10. (2.25 points)

An actuary is analyzing an experience rating plan using three years of experience that has the following information:

Policy effective date	January 1, 2019
Policy term	One Year
Annual loss trend	2%
Cap for individual claims	100,000
Credibility factor	0.60
Expected ultimate loss before modification	500,000

Reported Losses on Individual Claims by Policy Year as of June 30, 2018			
2015	2016	2017	2018
3,450	2,389	456	5,694
5,000	345	126,890	99,832
234	1,236,806	2,345	76,532
98,000		1,874	
324,789		690	
		26,986	

The actuary has determined limited loss development factors (LDFs) and limited expected values using aggregate data from similar policies as follows:

Maturity to Ultimate	Limited LDFs
18 months	1.50
30 months	1.23
42 months	1.20

Limit	Limited Expected Value
100,000	17,500
500,000	28,567
1,000,000	43,393
Unlimited	85,504

a. (1.25 points)

Calculate the expected reported losses for this plan for the three years of experience combined.

b. (1 point)

Calculate the experience modification factor for this policy.

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QUESTION 10

TOTAL POINT VALUE: 2.25 | **LEARNING OBJECTIVE(S): B3**

SAMPLE ANSWERS

Part a: 1.25 points

Sample 1

Not using 2018 period.
Assuming these are policy year LDFs.
Using Fisher method and calculating expected limited losses at current development and trend level.
Assuming expected ultimate loss at projected trend level is constant over time.

Expected limited loss

$$= 500K \times [1.5^{-1} \times 1.02^{-2} + 1.23^{-1} \times 1.02^{-3} + 1.2^{-1} \times 1.02^{-4}] \times \frac{17{,}500}{85{,}504}$$
$$= 222.758K$$

Sample 2

$$k = \frac{E(x) - E[x; 100{,}000]}{E(x)}$$

$$= \frac{85{,}504 - 17{,}500}{85{,}504}$$

$$= 0.7953$$

$$\% \text{ Limited} = 1 - 0.7953 = 0.2047$$

Year	Exp. Ult loss	% Lim.	Loss trend	LDF	Exp. Lim. loss
(1)	(2)	(3)	(4)	(5)	$(6) = \frac{(2) \times (3)}{(4) \times (5)}$
2017	500,000	0.2047	1.02^2	1.5	65,583.7498
2016	500,000	0.2047	1.02^3	1.23	78,411.9439
2015	500,000	0.2047	1.02^4	1.2	78,796.3161
					222,792.0098

$\therefore$ Expected reported losses $\approx 222{,}792$

Part b: 1 point

Sample 1

Hist capped loss $= 441{,}769$

$$\text{Mod} = 1 + 0.6 \times \left(\frac{441{,}769}{222{,}758} - 1\right) = 1.590$$

Sample 2

Year	Actual lim. loss
(1)	(2)
2015	$3{,}450 + 5{,}000 + 234 + 98{,}000 + 100{,}000 = 206{,}684$
2016	$2{,}389 + 345 + 100{,}000 = 102{,}734$
2017	$456 + 100{,}000 + 2{,}345 + 1{,}874 + 690 + 26{,}986 = 132{,}351$
	$441{,}769$

$$\text{Mod Factor} = 1 + z\,\frac{A - E}{E}$$
$$= 1 + 0.6 \times \left(\frac{441{,}769 - 222{,}792}{222{,}792}\right)$$
$$= 1.59$$

EXAMINER'S REPORT

Candidates were expected to understand the actuarial principles and concepts underlying the development of experience rating plans. They were expected to demonstrate this knowledge by calculating the experience modification factor of a policy. This question was very similar to step 3 of the Exam 8 syllabus case study.

Part a

Candidates were expected to determine the appropriate trend period, to select the appropriate LEV from the table, and to apply the correct limited LDF in order to calculate the expected reported losses.

Common mistakes included:

- Using the wrong trend period
- Multiplying the LDFs as if they were age to age factors instead of factors to ultimate
- Using a trend of 4% instead of 2%
- Developing the historical losses to ultimate

Part b

Candidates were expected to apply the individual claim cap to reported losses, select the appropriate policy years, and calculate the experience modification factor using the credibility factor.

Common mistakes included:

- Using Policy Year 2018
- Using actual losses as expected losses, and vice versa