

MS Module 24: Actuarial risk classification – homework assignment

(The attached PDF file has better formatting.)

Homework assignment

The mean values and the number of observations in each cell of a 2×2 classification table are

Means	Column 1	Column 2	Observations	Column 1	Column 2
Row 1	20	12	Row 1	5	4
Row 2	8	3	Row 2	2	3

Illustration: The cell in row 1 column 1 has a mean of 20 from a sample of 5 observations.

An actuary is setting class relativities for insurance pricing using a multiplicative model and a least squares bias function with

- a base rate of 4
- a starting relativity for column 1 of 2.0
- a starting relativity for column 2 of 1.0

We use the following notation:

M_{jk} = mean value for the cell with row j and column k

N_{jk} = number of observations for the cell with row j and column k

B = base rate

r_1 = relativity for Row 1

r_2 = relativity for Row 2

c_1 = relativity for Column 1

c_2 = relativity for Column 2

- What are the squared errors in each cell?
- What is the mean squared error?
- What is the partial derivative equation for the Row 1 relativity?
- What is the implied relativity for Row 1, given the starting relativities by column?
- What is the partial derivative equation for the Row 2 relativity?
- What is the implied relativity for Row 2, given the starting relativities by column?
- What is the partial derivative equation for the Column 1 relativity?
- What is the implied relativity for Column 1, given the computed relativities by row?
- What is the partial derivative equation for the Column 2 relativity?
- What is the implied relativity for Column 2, given the computed relativities by row?

(The homework assignment has a format similar to that of the practice problem for this module, though the figures in each cell differ.)