored Data. *Lifetime Data Analysis*, 9(4), 395–411. doi:10.1023/B:LIDA.0000012424.71723.9d

Matthews, D. E., & Farewell, V. T. (1982). On Testing for a Constant Hazard against a change point Alternative. *Biometrics*, 38(2), 463-468. doi:10.2307/2530460

See Also

Other exponential hazard change-point model functions: `est_ee()`, `pee()`, `ree()`

Examples

```
dee(x = c(1, 2), theta1 = 1, theta2 = 2, tau = 1.25)
```

`del` *Density for the Exponential-Lindley Hazard Change-Point Model*

Description

Computes the PDF of the Exponential-Lindley hazard change-point model with parameters `theta1`, `theta2`, and `tau`.

Usage

```
del(x, theta1, theta2, tau)
```

Arguments

`x`	Numeric vector of survival times (must be >= 0).
`theta1`	Rate parameter of the pre-change-point exponential regime; must be > 0.
`theta2`	Scale parameter of the post-change-point Lindley regime; must be > 0.
`tau`	Change-point parameter; must be > 0.

Value

A numeric vector of densities, the same length as `x`.

References

Joshi, S., & Rattihalli, R. N. (2020, October). Estimation of parameters in the Exponential-Lindley hazard change-point model. In *Proceedings of International Conference on Trends in Computational and Cognitive Engineering: TCCE 2019* , 345–356.doi:10.1007/9789811554148_29

See Also

Other Exponential-Lindley hazard change-point model functions: `est_el()`, `pel()`, `rel()`

Examples

```
del(x = c(0.5, 1, 2), theta1 = 0.3, theta2 = 0.5, tau = 1)
```

`dlgl` *Density for the Log-Logistic Hazard Change-Point Model*

Description

Computes the PDF of the log-logistic hazard change-point model with parameters `theta1`, `theta2`, and `tau`.

Usage

```
dlgl(x, theta1, theta2, tau)
```

Arguments

`x`	Numeric vector of survival times (must be >= 0).
`theta1`	Scale parameter of the pre-change-point log-logistic regime; must be > 0.
`theta2`	Scale parameter of the post-change-point log-logistic regime; must be > 0.
`tau`	Change-point parameter; must be > 0.

Value

A numeric vector of densities, the same length as `x`.

References

Nadar, S. S., Upadhyay, V., & Joshi, S. (2025). Detecting Clinical Risk Shift Through log–logistic Hazard Change-Point Model. *Mathematics*, 13(9), 1457. doi:10.3390/math13091457

See Also

Other log-logistic hazard change-point functions: `est_lgl()`, `plgl()`, `rlgl()`

Examples

```
dlgl(x = c(0.5, 1, 2), theta1 = 0.3, theta2 = 0.5, tau = 1)
```

`dlin` *Density for the Lindley Hazard Change-Point Model*

Description

Computes the PDF of the Lindley hazard change-point model with parameters `theta1`, `theta2`, and `tau`.

Usage

```
dlin(x, theta1, theta2, tau)
```

Arguments

`x`	Numeric vector of survival times (must be >= 0).
`theta1`	Scale parameter of the pre-change-point Lindley regime; must be > 0.
`theta2`	Scale parameter of the post-change-point Lindley regime; must be > 0.
`tau`	Change-point parameter; must be > 0.

Value

A numeric vector of densities, the same length as `x`.

References

Joshi, S., Jose, K. K. and Bhati, D. (2016). Estimation of a Change Point in the Hazard Rate of Lindley Model under Right Censoring. *Communications in Statistics - Simulation and Computation*. 46(5), 3563–3574. doi:10.1080/03610918.2015.1096381

See Also

Other Lindley hazard change-point model functions: `est_lin()`, `plin()`, `rlin()`

Examples

```
dlin(x = c(0.5, 1, 2), theta1 = 1, theta2 = 2, tau = 1.25)
```

dww *Density for the Weibull Hazard Change-Point Model*

Description

Computes the PDF of the Weibull hazard change-point model with parameters `theta1`, `theta2`, `tau`, and `k`.

