

# Package ‘rscssci’

July 23, 2025

**Type** Package

**Title** Visualization of Restricted Cubic Splines

**Version** 0.4.0

**Maintainer** Zhiqiang Nie <niezhiqiang@gdph.org.cn>

**Description** Restricted Cubic Splines were performed to explore the shape of association form of ``U, inverted U, L" shape and test linearity or non-linearity base on ``Cox,Logistic,linear,quasipoisson" regression, and auto output Restricted Cubic Splines figures. rscssci package could automatically draw RCS graphics with Y-axis ``OR,HR,RR,beta". The Restricted Cubic Splines method were based on Suli Huang (2022) <[doi:10.1016/j.ecoenv.2022.113183](https://doi.org/10.1016/j.ecoenv.2022.113183)>, Amit Kaura (2019) <[doi:10.1136/bmj.16055](https://doi.org/10.1136/bmj.16055)>, and Harrell Jr (2015, ISBN:978-3-319-19424-0 (Print) 978-3-319-19425-7 (Online)).

**Depends** R (>= 4.2.0)

**LazyData** true

**Imports** pacman, rms, ggplot2, survminer, segmented, survival, dplyr, patchwork, Cairo

**Encoding** UTF-8

**License** Artistic-2.0

**BugReports** <https://github.com/popnie/RCSsci/issues>

**RoxygenNote** 7.2.1

**NeedsCompilation** no

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**Repository** CRAN

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## Contents

rcssci_cox . . . . .	2
rcssci_linear . . . . .	3
rcssci_logistic . . . . .	4
rcssci_quasipoisson . . . . .	5
rsc_cox.lshap . . . . .	6
rsc_cox.nshap . . . . .	7
rsc_cox.prob . . . . .	8
rsc_cox.ushap . . . . .	9
rsc_linear.lshap . . . . .	10
rsc_linear.nshap . . . . .	11
rsc_linear.prob . . . . .	12
rsc_linear.ushap . . . . .	13
rsc_logistic.lshap . . . . .	14
rsc_logistic.nshap . . . . .	15
rsc_logistic.prob . . . . .	16
rsc_logistic.ushap . . . . .	17
rsc_quasipoisson.lshap . . . . .	18
rsc_quasipoisson.nshap . . . . .	19
rsc_quasipoisson.prob . . . . .	20
rsc_quasipoisson.ushap . . . . .	21
sbpdata . . . . .	22
<b>Index</b>	<b>23</b>

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rcssci_cox	<i>rcssci_cox</i>
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## Description

restricted cubic splines (RCS) published in SCI.

## Arguments

data	data.frame.Rdata
knot	knot=3-7 or automatic calculate by AIC min
y	outcome=0,1
time	sensor time
covs	covariables, univariate analysis without "covs" command, multivariable analysis with "covs" command
prob	position parameter,range from 0-1
x	main exposure and X-axis when plotting
filepath	path of plots output.

**Details**

Cox models with RCS splines were performed to explore the shape linear or nonlinear(U, inverted U,J,S,L,log,-log,temporary plateau shape)

**Value**

message.print PH assumption and other message

**Author(s)**

Zhiqiang Nie, <niezhiqiang@gdph.org.cn>

**Examples**

```
library(rcssci)
rcssci_cox(data=sbpdata, y = "status",x = "sbp",time = "time",
prob=0.1,filepath=tempdir())
# library(rcssci)
# rcssci_cox(knot=4,data=sbpdata, y = "status",x = "sbp",covs=c("age"),
# time = "time", prob=0.1,filepath="D:/temp")
```

---

rcssci\_linear

*rcssci\_linear*


---

**Description**

restricted cubic splines (RCS) published in SCI.

**Arguments**

data	data.frame.Rdata
knot	knot=3-7 or automatic calculate by AIC min
y	outcome=0,1
covs	covariables, univariate analysis without "covs" command, multivariable analysis with "covs" command
prob	position parameter,range from 0-1
x	main exposure and X-axis when plotting
filepath	path of plots output.

**Details**

linear models with RCS splines were performed to explore the shape linear or nonlinear(U, inverted U,J,S,L,log,-log,temporary plateau shape)

**Value**

message.print PH assumption and other message

**Author(s)**

Zhiqiang Nie, <niezhiqiang@gdph.org.cn>

**Examples**

```
library(rcssci)
rcssci_linear(data=sbpdata, y = "sbp", x = "age",
prob=0.1, filepath=tempdir())
# library(rcssci)
# rcssci_linear(knot=4, data=sbpdata, y = "sbp", x = "age",
# covs=c("gender"), prob=0.1, filepath="D:/temp")
```

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rcssci_logistic	<i>rcssci_logistic</i>
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**Description**

restricted cubic splines (RCS) published in SCI.

