

**Reading:** Odomirok.19-RBC  
**Model:** 2014.Fall #18  
**Problem Type:** Calculate RBC charge  $R_5$

(RBC (Model - 2014.Fall Q18)) a-Question

**Given**

|   | Line of Business |               |       |
|---|------------------|---------------|-------|
|   | Comm<br>Auto     |               |       |
|   | Liab             | G/L           | WC    |
| <b>industry average</b> L+LAE ratio (10 yrs)  |                  |               | 0.982 |
| <b>company average</b> L+LAE ratio (10 yrs)   |                  |               | 1.043 |
| <b>industry</b> L+LAE ratio                   |                  |               | 1.018 |
| adjustment for investment income              |                  |               | 0.817 |
| <b>company</b> NWP (current yr)               | 15,000           | 6,900         | 8,200 |
| <b>company</b> U/W expense ratio (current yr) |                  |               | 0.335 |
| portion of reserves on retro-rated plan       |                  |               |       |
| % <b>direct</b> loss-sensitive                |                  |               | 11.4% |
| % <b>assumed</b> loss-sensitive               |                  |               | 3.5%  |
| <b>NWP RBC charge after discounts</b>         | <b>570,000</b>   | <b>84,380</b> |       |

Excessive Premium Growth Charge: 20,462

**Find**

Calculate the total  $R_5$  RBC charge for all 3 lines combined

Total R<sub>5</sub> RBC for all lines = 577,647 <== final answer

(RBC (Model - 2014.Fall Q18)) b-Answer

Apply equations 4, 5, 6 in succession to arrive at the final answer.

#### Equation 4: Base RBC

$$R_5 \text{ Base RBC} = (\text{current yr NWP}) \times [(C \times A) + U - 1]$$

where

|   |   |                                  |   |       |                         |
|---|---|----------------------------------|---|-------|-------------------------|
| C | = | Company RBC L+LAE ratio          | = | 1.050 | <== see weighting below |
| A | = | Adjustment for investment income | = | 0.817 | <== given               |
| U | = | U/W expense ratio                | = | 0.335 | <== given               |

C is a 50/50 weighting between:

industry L+LAE ratio = 1.018 <== given (weight = 50%)

industry L+LAE ratio adjusted for company experience

|   |                      |                  |  |
|---|----------------------|------------------|--|
| = | industry L+LAE ratio | x                | (company average L+LAE) / (industry average L+LAE ratio) |
| = | 1.018                | x                | 1.043 / 0.982  |
| = | 1.081                | <== weight = 50% |  |

Putting this all together gives:

|                         |   |       |   |         |   |       |   |       |   |    |
|-------------------------|---|-------|---|---------|---|-------|---|-------|---|----|
| R <sub>5</sub> Base RBC | = | 8,200 | x | (1.0495 | x | 0.817 | + | 0.335 | - | 1) |
| R <sub>5</sub> Base RBC | = | 1,578 |   |         |   |       |   |       |   |    |

#### Equation 5: Subtract Loss-Sensitive Discount (LSD)

$$R_5 \text{ RBC after discount} = \text{Base RBC} - \text{LSD}$$

where

|     |   |          |   |                            |
|-----|---|----------|---|----------------------------|
| LSD | = | Base RBC | x | (D% + A%)                  |
|     | = | 1,578    | x | 3.95%                      |
|     | = | 62.3     |   |                            |
| D%  | = | 30%      | x | (% direct loss sensitive)  |
|     | = | 30%      | x | 11.4%                      |
|     | = | 3.42%    |   |                            |
| A%  | = | 15%      | x | (% assumed loss sensitive) |
|     | = | 15%      | x | 3.5%                       |
|     | = | 0.53%    |   |                            |

Putting this together gives:

|                                   |   |          |   |      |
|-----------------------------------|---|----------|---|------|
| R <sub>5</sub> RBC after discount | = | Base RBC | - | LSD  |
| R <sub>5</sub> RBC after discount | = | 1,578    | - | 62.3 |
| R <sub>5</sub> RBC after discount | = | 1,516    |   |      |

#### Equation 6: Final RBC after apply Premium Concentration Factor (PCF)

Calculate PCF and apply it to all lines of business

|     |   |       |   |     |   |                   |   |             |
|-----|---|-------|---|-----|---|-------------------|---|-------------|
| PCF | = | 0.7   | + | 0.3 | x | (max NWP by line) | / | (total NWP) |
|     | = | 0.7   | + | 0.3 | x | 15,000            | / | 30,100      |
|     | = | 0.850 |   |     |   |                   |   |             |

Putting this together gives the final answer:

|                                      |   |                         |                  |       |   |               |
|--------------------------------------|---|-------------------------|------------------|-------|---|---------------|
| Total R <sub>5</sub> RBC (all lines) | = | total RBC for all lines | x                | PCF   | + | growth charge |
| Total R <sub>5</sub> RBC (all lines) | = | (570000 + 84380 + 1516) | x                | 0.850 | + | 20,462        |
| Total R <sub>5</sub> RBC (all lines) | = | 577,647                 | <== final answer |       |   |               |