

Solutions to Extra Exercise 1

First we calculate the expected present value of the benefits.

(i) Deferred Annuity

$$\begin{aligned} 30000 {}_{29.5}p_{35.5} e^{-0.04 \times 29.5} \bar{a}_{65} &= 30000 \times 0.7778 \times 0.3073 \times 10.5705 \\ &= 75796.174 \end{aligned}$$

(ii) Term insurance

$$\begin{aligned} 100000 \bar{A}_{35.5:\overline{29.5}|}^1 &= 100000 \int_0^{29.5} e^{-0.04t} {}_tp_{35.5} \mu_{35.5+t} dt \\ &= 10653 \end{aligned}$$

$$EPV(benefits) = 75796 + 10653 = 86449.$$

1. Discrete case

$$\begin{aligned} \pi \ddot{a}_{35.5:\overline{30}|} &= \pi \sum_{t=0}^{29} {}_tp_{35.5} e^{-0.04t} \\ &= 16.866\pi \end{aligned}$$

$$\begin{aligned} \pi &= \frac{86449}{16.866} \\ &= 5126 \end{aligned}$$

2. Continuous case

$$\begin{aligned} \pi \bar{a}_{35.5:\overline{29.5}|} &= \pi \int_0^{29.5} e^{-0.04t} {}_tp_{35.5} dt \\ &= 16.3614\pi \end{aligned}$$

$$\begin{aligned} \pi &= \frac{86449}{16.3614} \\ &= 5284 \end{aligned}$$