2.5.3 → UW expenses: Premium-based method

→ Overview → Another method for determining the UW expense provisions when performing a ratemaking analysis is the premium-based projection method. Under this approach, variable + fixed expenses are handled seperately. This is especially important for insurance companies that have a significant amount of both types of UW expenses.

→ Like the All variable expense method, the premium-based projection method assumes that expense ratios during the projected period will be consistent w/ historical expense ratios. The main difference is that fixed + variable expense ratios are calculated seperately. So, we will also need to allocate expenses into fixed + variable components. For the exam, this allocation will typically be given to you if needed.

→ In addition, the premium based projection method has the same considerations as the All variable expense method, including what type of data to use for each expense category + how to handle non-recurring / extraordinary expenses or any restrictions on expenses. As a refresher,

Expense Category	Data Used	Divided By
General Expenses	Countrywide	Earned Premium
Other Acquisition Costs	Countrywide	Written Premium
Commissions and Brokerage	Countrywide/State	Written Premium
Taxes, Licenses, and Fees	State	Written Premium

→ Under the premium-based projection method, the steps for determining the UW expense provision are:
- → 1) Derive the expense ratio 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 ratio selections 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 into 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

Fixed expense per exposure = Fixed expense ratio × Projected average Premium

→ Notes → As mentioned above, the allocation for dividing each selected expense ratio into fixed + variable ratios will be given on the exam when needed. For example, you may be told that 75% of general expenses are fixed.

→ Generally, this division can be estimated using either detailed expense data from the insurer or activity-based cost studies. If this data is not available, professionals w/in the company should be consulted to get the best possible assumptions for allocating expenses.

→ lets revisit an example from the previous subsection to see how to apply the premium-based projection method.

→ Example →

You are given the following information:

	Countrywide Data	State-Level Data	% Assumed Fixed
General Expenses	63,200	-	80%
Other Acquisition Costs	38,750	-	60%
Commissions and Brokerage	-	3,900	0%
Taxes, Licenses, and Fees	-	1,250	15%
Written Premium	780,000	46,000	-
Earned Premium	735,000	42,000	-

Calculate the fixed and variable expense ratios using the Premium-based Projection Method.

→ We get the same ratios as before. Then, divide each ratio into fixed + variable ratios using the percentages assumed fixed.

Expense Category	Ratio	Fixed Ratio	Variable Ratio
General Expenses	$\frac{63,200}{735,000} = 8.60\%$	$0.80\,(0.0860) = 6.88\%$	$0.20\,(0.0860) = 1.72\%$
Other Acquisition Costs	$\frac{38,750}{780,000} = 4.97\%$	$0.60\,(0.0497) = 2.98\%$	$0.40\,(0.0497) = 1.99\%$
Commissions and Brokerage	$\frac{3,900}{46,000} = 8.48\%$	$0\,(0.0848) = 0\%$	$1\,(0.0848) = 8.48\%$
Taxes, Licenses, and Fees	$\frac{1,250}{46,000} = 2.72\%$	$0.15\,(0.0272) = 0.41\%$	$0.85\,(0.0272) = 2.31\%$

→ The fixed expense ratio is: 0.0688 + 0.0298 + 0 + 0.0041 = 10.27%

→ The variable expense ratio is: 0.0172 + 0.0199 + 0.0848 + 0.0231 = 14.49%

} Σ ≟ 24.76% ✓

→ Notice that of these two ratios equals the total expense ratio found using the All variable expense method.

→ Potential distortions

→ The premium-based projection method assumes that historical fixed + variable expense ratios will be the same in the projected period. Since variable expenses vary directly w/ premium, the historical variable expense ratio will likely be appropriate. However, by definition, fixed expenses do not vary w/ premium. So, the fixed expenses do not vary w/ premium. So, the fixed expense ratio will be distorted if historical + projected premium levels differ materially.

→ According to the source reading, there are 3 main circumstances that can cause this:

→ 1) Recent rate changes can impact historical expense ratios, as they are based on either WP or EP. This can result in a rate level indication that is either too high or too low. The magnitude of the rate changes + the # of years of expense ratios can both impact the degree of distortion. One potential solution is to on-level premiums before calculating expense ratios.

→ 2) Expense ratios can also be affected by premium +/or exposure trends. Since historical ratios are based on WP or EP during the historical period, any changes in the average premium that don't also affect UW expenses will cause the estimated fixed expense ratios to either be overstated or understated. One way to correct to correct for this is to trend historical premium + expenses to prospective levels before calculating expense ratios. Trending can be skipped if both average premium + average fixed expense trend at the same rate, as the trend factors will cancel each other out.

→ 3) For regional or national insurers, this method can create inequitable rates if CW expense ratios are applied to state-level premium to determine expected fixed expenses. In other words, fixed expenses will essentially be allocated to each state based on premium. So, states w/ premium above average will get a higher allocation of fixed expenses, which may not be fair. One solution is to calculate fixed expense ratios by state.

→ Trending

→ As mentioned in the previous subsection, variable expenses automatically adjust w/ premium changes + don't require trending. However, fixed expenses are assumed to be a constant dollar amount, so their average is expected to increase over time due to inflation + will thus need to be trended.

