Help for MnPFDecrementTable

[Nematrian website page: PFDecrementTableHelp, © Nematrian 2015]

We set out below further information on the parameters used by MnPFDecrementTable.

The number of 'status' codes to be included in the decrement table is *NumberStatusEntries*. A status code might be. The aim of the decrement table is to characterise the proportion of scheme members (or to be more precise the proportion of their who have a given status at time t who will have moved to a different The decrement table (using yearly ages) contains *MaxAge* - *MinAge* +1 entries per 'start' status and per 'end' status, i.e. the array returned will have $NumberStatusEntries^2 \times (MaxAge - MinAge + 1)$ entries. If individual who starts year in status i and ends year in status j is $I(i,j)$ then first $p = (MaxAge - MinAge + 1)$ entries in output are decrement rates × decrement fractions applicable to individuals $I(1,1)$ starting with youngest (at age MinAge), next p are for $I(1,2)$, etc.

Table is then derived from 5 input arrays: *DecrementAge* and *DecrementStatusCode* indicate age and *status* at start of year (any age between *MinAge* and *MaxAge*, any status), *DecrementRate* and *DecrementBecomesCode* provide (annual) rate of switch from original status to new status over year and what the new status is (where new ≠ old). *DecrementFraction* is proportion of benefit that is retained if a status switch occurs.

Rates of staying with the same status are derived by combining together decrements that involve movements. This combining can be done arithmetically or geometrically. If for a given starting status i the movement (and fraction) to new status j are $q_{i,j,x}$ (and $f_{i,j,x}$) (for a given age x) and there are $m = NumberStatusEntries$ statuses) then the output is calculated as follows:

Arithmetic:

$$l_{i,x} = 1$$

$$l_{i,x+1} = \max\left(0, 1 - \sum_{j=1, j\neq i}^{m} q_{i,j,x}\right) \qquad DecRateSum = \sum_{j=1, j\neq i}^{m} q_{i,j,x}$$

Geometric:

$$l_{i,x} = 1$$

$$l_{i,x+1} = \max\left(0, \prod_{j=1, j\neq i}^{m} (1 - q_{j,x})\right) \qquad DecRateSum = \sum_{j=1, j\neq i}^{m} q_{j,x}$$

If $DecRateSum \neq 0$ then:

$$PFDecrementTable(i,j,x) = \begin{cases} \dfrac{(1 - l_{i,x+1}) q_{i,j,x} f_{i,j,x}}{DecRateSum} & if\ i <> j \\ l_{i,x+1} & if\ i = j \end{cases}$$

If $DecRateSum = 0$ then:

$$PFDecrementTable(i,j,x) = \begin{cases} 0 & if\ i <> j \\ 1 & if\ i = j \end{cases}$$