

Package ‘SVDmX’

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Title Child/Child-Adult Mortality-Indexed Model Mortality Age Schedules

Version 0.1.0

Description Model age schedules of mortality, nqx , suitable for a life table. This package implements the SVD-Comp mortality model indexed by either child or child/adult mortality. Given input value(s) of either $5q_0$ or $(5q_0, 45q_{15})$, the $qx()$ function generates single-year $1qx$ or 5-year $5qx$ conditional age-specific probabilities of dying. See Clark (2016) <[doi:10.48550/arXiv.1612.01408](https://doi.org/10.48550/arXiv.1612.01408)> and Clark (2019) <[doi:10.1007/s13524-019-00785-3](https://doi.org/10.1007/s13524-019-00785-3)>.

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expit	<i>Calculate expit (inverse logit)</i>
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Description

Calculate expit (inverse logit)

Usage

```
expit(x)
```

Arguments

x	A number on the real line.
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Value

The expit of x.

Examples

```
expit(-5)
```

logit	<i>Calculate logit</i>
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Description

Calculate logit

Usage

```
logit(x)
```

Arguments

x	A number in the range (0,1).
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Value

The logit of x.

Examples

```
logit(0.5)
```

mods2018*SVD-Comp models data set - 'mods2018'*

Description

An R object containing a hierarchy of lists that contain SVD-derived components, estimated model coefficients, and other parameter values necessary to generate new l_{qx} values using the SVD Component mortality model indexed by child/child-adult mortality implemented by the 'qx()' function. The model objects have been 'cleaned' to remove large collections of data that are not necessary to perform predictions - this dramatically reduces their size. This is the 2018 version of the models that replicates the *Demography* paper.

Usage

mods2018

Format

An R list object with members:

Female: comps: 4 raw SVD-derived components

comps.sm: 4 smoothed SVD-derived components

aml: lm() model object for adult mortality model

v1: lm() model object for v1

v2: lm() model object for v2

v3: lm() model object for v3

v4: lm() model object for v4

offset: offset used when calculating SVD

q0: lm() model object for mortality at age 0

rownames: row labels for the predicted values

Male: comps: 4 raw SVD-derived components

comps.sm: 4 smoothed SVD-derived components

aml: lm() model object for adult mortality model

v1: lm() model object for v1

v2: lm() model object for v2

v3: lm() model object for v3

v4: lm() model object for v4

offset: offset used when calculating SVD

q0: lm() model object for mortality at age 0

rownames: row labels for the predicted values

Author(s)

Samuel J. Clark, <work@samclark.net>

Source

See model development in Clark (2016) [doi:10.48550/arXiv.1612.01408](https://doi.org/10.48550/arXiv.1612.01408) and Clark (2019) [doi:10.1007/s13524019007853](https://doi.org/10.1007/s13524019007853)

mods2022

SVD-Comp models data set - 'mods2022'

Description

An R object containing a hierarchy of lists that contain SVD-derived components, estimated model coefficients, and other parameter values necessary to generate new *lqx* values using the SVD Component mortality model indexed by child/child-adult mortality implemented by the `'qx()'` function. The model objects have been 'cleaned' to remove large collections of data that are not necessary to perform predictions - this dramatically reduces their size. This is the 2022 version of the models that includes additional Human Mortality Database life tables available after the *Demography* paper was published.

Usage

mods2022

Format

An R list object with members:

Female: comps: 4 raw SVD-derived components

comps.sm: 4 smoothed SVD-derived components

aml: lm() model object for adult mortality model

v1: lm() model object for v1

v2: lm() model object for v2

v3: lm() model object for v3

v4: lm() model object for v4

offset: offset used when calculating SVD

q0: lm() model object for mortality at age 0

rownames: row labels for the predicted values

Male: comps: 4 raw SVD-derived components

comps.sm: 4 smoothed SVD-derived components

aml: lm() model object for adult mortality model

v1: lm() model object for v1

v2: lm() model object for v2

v3: lm() model object for v3

v4: lm() model object for v4

offset: offset used when calculating SVD

q0: lm() model object for mortality at age 0

rownames: row labels for the predicted values

Author(s)

