

Assignment II

1. Assuming 6% interest rate for the whole period;

t	1	2	3	4	5	6	7	8	9	10
Deposit	12,000	12,000	12,000	12,000	12,000	12,000	12,000	12,000	12,000	12,000

Net present value of the life insurance fund at the end of year 10 would be equals to

$$PV = \Sigma(\$12,000 \times 1.06^{10-t})$$

$$= \$158,169.539$$

To calculate annual payment, we use the PMT formula where FV (Future Value) = 0

$$PMT = \frac{\$158,169.539 \times 0.06}{1 - (1 + 0.06)^{-10}}$$

$$PMT = \$21,490.17$$

2. 65 years old → \$20,000 per year annuity until the end of life with $E(\text{remaining life}) = 15 \text{ yrs}$
assume 6% interest rate

- a. How much should the insurance company charge the old man?

We need to calculate the NPV of the \$20,000 payment for 15 years at 6% discount rate

$$PV = \sum_{t=1}^{15} \left[\frac{\$20,000}{(1 + 0.06)^t} \right]$$

$$PV = \$194,244.98$$

- b. Second old man with $E(\text{remaining life}) = 20 \text{ yrs}$.

$$PV = \sum_{t=1}^{20} \left[\frac{\$20,000}{(1 + 0.06)^t} \right]$$

$$PV = \$229,398.42$$

- c. If distribution payments are made at the beginning of the year, then there will be one year less to discount, meaning the difference is just $= \frac{\$20,000}{1.06} = \$18,867.93$

3. Projected loss ratio is 77.5%, loss adjustment expense ratio is 12.9%. Commission payments and dividends to policy holders will be 16%, what may be the minimum yield on investments to achieve a positive operating ratio.

$$\text{Operating Ratio} = \text{Combined ratio after dividend} - \text{Investment yield}$$

$$\text{Operating ratio} = 77.5\% + 12.9\% + 16\% - \text{Investment yield} < 100\%$$

Thus, Investment yield should exceed 6.4% in order for operating ratio to be positive

4. Income from premium = \$3.6 million
Losses = \$1.96 million
Loss adjustment expenses = 6.6%
Dividend paid = 1.2%
Total investment income = \$170,000

Net Profitability in dollars = ???

Profit = $3,600,000 - 1,960,000 - (0.066 * 3,600,000) - (0.012 * 3,600,000) + \$170,000$

Net profitability = \$1,529,200