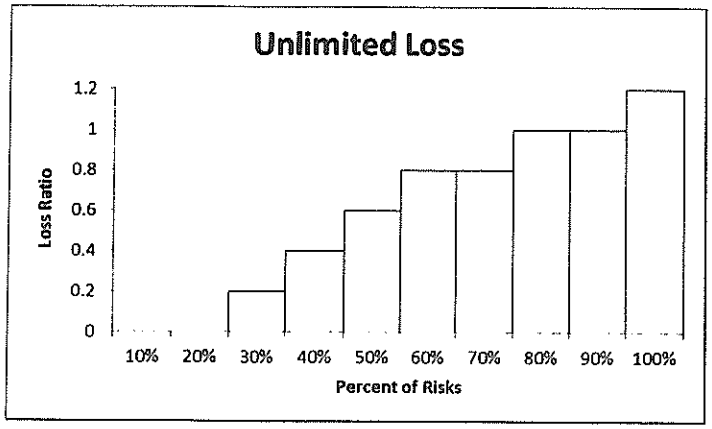
13. (2.5 points)

A risk is written using a retrospective rating plan with the following characteristics:

Standard Premium	$10,000,000
Expected Loss Ratio	60%
Loss Ratio at Maximum Premium	80%
Loss Ratio at Minimum Premium	20%
Loss Conversion Factor	1.085
Provision for Losses and Total Expenses Exclusive of Taxes	0.97

The following Lee Diagram depicts actual experience from a sample of similarly-sized risks and similar to the risk in question:



a. (1.25 points)

Determine the converted insurance charge for this plan.

b. (1.25 points)

The insured's actual ultimate losses are $8,700,000 and the final retrospective premium is $12,500,000. Determine the tax multiplier that was used in the rating of this plan.

CONTINUED ON NEXT PAGE

QUESTION: 13	
TOTAL POINT VALUE: 2.5	**LEARNING OBJECTIVE(S): B5**

SAMPLE ANSWERS

Part a: 1.25 points

Sample 1

In the chart: $E = 0.2 * 0.1 + 0.4 * 0.1 + 0.6 * 0.1 + 0.8 * 0.2 + 1 * 0.2 + 1.2 * 0.1 = 0.6$

From the chart, we can observe

$$\emptyset_{r_G} = \frac{[0.2 * (1 - 0.8) + 0.1 * (1.2 - 0.8)]}{0.6} = 0.1333$$

$$\varphi_{r_H} = \frac{0.2 * 0.2}{0.6} = 0.0667$$

$$Converted\ charge = cI = 1.085 * \left(\emptyset_{r_G} - \varphi_{r_H}\right) * E$$

$$= 1.085 * (0.1333 - 0.0667) * (0.6 * 10{,}000{,}000) = \$434{,}000$$

Sample 2

$$E\emptyset_{r_G} = [0.2 * (1 - 0.8) + 0.1 * (1.2 - 0.8)] = 0.08$$

$$E\varphi_{r_H} = 0.2 * 0.2 = 0.04$$

$$Converted\ charge = cI = 1.085 * \left(E\emptyset_{r_G} - E\varphi_{r_H}\right)$$

$= 1.085 * (0.08 - 0.04) = 0.0434$ as a % of Standard Premium

$434,000 in dollars

Part b: 1.25 points

Sample 1

$$Basic\ premium = b = e - (c - 1) * E + cI$$

$$b = (0.97 - 0.6) * 10{,}000{,}000 - (1.085 - 1) * 6{,}000{,}000 + 434{,}000 = 3{,}624{,}000$$

$$Retrospective\ premium = R = (b + c * L) * T$$

$L = \frac{8{,}700{,}000}{10{,}000{,}000} = 0.87 > 0.80$, so use 80% loss ratio at the maximum premium, i.e. 8,000,000

$$R = 12{,}500{,}000 = (3{,}624{,}000 + 1.085 * 8{,}000{,}000) * T$$

Solve for T

T = 1.0159

Sample 2

$$\emptyset_{r_H} - \emptyset_{r_G} = \frac{\left(e + E(A)\right)T - H}{E(A)T}$$

$$r_G - r_H = \frac{G - H}{E(A)T}$$

$$\emptyset_{r_H} - \emptyset_{r_G} = 0.733 - 0.133 = 0.6 = \frac{.97T - H}{1.085 * 0.6 * T}$$

$$r_G - r_H = 1.0 = \frac{1.25 - H}{1.085 * 0.6 * T}$$

$$0.5794T = 1.25 - 0.6510T$$

$$1.25 = 1.2304T$$

$$T = 1.0159$$

EXAM 8 FALL 2016 SAMPLE ANSWERS AND EXAMINER'S REPORT

EXAMINER'S REPORT

Candidates were expected to understand the concepts underlying the construction of a retrospective rating plan.

Part a

Candidates were expected to calculate the insurance charge and insurance savings, and then convert that into a Net Converted Insurance Charge.

Common mistakes include:

- Not dividing the insurance charge and savings by the expected losses, E
- Failing to calculate and include the insurance savings. If a candidate did not calculate the Net insurance charge in Part A, but properly included the insurance savings as part of the derivation of Part B, full credit was given.

Part b

Candidates were expected to use the answer from Part a, along with the basic premium equation and retrospective premium equation to determine the tax multiplier.

Common mistakes include:

- Not recognizing that the Provision for Losses and Total Expenses Exclusive of Taxes (0.97) represents e+E
- Using the actual ultimate losses of 8,700,000 instead of the losses at the maximum premium of 8,000,000