Usage

```
dww(x, theta1, theta2, tau, k)
```

Arguments

`x`	Numeric vector of survival times (must be >= 0).
`theta1`	Scale parameter of the pre-change-point Weibull regime; must be > 0.
`theta2`	Scale parameter of the post-change-point Weibull regime; must be > 0.
`tau`	Change-point parameter; must be > 0.
`k`	Shape parameter (constant); must be > 0.

Value

A numeric vector of densities, the same length as `x`.

References

M. R. Williams and D. Y. Kim. A test for an abrupt change in Weibull Hazard Functions with Staggered Entry and Type I Censoring. *Communications in Statistics - Theory and Methods*, 42(11): 1922–1933, 2013. doi:10.1080/03610926.2011.600505.

See Also

Other Weibull hazard change-point model functions: `est_ww()`, `pww()`, `rww()`

Examples

```
dww(x = c(0.5, 1, 2), theta1 = 1, theta2 = 3, tau = 0.5, k = 2)
```

`est_ee` *Parameter Estimation for the Exponential Hazard Change-Point Model*

Description

Estimates `theta1`, `theta2`, and `tau` from time-to-event data (`xi` and `di`) under the exponential hazard change-point model , and produces goodness-of fit criteria (AIC and BIC) , the distance metrics (L1-Norm, L2-Norm, K-S Statistic) and the Kaplan-Meier / Nelson-Aalen diagnostic plots against the fitted model.

Usage

```
est_ee(xi, di)
```

Arguments

`xi`	Numeric vector of observed times (must be >= 0). Requires at least 5 uncensored observations.
`di`	Numeric vector of event indicators (1 = event, 0 = censored). Defaults to all events if omitted.

Value

A list containing `Estimates` (the fitted `theta1`, `theta2`, `tau`), `DiagnosticMeasures` (L1-Norm, L2-Norm, K-S Statistic, AIC, BIC), and `plot` (Kaplan-Meier and Nelson-Aalen plots)

References

Gijbels, I., & Gürler, Ü. (2003). Estimation of a change point in a Hazard Function Based on Censored Data. *Lifetime Data Analysis*, 9(4), 395–411. doi:10.1023/B:LIDA.0000012424.71723.9d

Matthews, D. E., & Farewell, V. T. (1982). On Testing for a Constant Hazard against a change point Alternative. *Biometrics*, 38(2), 463-468. doi:10.2307/2530460

See Also

Other exponential hazard change-point model functions: `dee()`, `pee()`, `ree()`

Examples

```
# Demonstration 1 (Parameter estimation with missing di)
est_ee(xi=c(45,32,40,21,12,13,52,60))

# Demonstration 2 (Parameter estimation with (xi,di))
n <- 100
x <- ree(n, 1, 2, 1.25)
d <- sample(c(0,1), n, replace = TRUE, prob = c(0.2, 0.8))
est_ee(xi = x, di = d)
```

est_el *Parameter Estimation for the Exponential-Lindley Hazard Change-Point Model*

Description

Estimates `theta1`, `theta2`, and `tau` from time-to-event data (`xi` and `di`) under the Exponential-Lindley hazard change-point model with single change-point in hazard, and produces Kaplan-Meier / Nelson-Aalen diagnostic plots for the fitted model.

Usage

```
est_el(xi, di)
```

Arguments

`xi`	Numeric vector of observed times (must be >= 0). Requires at least 5 uncensored observations.
`di`	Numeric vector of event indicators (1 = event, 0 = censored). Defaults to all events if omitted.

Value

A list containing `ParameterEstimates` (the fitted `theta1`, `theta2`, `tau`), `DiagnosticMeasures` (L1-Norm, L2-Norm, K-S Statistic, AIC, BIC), and `plot` (Kaplan-Meier and Nelson-Aalen plots).

