12. (2.5 points)

Given the following loss ratios for a set of five identical risks:

Risk	Loss Ratio
1	40%
2	40%
3	80%
4	100%
5	140%

Assume that the sample loss ratio of 80% equals the expected loss ratio.

Construct a Table M showing the insurance charges for entry ratios from 0 to 2.0 in increments of 0.50.

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Question 12:

Model Solution 1
("The Upward Sum Method"):

E = (.4 + .4 + .8 + 1.0 + 1.4) / 5 = 80%

L/R
0%
40%
80%
120%
160%
200%

Using the double sum method, need more entry ratios to create rectangle areas
r = entry ratios = L / E

L/R	**r**	**# risks at r**	**# risks above r**	**double sum**	**Ø(r)**
0%	0	0	5	20	1.0
20%	.25	0	5	15	0.75
40%	.50	2	3	10	0.50
60%	.75	0	3	7	0.35
80%	1.0	1	2	4	0.20
100%	1.25	1	1	2	0.10
120%	1.50	0	1	1	0.05
140%	1.75	1	0	0	0
160%	2.0	0	0	0	0

Entry Ratio	**Ø(r) = insurance charge**
0	1.0
.5	0.5
1.0	0.2
1.5	0.05
2.0	0

Model Solution 2
("The % Method")

Risk	entry ratio (r_i) = Loss Ratio / ELR
1	0.5
2	0.5
3	1.0
4	1.25
5	1.75

Entry R	# Risks	# Risk >	% Risk >	$Ø(r_i)$
0	0	5	100%	1.0
0.5	2	3	60%	0.5
1.0	1	2	40%	0.2
1.25	1	1	20%	0.1
1.5	0	1	20%	0.05
1.75	1	0	0	0
2.0	0	0	0	0

$Ø(r_i) = Ø(r_{i+1}) + (r_{i+1} - r_i)$ x % Risks >
So

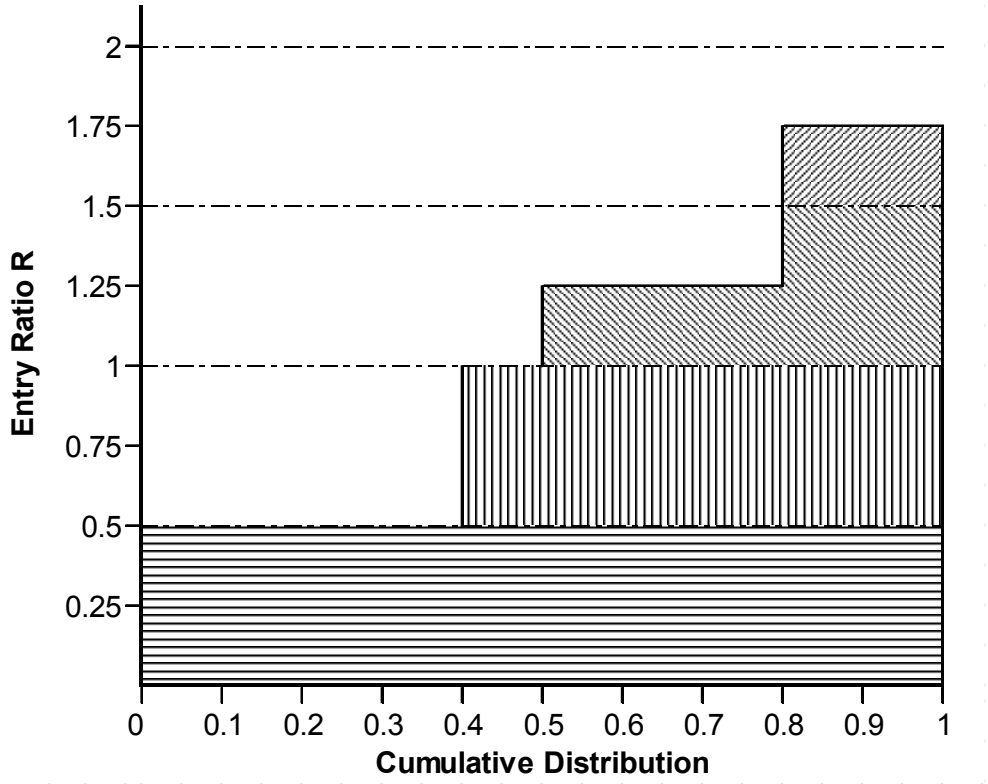
Entry r_i	$Ø(r_i)$
0	1.0
.5	0.5
1.0	0.2
1.5	0.05
2.0	0

Model Solution 3
("The Direct Method")

Entry Ratio	Portion Above Entry Ratio	Charge
0.0	(0.5 + 1 + 1.25 + 1.75 + .5) / 5 = 1	1.0
0.5	(0.5 + .75 + 1.25) / 5 = 0.5	0.5
1.0	(.25 + .75) / 5 = 0.2	0.2
1.5	(.25) / 5 = 0.05	0.05
2.0	0 / 5 = 0	0.0

Model Solution 4
("The Graphical Method")

Entry Ratio	# of Risks at	# of Risks Above	Percent Above	Charge
0.0	0	5	1.0	0.5 + 0.5 = 1
0.5	2	3	0.6	0.2 + (1-0.5)(1-0.4) = .5
1.0	1	2	0.4	.05 + (1.5-1.25)(1-.8) + (1.25-1)(1-.6) = 0.2
1.5	0	1	0.2	(1-.8)(1.75-1.5) = 0.05
2.0	0	0	0.0	0



Examiner's Comments:

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Most candidates were successful in calculating the correct insurance charges using one of the four model solutions. Candidates were not required to show the rows for entry ratios of 1.25 and 1.75, but no credit was deducted if those rows were in the final answer. The stated assumption "Assume that the sample loss ratio of 80% equals the expected loss ratio" should cue a well-prepared candidate that there is no need to normalize per the Brosius paper. Several candidates also included the calculation of the savings, which was not requested. This did not affect scores, but would have been an inefficient use of time.

By far the most common errors involved the table intervals. Using the upward sum method, intervals need to be evenly-spaced and have rows for each observed value to work correctly. For the % method, the intervals needn't be evenly-spaced, but table entries are required for observed values in order to calculate the required values. Some candidates did not include rows for entry ratios of 1.25 and 1.75, which produced erroneous final answers. Other, less common, errors include: improper conversion of loss ratios to entry ratios and arithmetic errors.

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