**Arguments**

data	data.frame.Rdata
knot	knot=3-7 or automatic calculate by AIC min
y	outcome=0,1
covs	covariables, univariate analysis without "covs" command, multivariable analysis with "covs" command
prob	position parameter, range from 0-1
x	main exposure and X-axis when plotting
filepath	path of plots output.

**Details**

logistic models with RCS splines were performed to explore the shape linear or nonlinear(U, inverted U, J, S, L, log, -log, temporary plateau shape)

**Value**

message.print PH assumption and other message

**Author(s)**

Zhiqiang Nie, <niezhiqiang@gdph.org.cn>

**Examples**

```
library(rcssci)
rcssci_logistic(data=sbpdata, y = "status",x = "sbp",
prob=0.1,filepath=tempdir())
# library(rcssci)
# rcssci_logistic(knot=4,data=sbpdata, y = "status",x = "sbp",
# covs=c("age","gender"),prob=0.1,filepath="D:/temp")
```

---

```
rcssci_quasipoisson  rcssci_quasipoisson
```

---

**Description**

restricted cubic splines (RCS) published in SCI.

**Arguments**

data	data.frame.Rdata
knot	knot=3-7 or automatic calculate by AIC min
y	outcome=0,1
covs	covariables, univariate analysis without "covs" command, multivariable analysis with "covs" command
prob	position parameter,range from 0-1
x	main exposure and X-axis when plotting
filepath	path of plots output.

**Details**

quasipoisson models with RCS splines were performed to explore the shape linear or nonlinear(U, inverted U,J,S,L,log,-log,temporary plateau shape)

**Value**

message.print PH assumption and other message

**Author(s)**

Zhiqiang Nie, <niezhiqiang@gdph.org.cn>

**Examples**

```
library(rcssci)
rcssci_quasipoisson(data=sbpdata, y = "status",x = "sbp",
prob=0.1,filepath=tempdir())
# library(rcssci)
# rcssci_quasipoisson(knot=4,data=sbpdata, y = "status",x = "sbp",
# covs=c("age","gender"),prob=0.1,filepath="D:/temp")
```

---

 rcox\_cox.lshap

*rcox\_cox.lshap*


---

### Description

restricted cubic splines (RCS) published in SCI.

### Arguments

data	data.frame.Rdata
knot	knot=3-7 or automatic calculate by AIC min
y	outcome=0,1
time	sensor time
covs	covariables, univariate analysis without "covs" command, multivariable analysis with "covs" command
prob	position parameter,range from 0-1
x	main exposure and X-axis when plotting
filepath	path of plots output.

### Details

Cox models with RCS splines were performed to explore the shape linear or nonlinear(U, inverted U,J,S,L,log,-log,temporary plateau shape)

### Value

message.print PH assumption and other message

### Author(s)

Zhiqiang Nie, <niezhiqiang@gdph.org.cn>

### Examples

```
library(rcssci)
rcox_cox.lshap(data=sbpdata, y = "status",x = "sbp",time = "time",
prob=0.1,filepath=tempdir())
# library(rcssci)
# rcox_cox.lshap(knot=4,data=sbpdata, y = "status",x = "sbp",covs=c("age"),
# time = "time", prob=0.1,filepath="D:/temp")
```

rcox.nshap

*rcox.nshap***Description**

restricted cubic splines (RCS) published in SCI.

**Arguments**

data	data.frame.Rdata
knot	knot=3-7 or automatic calculate by AIC min
y	outcome=0,1
time	sensor time
covs	covariables, univariate analysis without "covs" command, multivariable analysis with "covs" command
prob	position parameter,range from 0-1
x	main exposure and X-axis when plotting
filepath	path of plots output.

**Details**

Cox models with RCS splines were performed to explore the shape linear or nonlinear(U, inverted U,J,S,L,log,-log,temporary plateau shape)

**Value**

message.print PH assumption and other message

**Author(s)**

Zhiqiang Nie, <niezhiqiang@gdph.org.cn>

**Examples**

```
library(rcssci)
rcox.nshap(data=sbpdata, y = "status", x = "sbp", time = "time",
prob=0.1, filepath=tempdir())
# library(rcssci)
# rcox.nshap(knot=4, data=sbpdata, y = "status", x = "sbp", covs=c("age"),
# time = "time", prob=0.1, filepath="D:/temp")
```

---

 rcs\_cox.prob

*rsc\_cox.prob*


---

### Description

restricted cubic splines (RCS) published in SCI.