References

Joshi, S., & Rattihalli, R. N. (2020, October). Estimation of parameters in the Exponential-Lindley hazard change-point model. In *Proceedings of International Conference on Trends in Computational and Cognitive Engineering: TCCE 2019* , 345–356.doi:10.1007/9789811554148_29

See Also

Other Exponential-Lindley hazard change-point model functions: `del()`, `pel()`, `rel()`

Examples

```
# Demonstration 1 (Parameter estimation with missing di)
est_el(xi=c(45,32,45,22,12,13,78,99))

# Demonstration 2 (Parameter estimation with (xi,di))
x <- rel(n = 50, theta1 = 1.5, theta2 = 0.2, tau = 1.5)
d <- sample(c(0, 1), 50, replace = TRUE, prob = c(0.2, 0.8))
est_el(xi = x, di = d)
```

`est_lgl` *Parameter Estimation for the Log-Logistic Hazard Change-Point Model*

Description

Estimates `theta1`, `theta2`, and `tau` from time-to-event data (`xi` and `di`) under the log-logistic hazard change-point model , and produces goodness-of fit criteria (AIC and BIC) , the distance metrics (L1-Norm, L2-Norm, K-S Statistic) and the Kaplan-Meier / Nelson-Aalen diagnostic plots against the fitted model.

Usage

```
est_lgl(xi, di)
```

Arguments

`xi`	Numeric vector of observed times (must be >= 0). Requires at least 5 uncensored observations.
`di`	Numeric vector of event indicators (1 = event, 0 = censored). Defaults to all events if omitted.

Value

A list containing `ParameterEstimates` (the fitted `theta1`, `theta2`, `tau`), `DiagnosticMeasures` (L1-Norm, L2-Norm, K-S Statistic, AIC, BIC), and `plot` (Kaplan-Meier and Nelson-Aalen plots).

References

Nadar, S. S., Upadhyay, V., & Joshi, S. (2025). Detecting Clinical Risk Shift Through log–logistic Hazard Change-Point Model. *Mathematics*, 13(9), 1457. doi:10.3390/math13091457

See Also

Other log-logistic hazard change-point functions: `dlgl()`, `plgl()`, `rlgl()`

Examples

```
# Demonstration 1 (Parameter estimation with missing di)
est_lgl(x=c(45,32,45,22,12,13,78,99))

# Demonstration 2 (Parameter estimation with (xi,di))
x <- rlgl(n = 50, theta1 = 1.5, theta2 = 0.5, tau = 2)
d <- sample(c(0, 1), 50, replace = TRUE, prob = c(0.2, 0.8))
est_lgl(xi = x, di = d)
```

est_lin *Parameter Estimation for the Lindley Hazard Change-Point Model*

Description

Estimates theta1, theta2, and tau from time-to-event data (xi and di) under the Lindley hazard change-point model , and produces goodness-of fit criteria (AIC and BIC) , the distance metrics (L1-Norm, L2-Norm, K-S Statistic) and the Kaplan-Meier / Nelson-Aalen diagnostic plots against the fitted model.

Usage

```
est_lin(xi, di)
```

Arguments

xi	Numeric vector of observed times (must be >= 0). Requires at least 5 uncensored observations.
di	Numeric vector of event indicators (1 = event, 0 = censored). Defaults to all events if omitted.

Value

A list containing ParameterEstimates (the fitted theta1, theta2, tau), DiagnosticMeasures (L1-Norm, L2-Norm, K-S Statistic, AIC, BIC), and plot (Kaplan-Meier and Nelson-Aalen plots).

References

Joshi, S., Jose, K. K. and Bhati, D. (2016). Estimation of a Change Point in the Hazard Rate of Lindley Model under Right Censoring. *Communications in Statistics - Simulation and Computation*. 46(5), 3563–3574. doi:10.1080/03610918.2015.1096381

See Also

Other Lindley hazard change-point model functions: dlin(), plin(), rlin()

Examples

```
# Demonstration 1 (Parameter estimation with missing di)
est_lin(xi=c(22,12,15,25,10,13,30,9))

# Demonstration 2 (Parameter estimation with (xi,di))
n <- 100
x <- rlin(n, 1, 2, 1.25)
d <- sample(c(0,1), n, replace = TRUE, prob = c(0.2, 0.8))
est_lin(xi = x, di = d)
```

`est_ww` *Parameter Estimation for the Weibull Hazard Change-Point Model*

Description

Estimates `theta1`, `theta2`, `tau`, and `k` from time-to-event data (`xi` and `di`) under the Weibull hazard change-point model , and produces goodness-of fit criteria (AIC and BIC) , the distance metrics (L1-Norm, L2-Norm, K-S Statistic) and the Kaplan-Meier / Nelson-Aalen diagnostic plots against the fitted model.

