

# Package ‘SVDMx’

February 7, 2025

**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)>.

**Encoding** UTF-8

**License** GPL (>= 3)

**LazyData** true

**RoxygenNote** 7.3.2

**NeedsCompilation** no

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## Contents

expit . . . . .	2
logit . . . . .	2
mods2018 . . . . .	3
mods2022 . . . . .	4
mods2024 . . . . .	5
q1to5 . . . . .	6
qx . . . . .	7

<b>Index</b>	<b>9</b>
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expit

*Calculate expit (inverse logit)*

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**Description**

Calculate expit (inverse logit)

**Usage**

```
expit(x)
```

**Arguments**

x                    A number on the real line.

**Value**

The expit of x.

**Examples**

```
expit(-5)
```

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logit

*Calculate logit*

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**Description**

Calculate logit

**Usage**

```
logit(x)
```

**Arguments**

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

**Value**

The logit of x.

**Examples**

```
logit(0.5)
```

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

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**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, &lt;work@samclark.net&gt;

**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)

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 mods2022

*SVD-Comp models data set - 'mods2022'*


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**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 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)

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mods2024

*SVD-Comp models data set - 'mods2024'*

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**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)

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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  $1q_x$  to standard five-year age groups: 0, 1-4, 5-9, etc.

**Usage**

```
q1to5(q1)
```

**Arguments**

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

**Value**

Data frame: equivalent values for  $5q_x$ .

**Author(s)**

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

**Examples**

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

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



# Index

## \* datasets

mods2018, [3](#)

mods2022, [4](#)

mods2024, [5](#)

expit, [2](#)

logit, [2](#)

mods2018, [3](#)

mods2022, [4](#)

mods2024, [5](#)

q1to5, [6](#)

qx, [7](#)