

Package ‘Q2q’

October 12, 2022

Type Package

Title Interpolating Age-Specific Mortality Rates at All Ages

Version 0.1.0

Description Mortality Rates are usually published following an abridged description, i.e., by age groups 0, [1, 5[, [5, 10[, [10, 15[and so on. For some applications, a detailed (single) ages description is required. Despite the huge number of the proposed methods in the literature, there is a limited number of methods ensuring a high performance at lower and higher ages in the same time. For example, the 6-terms 'Lagrange' interpolation function is well adapted to mortality interpolation at lower ages (with unequal intervals) but is not adapted to higher ages. On the other hand, the 'Karup-King' method allows a good performance at higher ages but not adapted to lower ages. Interested readers can refer to the book of Shryock, Siegel and Associates (1993) for a detailed overview of the two cited methods. The package Q2q allows combining both the two methods to allow interpolating mortality rates at all ages. First, it starts by implementing each method separately, then the resulted curves are joined based on a 5-age averaged error between the two curves.

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Encoding UTF-8

LazyData true

RoxygenNote 7.1.1

Depends R(>= 3.0.0)

NeedsCompilation no

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Repository CRAN

Date/Publication 2020-11-23 10:10:03 UTC

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`getqx`*getqx*

Description

It interpolate the age specific mortality rates

Usage

```
getqx(Qx, nag)
```

Arguments

Qx	Five-ages mortality rates which can be a vector created using or a column of a numerical matrix
nag	number of age groups

Value

qx age-specific mortality rates
lx a vector containing the age evolution of survivorship
dx a vector containing the theoretical deaths occurred at age x
qx1l age specific mortality rates interpolated using the Lagrange method
qx1k age specific mortality rates interpolated using the Karup-king method
jonct_age the age where qxk and qx1l have been joined

Author(s)

Farid FLICI

Examples

```
getqx(c(0.12, seq(0.05, 0.8, by=0.05)), 17)
```

getqxt *getqxt: obtain the age specific mortality surface*

Description

getqxt interpolate the age specific mortality rates for a set of life tables

Usage

```
getqxt(Qxt, nag, t)
```

Arguments

Qxt	A surface of Five-ages mortality rates which should be a numerical matrix containing mortality rates without age identification column and time identification row
nag	the number of age groups
t	the number of years

Value

qxt a matrix containing the age-specific mortality rates for age x in rows and for year t in columns
lxt a matrix containing the age evolution of survivorship for the year t
dxt a matrix containing the theoretical deaths occurred at age x and year t
qxlt the age specific mortality rates interpolated using the Lagrange method for each year t
qxkt the age specific mortality rates interpolated using the Karup-king method for each year t
jonct_ages a vector containing, for each year t, the ages where qxkt and qxlt have been joined

Author(s)

Farid FLICI

Examples

```
getqxt(matrix(rep(c(0.12, seq(0.05, 0.5, by=0.05)), 5), byrow=FALSE, ncol=5), 11, 5)
```

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