Usage

```
est_ww(xi, di = NULL)
```

Arguments

`xi`	Numeric vector of observed times (must be >= 0). Requires at least 5 uncensored observations.
`di`	Numeric vector of event indicators (1 = event, 0 = censored). Defaults to all events if omitted.

Value

A list containing `ParameterEstimates` (the fitted `theta1`, `theta2`, `tau`, `k`), `DiagnosticMeasures` (L1-Norm, L2-Norm, K-S Statistic, AIC, BIC), and `plot` (Kaplan-Meier and Nelson-Aalen plots).

References

M. R. Williams and D. Y. Kim. A test for an abrupt change in Weibull Hazard Functions with Staggered Entry and Type I Censoring. *Communications in Statistics - Theory and Methods*, 42(11): 1922–1933, 2013. doi:10.1080/03610926.2011.600505.

See Also

Other Weibull hazard change-point model functions: `dww()`, `pww()`, `rww()`

Examples

```
# Demonstration 1 (Parameter estimation with missing di)
est_ww(xi=c(12,8,45,7,47,32,14,10,19,23))

# Demonstration 2 (Parameter estimation with (xi,di))
x <- rww(n = 50, theta1 = 1, theta2 = 3, tau = 0.5, k = 3)
d <- sample(c(0, 1), 50, replace = TRUE, prob = c(0.2, 0.8))
est_ww(xi = x, di = d)
```

pee *Distribution Function for the Exponential Hazard Change-Point Model*

Description

Computes the CDF of the exponential hazard change-point model with parameters `theta1`, `theta2`, and `tau`.

Usage

```
pee(x, theta1, theta2, tau)
```

Arguments

`x`	Numeric vector of survival times (must be >= 0).
`theta1`	Rate parameter of the pre-change-point exponential regime; must be > 0.
`theta2`	Rate parameter of the post-change-point exponential regime; must be > 0.
`tau`	Change-point parameter; must be > 0.

Value

A numeric vector of probabilities, the same length as `x`.

References

Gijbels, I., & Gürler, Ü. (2003). Estimation of a change point in a Hazard Function Based on Censored Data. *Lifetime Data Analysis*, 9(4), 395–411. doi:10.1023/B:LIDA.0000012424.71723.9d

Matthews, D. E., & Farewell, V. T. (1982). On Testing for a Constant Hazard against a change point Alternative. *Biometrics*, 38(2), 463-468. doi:10.2307/2530460

See Also

Other exponential hazard change-point model functions: `dee()`, `est_ee()`, `ree()`

Examples

```
pee(x = c(0.5, 1, 2), theta1 = 1, theta2 = 2, tau = 1.25)
```

`pel` *Distribution Function for the Exponential-Lindley Hazard Change-Point Model*

Description

Computes the CDF of the Exponential-Lindley hazard change-point model with parameters `theta1`, `theta2`, and `tau`.

Usage

```
pel(x, theta1, theta2, tau)
```

Arguments

`x`	Numeric vector of survival times (must be >= 0).
`theta1`	Rate parameter of the pre-change-point exponential regime; must be > 0.
`theta2`	Shape parameter of the post-change-point Lindley regime; must be > 0.
`tau`	Change-point parameter; must be > 0.

Value

A numeric vector of probabilities, the same length as `x`.

References

Joshi, S., & Rattihalli, R. N. (2020, October). Estimation of parameters in the Exponential-Lindley hazard change-point model. In *Proceedings of International Conference on Trends in Computational and Cognitive Engineering: TCCE 2019* , 345–356.doi:10.1007/9789811554148_29

See Also

Other Exponential-Lindley hazard change-point model functions: `del()`, `est_el()`, `rel()`

Examples

```
pel(x = c(0.5, 1, 2), theta1 = 0.3, theta2 = 0.5, tau = 1)
```

`plgl` *Distribution Function for the Log-Logistic Hazard Change-Point Model*

Description

Computes the CDF of the log-logistic hazard change-point model with parameters `theta1`, `theta2`, and `tau`.

Usage

```
plgl(x, theta1, theta2, tau)
```

Arguments

`x`	Numeric vector of survival times (must be >= 0).
`theta1`	Scale parameter of the pre-change-point log-logistic regime; must be > 0.
`theta2`	Scale parameter of the post-change-point log-logistic regime; must be > 0.
`tau`	Change-point parameter; must be > 0.