### Arguments

data	data.frame.Rdata
knot	knot=3-7 or automatic calculate by AIC min
y	outcome=0,1
time	sensor time
covs	covariables, univariate analysis without "covs" command, multivariable analysis with "covs" command
prob	position parameter,range from 0-1
x	main exposure and X-axis when plotting
filepath	path of plots output.

### Details

Cox models with RCS splines were performed to explore the shape linear or nonlinear(U, inverted U,J,S,L,log,-log,temporary plateau shape)

### Value

message.print PH assumption and other message

### Author(s)

Zhiqiang Nie, <niezhiqiang@gdph.org.cn>

### Examples

```
library(rcssci)
rsc_cox.prob(data=sbpdata, y = "status",x = "sbp",time = "time",
prob=0.1,filepath=tempdir())
# library(rcssci)
# rsc_cox.prob(knot=4,data=sbpdata, y = "status",x = "sbp",covs=c("age"),
# time = "time", prob=0.1,filepath="D:/temp")
```



---

`rsc_cox.ushap``rsc_cox.ushap`

---

## Description

restricted cubic splines (RCS) published in SCI.

## Arguments

<code>data</code>	<code>data.frame.Rdata</code>
<code>knot</code>	<code>knot=3-7</code> or automatic calculate by AIC min
<code>y</code>	<code>outcome=0,1</code>
<code>time</code>	sensor time
<code>covs</code>	covariables, univariate analysis without "covs" command, multivariable analysis with "covs" command
<code>prob</code>	position parameter, range from 0-1
<code>x</code>	main exposure and X-axis when plotting
<code>filepath</code>	path of plots output.

## Details

Cox models with RCS splines were performed to explore the shape linear or nonlinear(U, inverted U, J, S, L, log, -log, temporary plateau shape)

## Value

message.print PH assumption and other message

## Author(s)

Zhiqiang Nie, <niezhiqiang@gdph.org.cn>

## Examples

```
library(rcssci)
rsc_cox.ushap(data=sbpdata, y = "status", x = "sbp", time = "time",
prob=0.1, filepath=tempdir())
# library(rcssci)
# rsc_cox.ushap(knot=4, data=sbpdata, y = "status", x = "sbp", covs=c("age"),
# time = "time", prob=0.1, filepath="D:/temp")
```

---

<code>r</code> cs_linear.lshap	<i>r</i> cs_linear.lshap
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**Description**

restricted cubic splines (RCS) published in SCI.

**Arguments**

<code>data</code>	data.frame.Rdata
<code>knot</code>	knot=3-7 or automatic calculate by AIC min
<code>y</code>	outcome=0,1
<code>covs</code>	covariables, univariate analysis without "covs" command, multivariable analysis with "covs" command
<code>prob</code>	position parameter,range from 0-1
<code>x</code>	main exposure and X-axis when plotting
<code>filepath</code>	path of plots output.

**Details**

linear models with RCS splines were performed to explore the shape linear or nonlinear(U, inverted U,J,S,L,log,-log,temporary plateau shape)

**Value**

message.print PH assumption and other message

**Author(s)**

Zhiqiang Nie, <niezhiqiang@gdph.org.cn>

**Examples**

```
library(rcssci)
r
```

cs\_linear.lshap(data=sbpdata, y = "sbp", x = "age",
 prob=0.1, filepath=tempdir())
# library(rcssci)
# rcs\_linear.lshap(knot=4, data=sbpdata, y = "sbp", x = "age",
 # covs=c("gender"), prob=0.1, filepath="D:/temp")

---

rcs_linear.nshap	<i>rcs_linear.nshap</i>
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**Description**

restricted cubic splines (RCS) published in SCI.

**Arguments**

data	data.frame.Rdata
knot	knot=3-7 or automatic calculate by AIC min
y	outcome=0,1
covs	covariables, univariate analysis without "covs" command, multivariable analysis with "covs" command
prob	position parameter,range from 0-1
x	main exposure and X-axis when plotting
filepath	path of plots output.

