→ **Handling an imbalanced fundamental insurance equation**

→ As we learned in the previous sections, the fundamental insurance equation is

$$\text{Premium} = \text{Losses} + \text{LAE} + \text{UW Expenses} + \text{Profit}$$

→ The majority of this manual up to this point has focused on understanding individual components w/in the equation & using them to create actuarially sound rate indications.

→ Let's assume we've gone through the process of performing a rate indication, & the results show that the current premium book on adequate. In other words, the average premium is not equal to the expected costs plus the target UW profit, & the fundamental insurance equation is out of balance. What are our options?

→ **Non-pricing solutions**

→ If a company needs to balance the equation w/o changing premiums, one potential solution is to reduce expenses (either UW expenses or LAE). To give a few specific examples, they could try to reduce the amount spent litigating claims, decrease the marketing budget, or tighten the underlying guidelines. If they are able to reduce expenses, the overall rate level indication should be updated to reflect the new, lower expenses.

→ Another solution would be to <u>reduce the expected loss</u>. There are many ways this could be done. The company could add a deductible or some form of coverage modifications to policies. They could also implement a loss control program w/ the goal of reducing the expected frequency or severity. For example, a company that provides workers compensation insurance could mandate that its employees complete a safety training course in order to retain coverage.

→ **Pricing solutions**

→ The most common ways to balance the fundamental insurance equation are to implement a rate change or to simply accept a lower UW profit percentage. Although accepting a lower UW profit can work in the short term, a company needs to consistently meet its UW profit percentage to operate sufficiently in the long term. Thus, implementing a rate change is the most common solution for an unbalanced equation. The steps for implementing a rate change are:

→ 1) Select an overall average premium
→ 2) Construct a rating algorithm
→ 3) Select relativities for each rating variable, expense fees & other additive components
→ 4) Calculate any applicable
→ 5) Derive the base rate required to reach the selected overall average premium

→ We've already discussed Step 1 when we learned about rate indications in Section 2, & steps 2 & 3 were covered in Section 3. The remaining two steps are what we'll discuss for the remainder of this section.

→ **Expense fees & other additives**

→ In general, the total premium a policyholder pays can be broken into two components: variable & additive. The <u>variable premium</u> accounts for differences in risk characteristics, & is the product of the base rate & any relativities. The <u>additive premium</u>, sometimes called the fixed premium, is a flat amount for each policyholder regardless of risk characteristics. A generalized rating algorithm is presented below.

$$\boxed{\text{Total premium} = \underbrace{\text{Base premium} \times \text{relativity}}_{\text{variable premium}} + \text{Additive Premium}}$$

→ One of the most common ways additive premiums can be incorporated into a rating algorithm is through an <u>expense fee</u>. This fee is usually calculated as a fixed expense per exposure adjusted for variable expenses & the target UW profit. We can see this clearly by splitting the numerator of the pure premium formula for a rate indication into two separate pieces. Break the following equation:

$$\bar{P}_I = \frac{\bar{L} + \bar{E}_L + \bar{E}_F}{1 - v - Q_T}$$

$$= \underbrace{\frac{\bar{L} + \bar{E}_L}{1 - v - Q_T}}_{\text{variable premium}} + \underbrace{\frac{\bar{E}_F}{1 - v - Q_T}}_{\text{(Expense fee)}}$$

→ So,

$$\boxed{\text{Expense Fee per Exposure} = \frac{\text{Fixed Expense per Exposure}}{\text{Variable PLR}}}$$

→ Expense fees could also be expressed on a per policy basis instead of per exposure basis. To convert a per policy expense fee to a per exposure expense fee, simply divide by the average.

→ **Example** →

For a book of business containing 100 policies,

Fixed Expense Ratio	Total Projected Earned Premium	Exposure Count	Variable Expense Ratio	Target Profit %
12%	$87,500	175	20%	5%

Calculate the fixed expense fee per exposure, as well as the fixed expense fee per policy.

→ Start by calculating the fixed expense per exposure

$$\text{Fixed expense per exposure} = \frac{\text{Fixed Expense}}{\text{Exposure Count}}$$
$$= \frac{0.12 \times \$87,500}{175}$$
$$= \$60$$

→ Thus, the fixed expense fee on an exposure basis is

$$\text{Expense fee per exposure} = \frac{\$60}{1 - 0.20 - 0.05}$$
$$= \$80$$

→ To get the expense fee on a per policy basis, multiply by the average # of exposures per policy

$$\text{Expense fee per policy} = \text{Expense fee per exposure} \times \frac{\text{Exposure Count}}{\text{Policy Count}}$$
$$= \$80 \times \frac{175}{100}$$
$$= \$140$$

→ **Other additives**

→ Aside from expense fees, there are occasionally other additive components to premium. For instance, homeowner's policies may have additional coverage (tail coverage) that is priced separately & added to the variable premium in the base policy. Calculate other additive components by treating them in the same way we would treat an expense fee, i.e.

$$\boxed{\text{Additive Premium per exposure} = \frac{\text{Additive Amount per exposure}}{1 - v - Q_T}}$$