STAT 472
Quiz 7
Fall 2018

November 28, 2018

1. A life insurance company sells a whole life policy to (80). The death benefit is 100,000 payable at the end of the year of death. Annual premiums are payable for the life of the policy.

   You are given the following reserve basis for full preliminary term reserves:

   i. $i = 0.05$

   ii. Mortality follows the Standard Ultimate Life Table.

   a. (3 points) Calculate the first year premium under full preliminary term reserves.

   Solution:

$$ {}_1P^{FPT} = S \cdot v \cdot q_x = \frac{(100,000)(0.032658)}{1.05} = 3110.29 $$

   b. (5 points) Calculate the premium for all years after the first under full preliminary term reserves.

   Solution:

$$ P_{x+1}^{FPT} = \frac{100,000 A_{x+1}}{\ddot{a}_{x+1}} = \frac{100,000 A_{81}}{\ddot{a}_{81}} = \frac{(100,000)(0.60984)}{8.1934} = 7443.06 $$

c. (10 points) Calculate the full preliminary term reserves in the table below:

t	${}_tV^{FPT}$
0	Zero by Definition
0.7	${}_{0.7}V = ({}_0V + {}_1P^{FPT})(1-0.7) + ({}_1V)(0.7) = (0+3110.29)(0.3) + (0)(0.7) = 933.09$
1	Zero by Definition
2	${}_2V = 100,000\left(1-\frac{\ddot{a}_{82}}{\ddot{a}_{81}}\right) = 100,000\left(1-\frac{7.8401}{8.1934}\right) = 4312.01$
2.2	${}_{2.2}V = ({}_2V + P_{x+1}^{FPT})(1-0.2) + ({}_3V)(0.2)$ $= (4312.01+7443.06)(0.8) + (8593.50)(0.2) = 11,122.76$
3	${}_3V = 100,000\left(1-\frac{\ddot{a}_{83}}{\ddot{a}_{81}}\right) = 100,000\left(1-\frac{7.4893}{8.1934}\right) = 8593.50$

d. (2 points) Explain why a company would use full preliminary term reserves instead of net premium reserves.

Full Preliminary Term reserves are intended to approximate gross premium reserves. Gross premium reserves are more reflective of the true economic situation that net premium reserves but are more difficult to calculate. FPT reserves maintain the simplicity of the net premium reserves while generating reserves that are closer to economic reality than those of net premium reserves.