**Details**

linear models with RCS splines were performed to explore the shape linear or nonlinear(U, inverted U,J,S,L,log,-log,temporary plateau shape)

**Value**

message.print PH assumption and other message

**Author(s)**

Zhiqiang Nie, <niezhiqiang@gdph.org.cn>

**Examples**

```
library(rcssci)
rcs_linear.nshap(data=sbpdata, y = "sbp", x = "age",
prob=0.1,filepath=tempdir())
# library(rcssci
# rcs_linear.nshap(knot=4,data=sbpdata, y = "sbp", x = "age",
# covs=c("gender"),prob=0.1,filepath="D:/temp")
```

---

rcs\_linear.prob      *rcs\_linear.prob*

---

### Description

restricted cubic splines (RCS) published in SCI.

### Arguments

data	data.frame.Rdata
knot	knot=3-7 or automatic calculate by AIC min
y	outcome=0,1
covs	covariables, univariate analysis without "covs" command, multivariable analysis with "covs" command
prob	position parameter,range from 0-1
x	main exposure and X-axis when plotting
filepath	path of plots output.

### Details

linear models with RCS splines were performed to explore the shape linear or nonlinear(U, inverted U,J,S,L,log,-log,temporary plateau shape)

### Value

message.print PH assumption and other message

### Author(s)

Zhiqiang Nie, <niezhiqiang@gdph.org.cn>

### Examples

```
library(rcssci)
rcs_linear.prob(data=sbpdata, y = "sbp", x = "age",
prob=0.1,filepath=tempdir())
# library(rcssci)
# rcs_linear.prob(knot=4,data=sbpdata, y = "sbp", x = "age",
# covs=c("gender"),prob=0.1,filepath="D:/temp")
```

---

rcs_linear.ushap	<i>rcs_linear.ushap</i>
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---

**Description**

restricted cubic splines (RCS) published in SCI.

**Arguments**

data	data.frame.Rdata
knot	knot=3-7 or automatic calculate by AIC min
y	outcome=0,1
covs	covariables, univariate analysis without "covs" command, multivariable analysis with "covs" command
prob	position parameter,range from 0-1
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**Details**

linear models with RCS splines were performed to explore the shape linear or nonlinear(U, inverted U,J,S,L,log,-log,temporary plateau shape)

**Value**

message.print PH assumption and other message

**Author(s)**

Zhiqiang Nie, <niezhiqiang@gdph.org.cn>

**Examples**

```
library(rcssci)
rcs_linear.ushap(data=sbpdata, y = "sbp", x = "age",
prob=0.1,filepath=tempdir())
# library(rcssci)
# rcs_linear.ushap(knot=4,data=sbpdata, y = "sbp", x = "age",
# covs=c("gender"),prob=0.1,filepath="D:/temp")
```

---

rcs\_logistic.lshap     *rcs\_logistic.lshap*

---

### Description

restricted cubic splines (RCS) published in SCI.

### Arguments

data	data.frame.Rdata
knot	knot=3-7 or automatic calculate by AIC min
y	outcome=0,1
covs	covariables, univariate analysis without "covs" command, multivariable analysis with "covs" command
prob	position parameter,range from 0-1
x	main exposure and X-axis when plotting
filepath	path of plots output.

### Details

logistic models with RCS splines were performed to explore the shape linear or nonlinear(U, inverted U,J,S,L,log,-log,temporary plateau shape)

### Value

message.print PH assumption and other message

### Author(s)

Zhiqiang Nie, <niezhiqiang@gdph.org.cn>

### Examples

```
library(rcssci)
rcs_logistic.lshap(data=sbpdata, y = "status",x = "sbp",
prob=0.1,filepath=tempdir())
# library(rcssci)
# rcs_logistic.lshap(knot=4,data=sbpdata, y = "status",x = "sbp",
# covs=c("age","gender"),prob=0.1,filepath="D:/temp")
```

---

rcs\_logistic.nshap      *rcs\_logistic.nshap*

---

## Description

restricted cubic splines (RCS) published in SCI.

## Arguments

data	data.frame.Rdata
knot	knot=3-7 or automatic calculate by AIC min
y	outcome=0,1
covs	covariables, univariate analysis without "covs" command, multivariable analysis with "covs" command
prob	position parameter,range from 0-1
x	main exposure and X-axis when plotting
filepath	path of plots output.

