Uvod u Aktuarsku Matematiku: osnovne formule

$$q_x = \frac{d_x}{l_x} = \frac{l_x - l_{x+1}}{l_x}, \qquad p_x = 1 - q_x = \frac{l_{x+1}}{l_x}$$

$${}_np_x = \frac{l_{x+n}}{l_x} = \frac{l_{x+1}}{l_x}\frac{l_{x+2}}{l_{x+1}} \cdot \ldots \cdot \frac{l_{x+n}}{l_{x+n-1}} = p_x p_{x+1} \cdot \ldots \cdot p_{x+n-1}$$

$${}_nq_x = 1 - {}_np_x$$

$${}_{m|n}q_x = {}_mp_x - {}_{m+n}p_x = \frac{l_{x+m} - l_{x+m+n}}{l_x}$$

$$\mu_x = -\frac{d}{dx}\ln(l_x) = -\frac{1}{l_x}\frac{d}{dx}l_x$$

$$l_x = \int_x^\omega l_t \mu_t dt, \qquad l_x = l_0 \exp\{-\int_0^x \mu_t dt\}$$

$${}_np_x = \exp\{-\int_x^{x+n} \mu_t dt\} = \exp\{-\int_0^n \mu_{x+t} dt\}, \ \ \forall n$$

$${}_nq_x = \int_0^n {}_tp_x \mu_{x+t} dt, \ \ \forall n$$

$$D_x = v^x l_x, \qquad N_x = \sum_{t=0}^{\omega-1} D_x, \qquad N_x - D_x = N_{x+1}$$

$$a_x = \frac{N_{x+1}}{D_x}, \qquad \ddot{a}_x = \frac{N_x}{D_x}$$

$$a_{x:\overline{n}|} = \frac{N_{x+1} - N_{x+n+1}}{D_x}, \qquad \ddot{a}_{x:\overline{n}|} = \frac{N_x - N_{x+n}}{D_x}$$

$${}_m|a_x = \frac{N_{x+m+1}}{D_x}, \qquad {}_m|\ddot{a}_x = \frac{N_{x+m}}{D_x}$$

$${}_{m|n}|a_x = \frac{N_{x+m+1} - N_{x+m+n+1}}{D_x}, \qquad {}_{m|n}|\ddot{a}_x = \frac{N_{x+m} - N_{x+m+n}}{D_x}$$

$$S_{x:\overline{n}|} = \frac{D_x}{D_{x+n}} a_{x:\overline{n}|}, \qquad \ddot{S}_{x:\overline{n}|} = \frac{D_x}{D_{x+n}} \ddot{a}_{x:\overline{n}|}$$

$$(Ia)_x = \frac{S_{x+1}}{D_x}, \qquad (I\ddot{a})_x = \frac{S_x}{D_x}$$

$$a_x^{(m)} \approx a_x + \frac{m-1}{2m}, \qquad \ddot{a}_x^{(m)} \approx \ddot{a}_x - \frac{m-1}{2m}$$

$$a_{x:\overline{n}|}^{(m)} \approx a_{x:\overline{n}|} + \frac{m-1}{2m}(1 - \frac{D_{x+n}}{D_x}), \qquad \ddot{a}_{x:\overline{n}|}^{(m)} \approx \ddot{a}_{x:\overline{n}|} - \frac{m-1}{2m}(1 - \frac{D_{x+n}}{D_x})$$

$${}_n|a_x^{(m)} \approx {}_n|a_x + \frac{m-1}{2m}\frac{D_{x+n}}{D_x}, \qquad {}_n|\ddot{a}_x^{(m)} \approx {}_n|\ddot{a}_x - \frac{m-1}{2m}\frac{D_{x+n}}{D_x}$$

$${}_n|a_x^{(m)} \approx \frac{N_{x+n+1}}{D_x} + \frac{m-1}{2m} \cdot \frac{D_{x+n}}{D_x}, \qquad \ddot{a}_x^{(m)} \approx \frac{N_{x+n}}{D_x} - \frac{m-1}{2m} \cdot \frac{D_{x+n}}{D_x}$$

$$A_{x:\overline{n}|}^{\;\;1} = \frac{D_{x+n}}{D_x}, \qquad A_{x:\overline{n}|}^{1} = \frac{M_x - M_{x+n}}{D_x}, \qquad A_{x:\overline{n}|} = A_{x:\overline{n}|}^{1} + A_{x:\overline{n}|}^{\;\;1} = \frac{M_x - M_{x+n} + D_{x+n}}{D_x}$$