**Reading:** Werner 09: Risk Classification
**Model:** Univariabe Methods for Rating Variable Differentials
**Problem Type:** Pure Premium Method - With Credibility & Off-Balance

**Find** Calculate the indicated rate change for each class that results in a revenue-neutral overall change.

**Given**

| level of variable | EE | reported L + ALAE | current relativity |
|---|---|---|---|
| 1 | 171 | 107,730 | 1.460 |
| 2 | 418 | 171,380 | 1.000 |
| 3 | 210 | 128,100 | 0.700 |

* EE = Earned Exposures

Full credibility: 9,370 exposures
*Use the square-root rule for credibility.*
*Complement of credibility is no change.*

Step 1 complete the following table and note the key columns:

(Col 5) = indicated relativity

(Col 8) = current relativity (**normalized** so that the exposure-weighted average equals 1.000)

(Col 9) = weighted average of (Col 5) and (Col 8) using (Col 6) as the weight for (Col 5)

| (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) |
|---|---|---|---|---|---|---|---|---|
| level of variable | EE | reported L + ALAE | pure premium | indicated relativity | credibility (weights) | current relativity | **normalized** current relativity | cred-wtd indicated relativity |
| A | 171 | 107,730 | 630 | 1.236 | 0.135 | 1.46 | 1.432 | 1.405 |
| B | 418 | 171,380 | 410 | 0.804 | 0.211 | 1.00 | 0.981 | 0.944 |
| C | 210 | 128,100 | 610 | 1.197 | 0.150 | 0.70 | 0.687 | 0.763 |
| Total | 799 | 407,210 | 509.650 | 1.000 | -- | **1.020** | 1.000 | **0.995** |

(4) = (3) / (2)

(5) = (4) / (Tot4)

(6) = sqrt[ (2) / 9370 ] *(maximum value is 1.0)*

(7) given information

**(Tot7) = exposure-weighted average of (7)**

(8) = (7) / (Tot7)

(9) = [ (6) x (5) + (1.0 - (6)) x (8) ] **(Tot 9)** = exposure-weighted average of (9)

Step 2 calculate the % change in relativity <u>from</u> current <u>to</u> credibility-weighted indicated, but note:

**==>** you must first normalize the cred-wtd indicated relativity as shown in (Col 10)

**==>** you must then "**off-balance**" the change in (Col 11) so that the **total change is 0.0%** in (Col 12)

| (1) | (10) | (11) | (12) |
|---|---|---|---|
| level of variable | **normalized** cred-wtd ind. rel. | change | **change with off-bal.** |
| A | 1.413 | -3.2% | -1.3% |
| B | 0.948 | -5.2% | -3.3% |
| C | 0.767 | 9.5% | 11.7% |
| Total | 1.000 | -1.9% | 0.0% |

*(final answers in green)*

(12) = (10)/(8)-1 **<==** alternate formula for (12)

| **change with off-bal.** |
|---|
| -1.3% |
| -3.3% |
| 11.7% |
| 0.0% |

* *This way of calculating column (12) seems simpler than the method given in the examiner's report.*

(10) = (9) / (Tot9)

(11) = (10) / (7) - 1.0

**(12) = (1.0 + (11)) / (1.0 + (Tot11)) - 1.0**

**Reading:** Werner 09: Risk Classification

W-09 (022) - (Problem 2)

**Model:** Univariabe Methods for Rating Variable Differentials

**Problem Type:** Pure Premium Method - With Credibility & Off-Balance

**Find** Calculate the indicated rate change for each class that results in a revenue-neutral overall change.

**Given**

| level of variable | EE | reported L + ALAE | current relativity |
|---|---|---|---|
| 1 | 108 | 50,760 | 1.000 |
| 2 | 443 | 345,540 | 1.280 |
| 3 | 226 | 81,360 | 0.500 |

* EE = Earned Exposures

Full credibility: 10,580 exposures

*Use the square-root rule for credibility.*

*Complement of credibility is no change.*

Step 1 complete the following table and note the key columns:

(Col 5) = indicated relativity

(Col 8) = current relativity (**normalized** so that the exposure-weighted average equals 1.000)

(Col 9) = weighted average of (Col 5) and (Col 8) using (Col 6) as the weight for (Col 5)

| (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) |
|---|---|---|---|---|---|---|---|---|
| level of variable | EE | reported L + ALAE | pure premium | indicated relativity | credibility (weights) | current relativity | **normalized** current relativity | cred-wtd indicated relativity |
| A | 108 | 50,760 | 470 | 0.765 | 0.101 | 1.00 | 0.986 | 0.964 |
| B | 443 | 345,540 | 780 | 1.269 | 0.205 | 1.28 | 1.262 | 1.263 |
| C | 226 | 81,360 | 360 | 0.586 | 0.146 | 0.50 | 0.493 | 0.507 |
| Total | 777 | 477,660 | 614.749 | 1.000 | -- | **1.014** | 1.000 | **1.002** |

(4) = (3) / (2)

(5) = (4) / (Tot4)

(6) = sqrt[ (2) / 10580 ] *(maximum value is 1.0)*

(7) given information

**(Tot7) = exposure-weighted average of (7)**

(8) = (7) / (Tot7)

(9) = [ (6) x (5) + (1.0 - (6)) x (8) ] **(Tot 9)** = exposure-weighted average of (9)

Step 2 calculate the % change in relativity <u>from</u> current <u>to</u> credibility-weighted indicated, but note:

**==>** you must first normalize the cred-wtd indicated relativity as shown in (Col 10)

**==>** you must then "**off-balance**" the change in (Col 11) so that the **total change is 0.0%** in (Col 12)

| (1) | (10) | (11) | (12) |
|---|---|---|---|
| level of variable | **normalized** cred-wtd ind. rel. | change | **change with off-bal.** |
| A | 0.962 | -3.8% | -2.4% |
| B | 1.261 | -1.5% | -0.1% |
| C | 0.506 | 1.1% | 2.6% |
| Total | 1.000 | -1.4% | 0.0% |

(12) = (10)/(8)-1 **<==** alternate formula for (12)

| **change with off-bal.** |
|---|
| -2.4% |
| -0.1% |
| 2.6% |
| 0.0% |

* *This way of calculating column (12) seems simpler than the method given in the examiner's report.*

*(final answers in green)*

(10) = (9) / (Tot9)

(11) = (10) / (7) - 1.0

**(12) = (1.0 + (11)) / (1.0 + (Tot11)) - 1.0**