## Details

logistic models with RCS splines were performed to explore the shape linear or nonlinear(U, inverted U,J,S,L,log,-log,temporary plateau shape)

## Value

message.print PH assumption and other message

## Author(s)

Zhiqiang Nie, <niezhiqiang@gdph.org.cn>

## Examples

```
library(rcssci)
rcs_logistic.nshap(data=sbpdata, y = "status",x = "sbp",
prob=0.1,filepath=tempdir())
# library(rcssci)
# rcs_logistic.nshap(knot=4,data=sbpdata, y = "status",x = "sbp",
# covs=c("age","gender"),prob=0.1,filepath="D:/temp")
```

---

rcs\_logistic.prob      *rcs\_logistic.prob*

---

### Description

restricted cubic splines (RCS) published in SCI.

### Arguments

data	data.frame.Rdata
knot	knot=3-7 or automatic calculate by AIC min
y	outcome=0,1
covs	covariables, univariate analysis without "covs" command, multivariable analysis with "covs" command
prob	position parameter,range from 0-1
x	main exposure and X-axis when plotting
filepath	path of plots output.

### Details

logistic models with RCS splines were performed to explore the shape linear or nonlinear(U, inverted U,J,S,L,log,-log,temporary plateau shape)

### Value

message.print PH assumption and other message

### Author(s)

Zhiqiang Nie, <niezhiqiang@gdph.org.cn>

### Examples

```
library(rcssci)
rcs_logistic.prob(data=sbpdata, y = "status", x = "sbp",
prob=0.1,filepath=tempdir())
# library(rcssci)
# rcs_logistic.prob(knot=4,data=sbpdata, y = "status",x = "sbp",
# covs=c("age","gender"),prob=0.1,filepath="D:/temp")
```



---

rsc\_logistic.ushap      *rsc\_logistic.ushap*

---

## Description

restricted cubic splines (RCS) published in SCI.

## Arguments

data	data.frame.Rdata
knot	knot=3-7 or automatic calculate by AIC min
y	outcome=0,1
covs	covariables, univariate analysis without "covs" command, multivariable analysis with "covs" command
prob	position parameter,range from 0-1
x	main exposure and X-axis when plotting
filepath	path of plots output.

## Details

logistic models with RCS splines were performed to explore the shape linear or nonlinear(U, inverted U,J,S,L,log,-log,temporary plateau shape)

## Value

message.print PH assumption and other message

## Author(s)

Zhiqiang Nie, <niezhiqiang@gdph.org.cn>

## Examples

```
library(rcssci)
rsc_logistic.ushap(data=sbpdata, y = "status",x = "sbp",
prob=0.1,filepath=tempdir())
# library(rcssci)
# rsc_logistic.ushap(knot=4,data=sbpdata, y = "status",x = "sbp",
# covs=c("age","gender"),prob=0.1,filepath="D:/temp")
```

---

`rcs_quasipoisson.lshap`*rcs\_quasipoisson.lshap*

---

## Description

restricted cubic splines (RCS) published in SCI.

## Arguments

<code>data</code>	<code>data.frame.Rdata</code>
<code>knot</code>	<code>knot=3-7</code> or automatic calculate by AIC min
<code>y</code>	<code>outcome=0,1</code>
<code>covs</code>	covariables, univariate analysis without "covs" command, multivariable analysis with "covs" command
<code>prob</code>	position parameter,range from 0-1
<code>x</code>	main exposure and X-axis when plotting
<code>filepath</code>	path of plots output.

## Details

quasipoisson models with RCS splines were performed to explore the shape linear or nonlinear(U, inverted U,J,S,L,log,-log,temporary plateau shape)

## Value

`message.print` PH assumption and other message

## Author(s)

Zhiqiang Nie, <niezhiqiang@gdph.org.cn>

## Examples

```
library(rcssci)
rcs_quasipoisson.lshap(data=sbpdata, y = "status",x = "sbp",
prob=0.1,filepath=tempdir())
# library(rcssci)
# rcs_quasipoisson.lshap(knot=4,data=sbpdata, y = "status",x = "sbp",
# covs=c("age","gender"),prob=0.1,filepath="D:/temp")
```

---

`rcs_quasipoisson.nshap`*rcs\_quasipoisson.nshap*

---

**Description**

restricted cubic splines (RCS) published in SCI.

**Arguments**

<code>data</code>	<code>data.frame.Rdata</code>
<code>knot</code>	<code>knot=3-7</code> or automatic calculate by AIC min
<code>y</code>	<code>outcome=0,1</code>
<code>covs</code>	covariables, univariate analysis without "covs" command, multivariable analysis with "covs" command
<code>prob</code>	position parameter,range from 0-1
<code>x</code>	main exposure and X-axis when plotting
<code>filepath</code>	path of plots output.

