Reading: Fisher.TableM

Fisher_Horiz (Problem 1)

Model: Source Text

Problem Type: Calculate an empirical Table M using horizontal slices.

Given Experience for a group of risks with expected annual aggregate loss of $100,000

Risk	Actual annual aggregate loss
1	20,000
2	50,000
3	60,000
4	70,000
5	80,000
6	80,000
7	90,000
8	100,000
9	150,000
10	300,000

Find Construct a Table M using the horizontal slicing method.

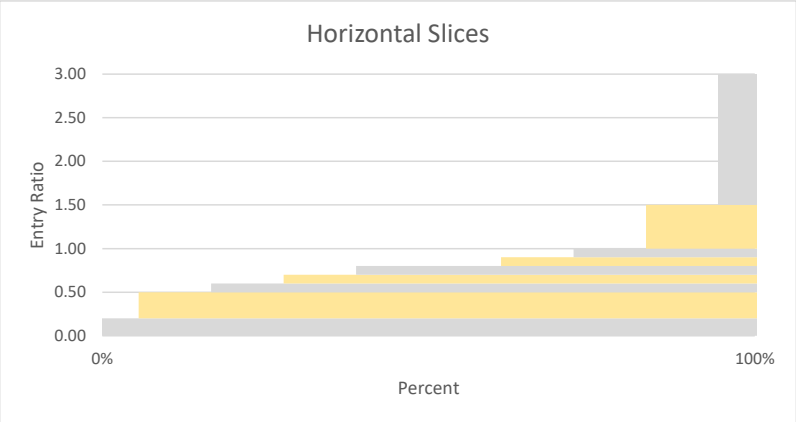
Solution

1.) Notice the risks in the group are already ordered by increasing actual loss. If your risks aren't ordered, do that first.

2.) Compute the entry ratio, r = [actual loss] / [expected loss], for each risk. Note they all have the same expected loss of $100,000.

Risk	Actual Loss	Entry Ratio, r
1	20000	0.2
2	50000	0.5
3	60000	0.6
4	70000	0.7
5	80000	0.8
6	80000	0.8
7	90000	0.9
8	100000	1.0
9	150000	1.5
10	300000	3.0

3.) [Optional] Draw a Lee diagram.



4.) For each distinct entry ratio, plus the 0 entry ratio, fill out the table below as follows:

a.) # Risks: This is the number of risks with entry ratio r

b.) # Risks over r: This is the number of risks with entry ratios strictly greater than r

c.) % Risks over r: This is b.) / [Total # of risks]

d.) Difference in r: This is the r value from the next row minus the r value from the current row. It is zero for the last row.

e.) Insurance charge: Start at the last row and work upwards. The last row always has zero insurance charge.
For row k, multiply the kth row difference in r by the kth row % risks over r then add this to the insurance charge for row k+1.

f.) Compute the insurance savings using the formula: $\psi(r) = \phi(r) + r - 1$

Entry Ratio, r	# Risks	# Risks over r	% Risks over r	Difference in r	ϕ(r)	φ(r)
0	0	10	100%	0.2	1.00	0.00
0.2	1	9	90%	0.3	0.80	0.00
0.5	1	8	80%	0.1	0.53	0.03
0.6	1	7	70%	0.1	0.45	0.05
0.7	1	6	60%	0.1	0.38	0.08
0.8	2	4	40%	0.1	0.32	0.12
0.9	1	3	30%	0.1	0.28	0.18
1.0	1	2	20%	0.5	0.25	0.25
1.5	1	1	10%	1.5	0.15	0.65
3.0	1	0	0%	0	0	2.00

Notice the horizontal method really only lends itself to calculating at entry ratios corresponding to known losses.
To calculate an "in-between" entry ratio insurance charge, form a trapezoid and add that area instead.
Fisher points out in practice there are usually sufficient losses to construct a Table M with intervals of 0.01 between rows and that linear interpolation is usually accurate enough.