11/6/19

M159 (Continued)

Case 1: If given unprimed probabilities (no p's)

then ${}_nq_x^{(\tau)} = \sum_j {}_nq_x^{(j)}$

Then ${}_np_x^{(\tau)} = 1 - {}_nq_x^{(\tau)}$

Case 2: If given primed probabilities

then ${}_np_x^{(\tau)} = \prod_j {}_np_x'^{(j)}$

Then ${}_nq_x^{(\tau)} = 1 - {}_np_x^{(\tau)}$

Relating Primed & Unprimed Probabilities

3 Cases:

Case 1: (CF) There is a constant force of departure each year for each decrement

Case 2: (MUDD) There is a uniform distribution of departures each year in the multiple decrement model

$$\left.\begin{aligned} \therefore\ {}_tq_x^{(j)} &= t \cdot q_x^{(j)} \\ \Rightarrow {}_tq_x^{(\tau)} &= t \cdot q_x^{(\tau)} \end{aligned}\right\}$$

x - integer

$0 \le t \le 1$

Case 3: (SUDD) There is a uniform distribution of departures each year in the associated single decrement model

$$\therefore \quad {}_tq_x'^{(j)} = t \cdot q_x'^{(j)}$$

$$\text{and} \quad {}_tp_x'^{(j)} \cdot \mu_{x+t}^{(j)} = \text{constant} = q_x'^{(j)}$$

Formulas:

CF & MUDD give the same formula:

$$\boxed{{}_tp_x'^{(j)} = \left[{}_tp_x^{(\tau)}\right]^{\left(\frac{q_x^{(j)}}{q_x^{(\tau)}}\right)}}$$

Commit to Memory