**Details**

quasipoisson models with RCS splines were performed to explore the shape linear or nonlinear(U, inverted U,J,S,L,log,-log,temporary plateau shape)

**Value**

`message.print` PH assumption and other message

**Author(s)**

Zhiqiang Nie, <niezhiqiang@gdph.org.cn>

**Examples**

```
library(rcssci)
rcs_quasipoisson.nshap(data=sbpdata, y = "status",x = "sbp",
prob=0.1,filepath=tempdir())
# library(rcssci)
# rcs_quasipoisson.nshap(knot=4,data=sbpdata, y = "status",x = "sbp",
# covs=c("age","gender"),prob=0.1,filepath="D:/temp")
```

---

rcs\_quasipoisson.prob *rcs\_quasipoisson.prob*

---

### Description

restricted cubic splines (RCS) published in SCI.

### Arguments

data	data.frame.Rdata
knot	knot=3-7 or automatic calculate by AIC min
y	outcome=0,1
covs	covariables, univariate analysis without "covs" command, multivariable analysis with "covs" command
prob	position parameter,range from 0-1
x	main exposure and X-axis when plotting
filepath	path of plots output.

### Details

quasipoisson models with RCS splines were performed to explore the shape linear or nonlinear(U, inverted U,J,S,L,log,-log,temporary plateau shape)

### Value

message.print PH assumption and other message

### Author(s)

Zhiqiang Nie, <niezhiqiang@gdph.org.cn>

### Examples

```
library(rcssci)
rcs_quasipoisson.prob(data=sbpdata, y = "status", x = "sbp",
prob=0.1,filepath=tempdir())
# library(rcssci)
# rcs_quasipoisson.prob(knot=4,data=sbpdata, y = "status",x = "sbp",
# covs=c("age","gender"),prob=0.1,filepath="D:/temp")
```

---

`rcs_quasipoisson.ushap`*rcs\_quasipoisson.ushap*

---

## Description

restricted cubic splines (RCS) published in SCI.

## Arguments

<code>data</code>	<code>data.frame.Rdata</code>
<code>knot</code>	<code>knot=3-7</code> or automatic calculate by AIC min
<code>y</code>	<code>outcome=0,1</code>
<code>covs</code>	covariables, univariate analysis without "covs" command, multivariable analysis with "covs" command
<code>prob</code>	position parameter,range from 0-1
<code>x</code>	main exposure and X-axis when plotting
<code>filepath</code>	path of plots output.

## Details

quasipoisson models with RCS splines were performed to explore the shape linear or nonlinear(U, inverted U,J,S,L,log,-log,temporary plateau shape)

## Value

`message.print` PH assumption and other message

## Author(s)

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## Examples

```
library(rcssci)
rcs_quasipoisson.ushap(data=sbpdata, y = "status",x = "sbp",
prob=0.1,filepath=tempdir())
# library(rcssci)
# rcs_quasipoisson.ushap(knot=4,data=sbpdata, y = "status",x = "sbp",
# covs=c("age","gender"),prob=0.1,filepath="D:/temp")
```

---

sbpdata	<i>A data on sbp and status.</i>
---------	----------------------------------

---

**Description**

A data on sbp and status.

**Usage**

```
data(sbpdata)
```

**Format**

An object of class `tbl_df` (inherits from `tbl`, `data.frame`) with 3621 rows and 5 columns.

**Examples**

```
data(sbpdata)
```

# Index

## \* datasets

sbpdata, [22](#)

rco\_cox.lshap, [6](#)

rco\_cox.nshap, [7](#)

rco\_cox.prob, [8](#)

rco\_cox.ushap, [9](#)

rco\_linear.lshap, [10](#)

rco\_linear.nshap, [11](#)

rco\_linear.prob, [12](#)

rco\_linear.ushap, [13](#)

rco\_logistic.lshap, [14](#)

rco\_logistic.nshap, [15](#)

rco\_logistic.prob, [16](#)

rco\_logistic.ushap, [17](#)

rco\_quasipoisson.lshap, [18](#)

rco\_quasipoisson.nshap, [19](#)

rco\_quasipoisson.prob, [20](#)

rco\_quasipoisson.ushap, [21](#)

rcssci\_cox, [2](#)

rcssci\_linear, [3](#)

rcssci\_logistic, [4](#)

rcssci\_quasipoisson, [5](#)

sbpdata, [22](#)