

## Expected Loss Ratio Method

 10M

The first loss reserving method we'll discuss is the *expected loss ratio method*. Under this method, we estimate the ultimate losses by multiplying the earned premium by the expected loss ratio.

Note that the *loss ratio* is the ratio of losses to premiums. In other words, it is the percentage of the premium received that the insurer pays out in losses. To determine the expected loss ratio for current policies, actuaries will analyze historical loss ratios.

Then, for block of business  $i$ , the estimated ultimate losses are

$$\hat{L}_i^{\text{ult.}} = P_i^E \times ELR_i \quad (\text{S5.1.1.1})$$

where  $P_i^E$  is the earned premium and  $ELR_i$  is the expected loss ratio.

### Coach's Remarks

A block of business usually refers to a group of similar policies for a particular **line of business** and a certain **policy period**. Throughout this section, we will mostly be working with data from the same line of business that is aggregated by accident year (AY), which means the only difference between the blocks of business is the policy period. Therefore, the subscript  $i$  in (S5.1.1.1) will represent **accident year**.

Specifics on accident year will be discussed in greater detail in the section on the chain-ladder method.

Then, to calculate the reserve,  $R_i$ , subtract the losses paid-to-date,  $L_i^P$ , from the estimated ultimate losses,  $\hat{L}_i^{\text{ult.}}$ .

$$R_i = \hat{L}_i^{\text{ult.}} - L_i^P \quad (\text{S5.1.1.2})$$

Finally, the total reserve is the sum of the reserves for all blocks of business.

$$\sum_{\text{all } i} R_i$$

Simple enough. Let's try a couple examples.

### Example S5.1.1.1

You are given the following information for a certain block of business:

Earned Premium	1,000
Expected Loss Ratio	0.72
Losses Incurred-to-Date	550
Losses Paid-to-Date	480

Using the expected loss ratio method, estimate the loss reserve for this block of business.

### Solution

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Apply (S5.1.1.1) and (S5.1.1.2).

$$\begin{aligned} R &= \hat{L}^{\text{ult.}} - L^P \\ &= (P^E \times ELR) - L^P \\ &= 1,000(0.72) - 480 \\ &= \mathbf{240} \end{aligned}$$



### Example S5.1.1.2

You're given the following information for a particular line of business:

Year	Earned Premium	Expected Loss Ratio	Losses Paid-to-Date
AY1	1,150	0.74	810
AY2	1,250	0.71	710
AY3	1,200	0.72	620
AY4	1,500	0.69	410

Using the expected loss ratio method, estimate the loss reserve at the end of AY4.

## Solution

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Because the data is from the same line of business and is aggregated by accident year, each row in the table represents one block of business.