Value

A numeric vector of probabilities, the same length as `xi`.

References

Nadar, S. S., Upadhyay, V., & Joshi, S. (2025). Detecting Clinical Risk Shift Through log–logistic Hazard Change-Point Model. *Mathematics*, 13(9), 1457. doi:10.3390/math13091457

See Also

Other log-logistic hazard change-point functions: `dlgl()`, `est_lgl()`, `rlgl()`

Examples

```
plgl(x = c(0.5, 1, 2), theta1 = 0.3, theta2 = 0.5, tau = 1)
```

plin *Distribution Function for the Lindley Hazard Change-Point Model*

Description

Computes the CDF of the Lindley hazard change-point model with parameters `theta1`, `theta2`, and `tau`.

Usage

```
plin(x, theta1, theta2, tau)
```

Arguments

`x`	Numeric vector of survival times (must be >= 0).
`theta1`	Scale parameter of the pre-change-point Lindley regime; must be > 0.
`theta2`	Scale parameter of the post-change-point Lindley regime; must be > 0.
`tau`	Change-point parameter; must be > 0.

Value

A numeric vector of probabilities, the same length as `x`.

References

Joshi, S., Jose, K. K. and Bhati, D. (2016). Estimation of a Change Point in the Hazard Rate of Lindley Model under Right Censoring. *Communications in Statistics - Simulation and Computation*. 46(5), 3563–3574. doi:10.1080/03610918.2015.1096381

See Also

Other Lindley hazard change-point model functions: `dlin()`, `est_lin()`, `rlin()`

Examples

```
plin(x = c(0.5, 1, 2), theta1 = 1, theta2 = 2, tau = 1.25)
```

pww *Distribution Function for the Weibull Hazard Change-Point Model*

Description

Computes the CDF of the Weibull hazard change-point model with parameters `theta1`, `theta2`, `tau`, and `k`.

Usage

```
pww(x, theta1, theta2, tau, k)
```

Arguments

`x`	Numeric vector of survival times (must be >= 0).
`theta1`	Scale parameter of the pre-change-point Weibull regime; must be > 0.
`theta2`	Scale parameter of the post-change-point Weibull regime; must be > 0.
`tau`	Change-point parameter; must be > 0.
`k`	Shape parameter (constant); must be > 0.

Value

A numeric vector of probabilities, the same length as `x`.

References

M. R. Williams and D. Y. Kim. A test for an abrupt change in Weibull Hazard Functions with Staggered Entry and Type I Censoring. *Communications in Statistics - Theory and Methods*, 42(11): 1922–1933, 2013. doi:10.1080/03610926.2011.600505.

See Also

Other Weibull hazard change-point model functions: `dww()`, `est_ww()`, `rww()`

Examples

```
pww(x = c(0.5, 1, 2), theta1 = 1, theta2 = 3, tau = 0.5, k = 2)
```

`ree` *Random Number Generation for the Exponential Hazard Change-Point Model*

Description

Generates random survival times for the exponential hazard change-point model with parameters `theta1`, `theta2`, and `tau`.

Usage

```
ree(n, theta1, theta2, tau)
```

Arguments

`n`	Sample size.
`theta1`	Rate parameter of the pre-change-point exponential regime; must be > 0.
`theta2`	Rate parameter of the post-change-point exponential regime; must be > 0.
`tau`	Change-point parameter; must be > 0.

Value

A numeric vector of length `n` of random survival times.

References

Gijbels, I., & Gürler, Ü. (2003). Estimation of a change point in a Hazard Function Based on Censored Data. *Lifetime Data Analysis*, 9(4), 395–411. doi:10.1023/B:LIDA.0000012424.71723.9d

Matthews, D. E., & Farewell, V. T. (1982). On Testing for a Constant Hazard against a change point Alternative. *Biometrics*, 38(2), 463-468. doi:10.2307/2530460

See Also

Other exponential hazard change-point model functions: `dee()`, `est_ee()`, `pee()`

Examples

```
ree(n = 100, theta1 = 1, theta2 = 0.5, tau = 1.25)
```

`rel` *Random Number Generation for the Exponential-Lindley Hazard Change-Point Model*

Description

Generates random survival times for the Exponential-Lindley hazard change-point model with parameters `theta1`, `theta2`, and `tau`.

