

4.2 Summary

 20m

Previous sections explained calculating actuarial indications and potential alternatives. When a rate level is inadequate, companies can use non-pricing solutions (e.g., reducing expenses) or implement a rate change. This section focused on rate changes, detailing two methods for deriving the base rate: the extension of exposures and an approximation of average rate differentials.

For new products, actuaries often rely on raw data or related product rates (from the company, competitors, or rating bureaus), making necessary adjustments.

The section also highlighted the actuary's role in communicating rate changes to stakeholders and monitoring actual changes against expectations.

Handling an Imbalanced Fundamental Insurance Equation

Non-pricing solutions:

- Reduce expenses (UW expenses, LAE, or both)
- Reduce the expected loss (e.g., coverage modifications, loss control programs, etc.)

Pricing solutions:

- Change the target UW profit %
- Implement a rate change

STEPS FOR IMPLEMENTING A RATE CHANGE

1. Select an overall average premium.
2. Construct a rating algorithm.
3. Select relativities for each rating variable.
4. Calculate any applicable additive components.

5. Derive the base rate required to reach the selected overall average premium.

Expense Fees and Other Additives

- **Variable premium** – accounts for differences in risk characteristics, and is the product of the base rate and any relativities.
- **Additive premium** – a flat premium amount for each policyholder regardless of risk characteristics.
- **Expense fee** – the fixed expense per exposure adjusted for variable expenses and the target UW profit.

$$\text{Expense Fee per Exposure} = \frac{\text{Fixed Expense per Exposure}}{1 - V - Q_t}$$

Other additive components to premium would be treated in the same way an expense fee would.

$$\text{Additive Premium per Exposure} = \frac{\text{Additive Amount per Exposure}}{1 - V - Q_t}$$

Deriving Base Rates: No Change to Relativities

If there are no changes to relativities and premium is entirely variable:

$$\begin{aligned} \text{Proposed Base Rate} &= \frac{\text{Proposed Variable Premium}}{\text{Current Variable Premium}} \times \text{Current Base Rate} \\ &= \left(1 + \frac{\% \text{ Change in}}{\text{Variable Premium}} \right) \times \text{Current Base Rate} \end{aligned}$$

Deriving Base Rates: Changing Relativities

If the rate review results in one or more rating variables changing relativities, there are three viable methods for deriving the proposed base rate.

APPROXIMATED AVERAGE RATE DIFFERENTIAL

$$\text{Proposed Base Rate} = \frac{\text{Proposed Avg Premium} - \text{Proposed Additive Fee}}{\text{Proposed Avg Rating Factor}}$$

Approximate the average rating factor as the product of the weighted average rating factors for each individual rating variable.

Options for weighting:

1. Current variable premium at base (most accurate)
2. Adjusted exposures (equivalent to weighting by variable premium at base)
3. Unadjusted exposures (least accurate)

When calculating the **exact** average rating factor, weight by unadjusted exposures.

APPROXIMATED CHANGE IN AVERAGE RATE DIFFERENTIAL

$$\frac{\text{Proposed Base Rate}}{\text{Current Base Rate}} = \frac{\frac{\text{Proposed Avg Premium} - \text{Proposed Additive Fee}}{\text{Current Avg Premium} - \text{Current Additive Fee}} \times \text{Current Base Rate}}{\text{Current Base Rate}} \times \text{OBF}$$

Only requires you to assess rating variables that are changing relativities. Approximate the overall off-balance factor as the product of the off-balance factors for each individual rating variable.

Options for calculating an off-balance factor:

1. Weight rating factors by current variable premium at base or adjusted exposures

$$\text{OBF} = \frac{\text{Avg Current Rating Factor}}{\text{Avg Proposed Rating Factor}}$$

2. Weight relativity change factors by current variable premium (not at base)

$$\text{OBF} = \frac{1}{\text{Avg Relativity Change Factor}}$$

EXTENSION OF EXPOSURES

Re-rate all unique combinations of rating variables using the proposed rating factors and a seed base rate.

$$\text{Proposed Base Rate} = \text{Seed Base Rate} \times \frac{\frac{\text{Proposed Avg Premium} - \text{Proposed Additive Fee}}{\text{Proposed Avg Premium with Seed Base Rate} - \text{Proposed Additive Fee}}}$$

Capping Rates

Capping a Non-Base Class

- **Capping** – limiting the impact to premium a rate revision can have on a single class.
- **Shortfall** – the difference between the unlimited proposed premium and the proposed premium limited at the cap.

