Manual for SOA Exam MLC.

Chapter 2. Survival models.

Section 2.6. Selected survival models.

Extract from:
"Arcones' Manual for SOA Exam MLC. Fall 2009 Edition",
available at http://www.actexmadriver.com/

Selected survival models

A **select table** is a mortality table for a group of people subject to a special circumstance (disability, retirement, etc). The variable in common of this group of people is called the **concomitant variable**. The probability of surviving from time x, to time $x+t$ for an entity selected at time x is ${}_tp_{[x]}$. Here, the age at selection is denoted by $[x]$. The select survival function is denoted by $S(x;t) = {}_tp_{[x]}$. The force of mortality is $\mu_{[x]+t} = -\frac{d}{dt}\log S(x;t)$. The expected future life is

$$\mathring{e}_{[x]} = \int_0^\infty S(x;t)\,dt.$$

Example 1

Given that $S(x;t) = 1 - \frac{t}{90-x}$, *for* $0 \leq t \leq 90 - x$, *find* $\mathring{e}_{[x]}$ *and* $\mu_{[x]+t}$.

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Solution: We have that

$$\mathring{e}_{[x]} = \int_0^\infty S(x;t)\,dt = \int_0^{90-x} \left(1 - \frac{t}{90-x}\right)\,dt = \frac{90-x}{2}$$

and

$$\mu_{[x]+t} = -\frac{d}{dt}\log S(x;t) = \frac{1}{90-x-t}.$$