Samuel J. Clark, <work@samclark.net>

Source

See model development in Clark (2016) [doi:10.48550/arXiv.1612.01408](https://doi.org/10.48550/arXiv.1612.01408) and Clark (2019) [doi:10.1007/s13524019007853](https://doi.org/10.1007/s13524019007853)

 mods2024

SVD-Comp models data set - 'mods2024'

Description

An R object containing a hierarchy of lists that contain SVD-derived components, estimated model coefficients, and other parameter values necessary to generate new l_{qx} values using the SVD Component mortality model indexed by child/child-adult mortality implemented by the 'qx()' function. The model objects have been 'cleaned' to remove large collections of data that are not necessary to perform predictions - this dramatically reduces their size. This is the 2024 version of the models that includes additional Human Mortality Database life tables available after the *Demography* paper was published.

Usage

mods2024

Format

An R list object with members:

Female: comps: 4 raw SVD-derived components

comps.sm: 4 smoothed SVD-derived components

aml: lm() model object for adult mortality model

v1: lm() model object for v1

v2: lm() model object for v2

v3: lm() model object for v3

v4: lm() model object for v4

offset: offset used when calculating SVD

q0: lm() model object for mortality at age 0

rownames: row labels for the predicted values

Male: comps: 4 raw SVD-derived components

comps.sm: 4 smoothed SVD-derived components

aml: lm() model object for adult mortality model

v1: lm() model object for v1

v2: lm() model object for v2

v3: lm() model object for v3

v4: lm() model object for v4
offset: offset used when calculating SVD
q0: lm() model object for mortality at age 0
rownames: row labels for the predicted values

Author(s)

Samuel J. Clark, <work@samclark.net>

Source

See model development in Clark (2016) [doi:10.48550/arXiv.1612.01408](https://doi.org/10.48550/arXiv.1612.01408) and Clark (2019) [doi:10.1007/s13524019007853](https://doi.org/10.1007/s13524019007853)

q1to5	<i>Convert life table probabilities of Dying from 1-year to standard 5-year age groups</i>
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Description

Convert 1-year life table probabilities of dying 1qx to standard five-year age groups: 0, 1-4, 5-9, etc.

Usage

```
q1to5(q1)
```

Arguments

q1	Decimal: the input values for 1qx; either a single vector or a matrix, age x life table.
----	--

Value

Data frame: equivalent values for 5qx.

Author(s)

Samuel J. Clark, <work@samclark.net>

Examples

```
q1 <- qx("female", 0.08, out5=FALSE)
q1to5(q1)
```

qx	<i>Generate 1qx or 5qx age schedule of mortality from child or child/adult mortality</i>
----	--

Description

Generate single-year 1qx or 5-year 5qx age-specific probabilities of dying using the SVD-Comp mortality model indexed by child mortality, 5q0, or child and adult mortality, 5q0 and 45q15.

Usage

```
qx(  
  sex,  
  cm,  
  smooth = TRUE,  
  outlogit = FALSE,  
  out5 = TRUE,  
  am = NULL,  
  modsv = 2024  
)
```

Arguments

sex	Character: 'female' or 'male'.
cm	Decimal: the input value(s) for 5q0; either a single value or a vector of values.
smooth	Boolean: use either smooth or raw SVD-derived components. Default is TRUE.
outlogit	Boolean: output either logit-scale or natural-scale nqx values. Default is FALSE. When TRUE oldest age not returned because logit(1) not defined.
out5	Boolean: output either 5-year or 1-year age groups. Default is TRUE.
am	Optional decimal: input value(s) for 45q15; either single value or vector of values. If a vector, must have the same number of elements as cm.
modsv	Optional integer: specifies version of calibration models to use: 2018, 2022, or 2024. Defaults is 2024.

Value

Data frame: generated 1qx or 5qx values. Oldest age assumed to be 1.0. Columns labeled with input child mortality values.

Author(s)

Samuel J. Clark, <work@samclark.net>

References

Clark (2016) [doi:10.48550/arXiv.1612.01408](https://doi.org/10.48550/arXiv.1612.01408) and Clark (2019) [doi:10.1007/s13524019007853](https://doi.org/10.1007/s13524019007853)

Examples

```
qx("female",0.05)
qx("female",0.05,modsv=2022)
qx("male",0.03,am=0.26)
qx("male",0.03,TRUE,TRUE,TRUE,0.26)
qx("male",c(0.03,0.01))
```

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