METHOD 1: FORMULAS

1. Reduce the capped class's relativity in order to comply with the cap.

$$\text{Initial Capped Relativity} = \frac{\text{Current Relativity} \times (1 + \text{Cap})}{\text{OBF} \times (1 + \text{Target Rate Change})}$$

2. Calculate the shortfall adjustment factor.

$$\text{Shortfall Adjustment Factor} = 1 + \frac{\text{Premium Shortfall}}{\text{Total Prop Prem from Uncapped Classes}}$$

3. Calculate the final base rate.

$$\text{Final Base Rate} = \text{Proposed Base Rate} \times \text{Shortfall Adjustment Factor}$$

4. Re-adjust the relativity for the capped class.

$$\text{Final Capped Relativity} = \frac{\text{Initial Capped Relativity}}{\text{Shortfall Adjustment Factor}}$$

5. Compute the final premium amounts for the uncapped classes (if needed).

$$\text{Final Premium} = \text{Proposed Premium} \times \text{Shortfall Adjustment Factor}$$

METHOD 2: MANUALLY REALLOCATE THE SHORTFALL

1. Compute the premium shortfall as a result of capping.
2. Reallocate the premium shortfall to other classes in proportion to their proposed premiums.
3. Compute the adjusted relativities for each class.

$$\text{Adjusted Relativity} = \text{Proposed Relativity} \times \frac{\text{Final Premium}}{\text{Proposed Premium}}$$

4. Rebase to derive the final relativities and base rate.

Capping the Base Class

Capping the base class inherently lowers the base rate, reducing the premium for all classes. This changes Method 1 slightly but does not change Method 2.

METHOD 1: FORMULAS

1. Compute the capped base adjustment factor.

$$\text{Capped Base Adjustment Factor} = \frac{1 + \text{Cap}}{1 + \text{Proposed}}$$

2. Calculate the final base rate.

$$\text{Final Base Rate} = \text{Proposed Base Rate} \times \text{Capped Base Adjustment Factor}$$

3. Calculate the shortfall adjustment factor

$$\text{Shortfall Adjustment Factor} = 1 + \frac{\text{Premium Shortfall}}{\text{Total Prop Prem from Uncapped Classes}}$$

4. Calculate the final relativities for the non-capped classes.

$$\text{Final Relativity} = \text{Proposed Relativity} \times \frac{\text{Shortfall Adjustment Factor}}{\text{Capped Base Adjustment Factor}}$$

5. Compute the final premium amounts for the uncapped classes (if needed).

$$\text{Final Premium} = \text{Proposed Premium} \times \text{Shortfall Adjustment Factor}$$

METHOD 2: MANUALLY REALLOCATE THE SHORTFALL

Same as capping a non-base class.

Minimum Premiums

Similar to an expense fee, a minimum premium ensures that each individual risk pays enough premium to cover expected expenses and losses.

$$\text{Effect of Minimum Premium} = \frac{\text{Total Premium with Minimum}}{\text{Total Premium without Minimum}} - 1$$

When adding a minimum premium to a policy, the base rate should be multiplied by the following factor to offset the increase in the average premium.

$$\text{Minimum Premium Offset Factor} = \frac{1}{1 + \text{Effect}}$$

Premium Transition Rules

The insurer would select a maximum and minimum allowable change to premium that a policyholder could observe over a single renewal. If a rate review indicates that a policyholder should receive an increase/decrease larger than the selected minimum/maximum allowable change, the portion exceeding the minimum/maximum allowable change is deferred until the next renewal.

When implementing such a rule, the company needs to carefully consider the minimum/maximum premium change amounts, the period of time needed to fully transition to the new rate, and the effect on the total average premium.

Ratemaking Using External Rates

Challenges when using external rates:

- The company must gain access to a competitor's rating manual or a rating bureau filing which is usually not public information.
- The company's expenses and expected loss costs may differ.

Potential adjustments:

- The company can adjust its fixed expense fee to reflect anticipated differences in fixed expenses.
- The company can adjust for anticipated differences in the variable PLR by multiplying the base rate and expense fee by a factor of:

$$\frac{\text{External Variable Permissible Loss Ratio}}{\text{Company Variable Permissible Loss Ratio}}$$

- If the company anticipates that its expected loss cost to be different, it may increase/decrease the base rate to account for the percent difference.
- The company can make judgemental adjustments to rating factors/base rates to account for anticipated differences in loss costs

Communication and Monitoring

It is important for an actuary to communicate the expected effect of the rate change to relevant stakeholders, such as management or key regulators. The actual effects of the rate change should be monitored so that the expected effects of a rate change can be compared to its actual effects.