STAT 479
Quiz 5
Fall, 2022

November 17, 2022

1. You are given the following Paid Claims triangle:

Cumulative Loss Payments by Development Year			
Accident Year	Development Year		
	0	1	2
2020	200,000	420,000	470,000
2021	300,000	600,000	
2022	500,000		

There is no further development after year 2.

a. Calculate the loss reserve on December 31, 2022 using the chain ladder method with volume weighted average loss development factors.

Solutions:

$$f_{1/0} = \frac{420,000 + 600,000}{200,000 + 300,000} = 2.04$$

$$f_{2/1} = \frac{470,000}{420,000} = 1.119$$

$$AY2020 = (470,000)(1-1) = 0$$

$$AY2021 = (600,000)(1.119) - 600,000 = 71,428.57$$

$$AY2020 = (500,000)(1.119)(2.04) - 500,000 = 641,428.57$$

$$\text{Loss Reserve} = 0 + 71,428.57 + 641,428.57 = 712,851.14$$

The earned premium for 2020 was 600,000. The earned premium for 2021 was 900,000. The earned premium for 2022 was 1,400,000.

The expected loss ratio for each year is 80%.

b. Calculate the loss reserve on December 31, 2022 using the Bornhuetter- Ferguson Method. Remember that you must calculate the loss reserve for each accident year and then add them together to get the total loss reserve.

Solutions:

$$f_{1/0} = \frac{420,000 + 600,000}{200,000 + 300,000} = 2.04$$

$$f_{2/1} = \frac{470,000}{420,000} = 1.119$$

$$AY2020 = EP = (600,000)(0.8) = 480,000$$
$$\text{LR} = (480,000)\left(1 - \frac{1}{f_{ULT}}\right) = (480,000)\left(1 - \frac{1}{1}\right) = 0$$

$$AY2020 = EP = (900,000)(0.8) = 720,000$$
$$\text{LR} = (720,000)\left(1 - \frac{1}{f_{ULT}}\right) = (720,000)\left(1 - \frac{1}{1.119}\right) = 76,595.74$$

$$AY2020 = EP = (1,400,000)(0.8) = 1,120,000$$
$$\text{LR} = (1,120,000)\left(1 - \frac{1}{f_{ULT}}\right) = (1,120,000)\left(1 - \frac{1}{(1.119)(2.04)}\right) = 629,386.73$$

$$\text{Loss Reserve} = 0 + 76,595.74 + 629,386.73 = 705,982.47$$