Usage

```
rel(n, theta1, theta2, tau)
```

Arguments

`n`	Sample size.
`theta1`	Rate parameter of the pre-change-point exponential regime; must be > 0.
`theta2`	Shape parameter of the post-change-point Lindley regime; must be > 0.
`tau`	Change-point parameter; must be > 0.

Value

A numeric vector of length `n` of random survival times.

References

Joshi, S., & Rattihalli, R. N. (2020, October). Estimation of parameters in the Exponential-Lindley hazard change-point model. In *Proceedings of International Conference on Trends in Computational and Cognitive Engineering: TCCE 2019* , 345–356.doi:10.1007/9789811554148_29

See Also

Other Exponential-Lindley hazard change-point model functions: `del()`, `est_el()`, `pel()`

Examples

```
rel(n = 100, theta1 = 1.5, theta2 = 0.2, tau = 5)
```

`rlgl` *Random Number Generation for the Log-Logistic Hazard Change-Point Model*

Description

Generates random survival times for the log-logistic hazard change-point model with parameters `theta1`, `theta2`, and `tau`.

Usage

```
rlgl(n, theta1, theta2, tau)
```

Arguments

`n`	Sample size.
`theta1`	Scale parameter of the pre-change-point log-logistic regime; must be > 0.
`theta2`	Scale parameter of the post-change-point log-logistic regime; must be > 0.
`tau`	Change-point parameter; must be > 0.

Value

A numeric vector of length `n` of random survival times

References

Nadar, S. S., Upadhyay, V., & Joshi, S. (2025). Detecting Clinical Risk Shift Through log–logistic Hazard Change-Point Model. *Mathematics*, 13(9), 1457. doi:10.3390/math13091457

See Also

Other log-logistic hazard change-point functions: `dlgl()`, `est_lgl()`, `plgl()`

Examples

```
rlgl(n = 100, theta1 = 1.5, theta2 = 0.2, tau = 5)
```

`rlin` *Random Number Generation for the Lindley Hazard Change-Point Model*

Description

Generates random survival times for the Lindley hazard change-point model with parameters `theta1`, `theta2`, and `tau`.

Usage

```
rlin(n, theta1, theta2, tau)
```

Arguments

`n`	Sample size.
`theta1`	Scale parameter of the pre-change-point Lindley regime; must be > 0.
`theta2`	Scale parameter of the post-change-point Lindley regime; must be > 0.
`tau`	Change-point parameter; must be > 0.

Value

A numeric vector of length `n` of random survival times.

References

Joshi, S., Jose, K. K. and Bhati, D. (2016). Estimation of a Change Point in the Hazard Rate of Lindley Model under Right Censoring. *Communications in Statistics - Simulation and Computation*. 46(5), 3563–3574. doi:10.1080/03610918.2015.1096381

See Also

Other Lindley hazard change-point model functions: `dlin()`, `est_lin()`, `plin()`

Examples

```
rlin(n = 100, theta1 = 1, theta2 = 2, tau = 1.25)
```

rww *Random Number Generation for the Weibull Hazard Change-Point Model*

Description

Generates random survival times for the Weibull hazard change-point model with parameters `theta1`, `theta2`, `tau`, and `k`.

Usage

```
rww(n, theta1, theta2, tau, k)
```

Arguments

`n`	Sample size.
`theta1`	Scale parameter of the pre-change-point Weibull regime; must be > 0.
`theta2`	Scale parameter of the post-change-point Weibull regime; must be > 0.
`tau`	Change-point parameter; must be > 0.
`k`	Shape parameter (constant); must be > 0.

Value

A numeric vector of length `n` of random survival times.

References

M. R. Williams and D. Y. Kim. A test for an abrupt change in Weibull Hazard Functions with Staggered Entry and Type I Censoring. *Communications in Statistics - Theory and Methods*, 42(11): 1922–1933, 2013. doi:10.1080/03610926.2011.600505.

See Also

Other Weibull hazard change-point model functions: `dww()`, `est_ww()`, `pww()`

Examples

```
rww(n = 100, theta1 = 1, theta2 = 3, tau = 0.5, k = 2)
```

Index