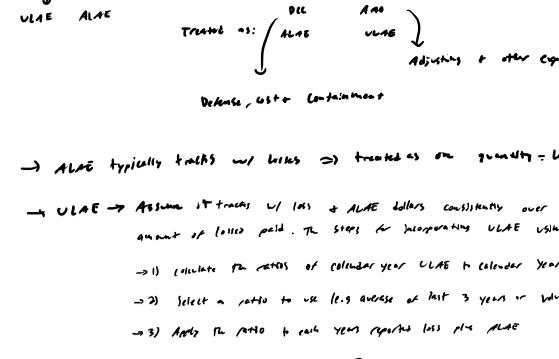


(my) 2.6 → Expenses & profits

2.6.1 → Loss adjustment expenses



→ VALE typically tracks net losses \Rightarrow treated as one quantity = losses + LAE

- VALE \rightarrow Assume it tracks w/ loss + LAE dollars consistently over time. This assumption applies to both the rate of payment & the amount of losses paid. The steps for incorporating VALE using this approach are as follows:
 - 1) calculate the ratio of calendar year VALE to calendar year paid loss rates since our recent years (e.g. 3 or more years depending on the line of business)
 - 2) select a ratio to use (avg average or last 3 years or volume-weighted average)
 - 3) Apply the ratio to each year's reported loss rate alone

2.6.2 → UW Expenses: All variable method

→ UW expenses are typically classified into the following categories:

- 1) Commissions & brokerage paid to insurance agents or brokers as compensation for generating business, typically paid as a percentage of premiums written
- 2) Other acquisition costs paid to acquire business, such as marketing costs
- 3) Taxes, licenses & fees paid by the insurer
- 4) General expenses associated w/ the insurer's operation

→ when estimating the UW expense provision, it is common to categorize UW expenses as either variable expenses or fixed expenses.

→ Variable expense are expenses that vary w/ premium, so they are declined as a constant percentage of the premium.

→ Fixed expenses are assumed to be the same for each risk, so they don't vary w/ premium.

→ fundamental insurance equation

$$\text{premium} = \text{losses} + \text{LAE} + \text{UW expenses} + \text{UW profit}$$

$$P = L + E_L + (E_V + E_F) + Q - R \quad \text{variable expenses} \text{ and } \text{fixed expenses are expressed as a \% of premium?}$$

↓
Fixed Variable
expenses -----

$$\Rightarrow P = \frac{L + E_L + E_F}{1 - V - Q} \quad \text{At aggregate level?}$$

$$\left(\frac{1}{x}\right) P = \left(\frac{L}{x} + \frac{E_L}{x}\right) - \frac{1}{x} \rightarrow \text{H exposures}$$

$$\Rightarrow \frac{P}{x} = \frac{(L + E_L + E_F)/x}{1 - V - Q} \quad \text{At level per exposure level?}$$

→ Incorporating reinsurance \rightarrow Two options:

- 1) reduce losses for reinsurance
- 2) include net cost of reinsurance as an expense item

→ All variable expense method

→ no differentiation between fixed & variable UW expenses; all are treated as variable to premium

→ Once the data is gathered, follow these steps to estimate the UW expense provision:

- 1) Derive the expense ratios for each year & each category, this can be done by dividing the historical CY expenses for a category by the CY UW or EP during the same historical period. Repeat this for each year & category.
- 2) Select a ratio for each expense type: As w/ other steps in the ratemaking process, the selection should be made w/ what is expected in the future. So, this may involve selecting a multi-year average (either straight or weighted), the latest year's ratio, or a judgemental pick.
- 3) Sum the ratios for each expense category to find the total UW expense provision. This provision will then be used directly in the rate level projection formula on screen 20.

→ Trending \rightarrow Even though UW expenses likely increase w/ inflation, the they are expressed as a % of premium, that is taken into account \Rightarrow no trendless need &

2.6.3 → UW Expenses: Premium-based method

→ Premium-based projection method \rightarrow under this approach, variable & fixed expenses are handled separately. Important for companies w/ significant amounts of each

→ The steps for determining the UW expense provision are:

- 1) derive the expense ratios for each year & category
- 2) Select a ratio for each expense type
- 3) Divide each selected expense ratio into fixed & variable ratios
- 4) Sum the fixed expense ratios, selecting for each expense category to find the total fixed expense provision. Repeat for variable expenses.

→ notice that the steps are essentially the same as for the All variable expense method, w/ an additional step to split each category's expense data fixed + variable ratios.

→ This method will result in ratios for both fixed + variable expenses. If the average fixed expense per exposure is needed instead, this can be found as

$$\rightarrow \text{Fixed expense per exposure} = \text{Fixed expense ratio} \times \text{Projected average Premium}$$

→ Trending \rightarrow For exam, assume fixed expenses don't need trended either

2.6.4 → UW Expenses: Exposure/Policy-based method

→ the Premium-based projection method can result in distorted fixed expense ratios if the historical & projected premium levels differ. An alternative is to use a method that assigns fixed expense based on exposures or # of policies, i.e. the exposure/policy-based projection method.

→ Under this method, variable expenses are handled the same way as in other methods, i.e. divided by premiums. However, historical fixed expenses are divided by historical exposures or policy counts, rather than premium. The choice depends on whether fixed expenses are assumed to be constant for each exposure (in most cases, divide historical expenses by exposures) or for each policy (in which case, divide by the N on policies). we will explain this method using exposures, but the process is the same when using policy counts.

