2.7.9 → Adjusting historical Losses

→ Overview → Just as historical premium data is adjusted for the direct effects of rate changes, historical loss data ought to be adjusted to reflect the direct effects of benefit changes. The process of on-leveling losses is similar to the parallelogram method used for on-leveling premiums.

→ When adjusting loss data, it is important to consider both the timing & the specifics of the benefit change. For example, a benefit change may affect all claims that occur on or after a specified date, or it may apply only to claims from policies written on or after that date. The necessary adjustment will depend on the particular situation.

→ Another factor to consider when applying benefit changes is that losses are often influenced by seasonality. However, the parallelogram method assumes a uniform distribution over time. To account for seasonality, it is advisable to measure loss adjustments at a more granular level than years (e.g. quarters).

→ Like the on-level factor used for adjusting premiums, the loss adjustment factor for benefit changes is calculated as:

$$\boxed{\text{Adjustment Factor} = \frac{\text{Current loss level}}{\text{Avg loss level of Historical period}}}$$

→ Consider the following examples to see how to adjust losses for benefit changes.

→ Examples →

A company implemented the following benefit increases for annual policies:

- A 4% benefit increase that impacts all losses on policies written after 8/15/2018.
- A 2% benefit increase that impacts all new losses after 9/1/2019.

Calculate the direct benefit change loss adjustment factor for accident quarter 3 of 2019.

→ First, illustrate the benefit changes in a graph. Since the 4% benefit increase impacts all losses on policies written after 8/15/2018, draw a diagonal line for this change. The 2% benefit increase impacts all new losses after 9/1/2019, so draw a vertical line for the 2% change.
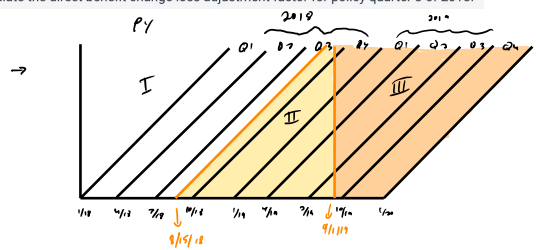

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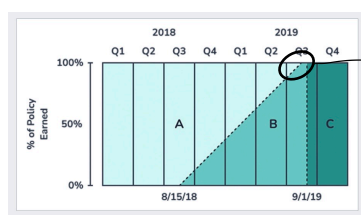
$$\begin{array}{c} {}^{7/24} \\ {}^{7/24}\triangle \end{array} \Rightarrow \text{Area} \times 4 = \text{portion of Quarter} \\ \qquad \qquad \downarrow \text{cause quarters} \\ \text{portion of year}$$

Group	Cumulative benefit	Portion	WA Benefit change 2019 Q3	Loss adjustment factor
A	1.00	$(\frac{3}{32})^2 (\frac{1}{2}) *4 = \frac{1}{32} = 0.03125$	Sumproduct = 1.045	$\frac{\text{Current loss level}}{\text{Avg loss level of Historical period}} = \frac{1.0608}{1.045}$
B	1.04 (1.00) = 1.04	$1 - (\frac{1}{32} + \frac{1}{4}) = 0.6354$		≈ 1.0146
C	1.04 (1.02) = 1.0608	$\frac{1}{4} = 0.5573$		

→ A company implemented the following benefit increases for annual policies:

- A 4% benefit increase that impacts all losses on policies written after 8/15/2018.
- A 2% benefit increase that impacts all new losses after 9/1/2019.

Calculate the direct benefit change loss adjustment factor for policy quarter 3 of 2018.

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Group	Cumulative benefit	Portion	WA	Factor
I	1.00	0.5	Sumproduct = 1.0208	$\frac{1.0608}{1.0208} = 1.0392$
II	1.04 (1.00) = 1.04	$0.5 - \sim 0.4861$		
III	1.04 (1.02) = 1.0608	$(\frac{1}{2})^2 (\frac{1}{3}) *4 = 0.0139$		

↳ cause quarters