→ The type of data used for the Exposure/policy-based projection method depends on the category of expense being analyzed. Similar to other methods introduced, however, exposure data is also needed. Similar to premium data, written exposures should be used for fixed expenses that are incurred at the start of a policy, while earned exposures should be used for fixed expenses that are incurred throughout the policy. In summary, the historical expense ratio for each category use the following data:

Expense	Data Used	Fixed Divided By	Variable Divided By
General Expense	Countrywide	Earned Exposure	Earned Premium
Other Acquisition	Countrywide	Written Exposure	Written Premium
Commissions and Brokerage	Countrywide/State	Written Exposure	Written Premium
Taxes, Licenses, and Fees	State	Written Exposure	Written Premium

→ The steps for determining the UW expense provision under the Exposure/policy-based projection method are:

- 1) Split each expense into fixed & variable components
- 2) Derive the expense ratio for each year & category. Divide by exposures (or policy counts) for fixed expenses + premium for variable expenses
- 3) Select a ratio for each expense type
- 4) Sum the fixed expense ratios selecting for each expense category to find the total fixed expense provision. Repeat for variable expenses

→ This procedure results in the average fixed expense per exposure. So if the adjusted fixed expense ratio is needed instead, it can be found as

$$\rightarrow \text{Projected fixed expense ratio} = \frac{\text{Avg Adjusted fixed expense per exposure}}{\text{Projected avg premium}}$$

→ Trending \rightarrow As explained previously, variable expenses don't require trending as they are a constant percentage of premium. However, fixed expenses will likely need to be trended as they are a constant dollar amount

→ For the exposure/policy-based projection method, average fixed expenses are found by dividing total fixed expenses by exposures or policy counts. For an insurance-sensitive exposure base (e.g. payroll per \$100), trending is not necessary if expenses + exposures are trending at the same rate. For a non-insurance-sensitive exposure base (e.g. car year or home year) or for each policy (in which case, divide by the N on policies), we will explain this method using exposures, but the process is the same when using policy counts.

→ To select an trend for expenses, internal expense data can be used. However, since internal expense data can be volatile, it may make sense to instead use government indices (e.g. Consumer Price Index or Employment Cost Index), along w/ incorporating any anticipated changes in internal company practices.

→ Like the premium & loss trend procedures discussed previously, expense trends can be found by examining the historical change in average expenses. The trend period will be from the average data expenses were incurred in the historical experience period to the average data they will be incurred in the future. Rates are expected to be in effect.

→ For expenses incurred at the beginning of a policy, trend using the average data that policies are written.

→ For expenses incurred throughout a policy, trend using the average data that policies are earned.

→ Since the experience period is a CY, recall that the average data that policies are writing or earned is the same for historical data (i.e. the midpoint of the CY). However, when looking at the current period, policies are written when the new ones are written, while policies are earned up to a policy period after the last written date, so, expenses incurred throughout the policy will be trended for half a policy period longer than expenses incurred at the inception of a policy. This will be shown in the example below.

→ One possible way to simplify expense trending is to assume that all expenses are incurred in the same way (i.e. either all at inception or all throughout the policy period). The impact of this simplification will depend on the magnitude of the expense trend & the portion of premium that fixed expenses represent.

→ Another possible simplification is to trend historical fixed expenses from a single date, rather than determining the trend length for each historical year separately. For instance, assume a 3-year average expense ratio is selected, this ratio could be trended from the midpoint of the 3-year period. This should give approximately the same result as trending each year's expense ratio separately & then averaging the results. If the ratio selected was only the latest year, there would be no difference.

→ To select an trend for expenses, internal expense data can be used. However, since internal expense data can be volatile, it may make sense to instead use government indices (e.g. Consumer Price Index or Employment Cost Index), along w/ incorporating any anticipated changes in internal company practices.

→ Like the premium & loss trend procedures discussed previously, expense trends can be found by examining the historical change in average expenses. The trend period will be from the average data expenses were incurred in the historical experience period to the average data they will be incurred in the future. Rates are expected to be in effect.

→ For expenses incurred at the beginning of a policy, trend using the average data that policies are written.

→ For expenses incurred throughout a policy, trend using the average data that policies are earned.

→ Since we were able to derive the LR method using the results from the PP method, those methods should be equivalent. However this equivalence depends on whether constant data & assumptions are used for both methods. For instance, if the premium at LAE is calculated using the parallellogram method, rather than the exposure method, this method cannot be used for a new company that wants to determine the indicated rate.

→ If the underlying loss measure used in the calculations is different to the PP method (using pure premium & the LR method utilizing LR losses). This means that the premium at LAE is needed for the LR method, but not the PP method. In addition, clearly defined expenses are needed for the PP method, but not the LR method.

→ If, on the other hand, the LR method is typically used when premium at the LAE is not available or sufficient for an insurance product w/ a longer rating period, then one might consider to calculate initial premiums by calculating the indicated rate to the current rate. Likewise, the indicated rate change can still be found by comparing the indicated rate times the income change factor.

→ Some actuaries prefer to state the indication as a percent change to existing rates, as this gives an approximation of the average impact on existing policyholders, i.e. the indicated rates with fully representative changes to policyholders (retention). So, if the LR method may be preferred b/c of that. However, assuming that the current average rate is available, the indicated rate change can still be found by comparing the indicated rate using the PP method to the current rate. Likewise, the indicated rate to change can be found from the LR method by multiplying the current rate times the income change factor.

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