→ Recall that for the premium-based projection method, the fixed expense ratio is calculated as fixed expenses divided by premium. Some companies may assume that average fixed expenses + average premium are changing at the same rate, which means the fixed expense ratio will be consistent + no trending is needed. However, other companies still trend the fixed expense ratio, which implies that the average fixed expenses are changing at a different rate than average premium. For the exam, we will assume that the fixed expense provision does not need to be trended under the premium-based projection method.

→ Example →

You are given the following information:

	2016	2017	2018	% Fixed
Written Premium	915,000	931,000	942,000	-
Earned Premium	870,000	885,000	896,000	-
General Expenses	31,000	36,000	43,000	85%
Other Acquisition Costs	66,000	74,000	83,000	70%
Commissions and Brokerage	12.3%	12.6%	12.1%	0%
Taxes, Licenses, and Fees	2.1%	2.0%	2.3%	25%

Calculate the fixed and variable expense ratios using the Premium-based Projection Method. Justify all selections.

→ First, find the expense ratios for each year + category. Note that we are directly given the expense ratios for commissions + brokerage + for taxes, licenses + fees. General expenses are typically incurred throughout the policy period, so divide those by EP. Other acquisition costs are typically incurred at the onset of a policy, so divide those by WP

	2016	2017	2018
General Expenses	$\frac{31,000}{870,000} = 3.56\%$	$\frac{36,000}{885,000} = 4.07\%$	$\frac{43,000}{896,000} = 4.80\%$
Other Acquisition Costs	$\frac{66,000}{915,000} = 7.21\%$	$\frac{74,000}{931,000} = 7.95\%$	$\frac{83,000}{942,000} = 8.81\%$
Commissions and Brokerage	12.3%	12.6%	12.1%
Taxes, Licenses, and Fees	2.1%	2.0%	2.3%

→ The expense ratios for general expenses + other acquisition costs are both increasing, so I will select the most recent expense ratios for those categories. There isn't a clear pattern for the expense ratios for commissions + brokerage + taxes, licenses + fees. So I will select an all-year average for these categories

Expense Category	Ratio	Fixed Ratio	Variable Ratio
General Expenses	4.80%	$0.85\,(0.0480) = 4.08\%$	$0.15\,(0.0480) = 0.72\%$
Other Acquisition Costs	8.81%	$0.70\,(0.0881) = 6.17\%$	$0.30\,(0.0881) = 2.64\%$
Commissions and Brokerage	12.33%	$0\,(0.1233) = 0\%$	$1\,(0.1233) = 12.33\%$
Taxes, Licenses, and Fees	2.13%	$0.25\,(0.0213) = 0.53\%$	$0.75\,(0.0213) = 1.60\%$

→ The fixed expense ratio is → 0.0408 + 0.0617 + 0 + 0.0053 = 10.78%

→ The variable expense ratio is → 0.0072 + 0.0264 + 0.1233 + 0.0160 = 17.30%

→ Note → Other expense ratio selections are reasonable, as long as valid justification is provided. For instance, you may choose to select straight averages for all expense ratios if you assume that any of the patterns in the expense ratios are just random volatility.

→ Assignment

→ Q1)

(2 points) Assume the fixed expense provision in a statewide rate level indication is based on a countrywide historical multi-year average of the ratios of actual expenses to actual earned premiums.

(a) *(1 point)* State two items that can cause this methodology to create inaccurate and inequitable indicated rate changes.

(b) *(1 point)* For each of the two items stated above, give a potential solution to correct for the inaccuracy.

→ a) Acceptable answers include:
- → 1) A rate change could render historical fixed expense ratios inaccurate for the new rate
- → 2) Any large, non-recurring expenses during the historical period could skew the average ratio
- → 3) Improperly allocating the amount of each expense that is fixed + variable could distort the ratios
- → 4) Discrepancies between the statewide + countrywide expense ratios could lead to distortions. For example, the statewide "taxes, licensing + fees" expense ratio is likely different from the countrywide ratio
- → 5) Differences in the premium + fixed expense trend could cause the expected future expense ratios to be different from historical expense ratios

→ b)
- → 1) On-leveling the historical premium before calculating the expense ratios would address the differences in historical rate levels
- → 2) Excluding the non-recurring expenses from the calculations of the CY expense ratio or omitting the CY ratio from the average expense ratio would mitigate the impact of unusually high expenses in a specific historical year
- → 3) Accurately allocating the percentages of fixed + variable expenses w/in each expense category
- → 4) Using statewide data for "taxes, licensing, + fees" ratio rather than the countrywide data
- → 5) Trending fixed expenses + premiums seperately at their respective trend rates to future levels before computing expense ratios would correct for discrepancies in their trend rates

→ Q2)

Given:

	Annual Policy Period		
	2021	2022	2023
Countrywide Other Acquisition	$10,000	$11,100	$10,500
Statewide Taxes, Licenses, and Fees	$900	$888	$965
Statewide Commissions and Brokerage	$9,000	$2,850	$3,000
Countrywide General Expenses	$40,800	$36,500	$32,200
Statewide Earned Premium	$32,000	$33,500	$37,000
Statewide Written Premium	$33,000	$36,000	$38,500
Countrywide Earned Premium	$500,500	$513,000	$518,500
Countrywide Written Premium	$545,000	$560,000	$565,000

Expense Category	% Fixed
Other Acquisition	60%
Taxes, Licenses, and Fees	40%
Commissions and Brokerage	0%
General Expenses	30%

- Expenses are incurred evenly throughout the policy period and trend at the same rate as premium.

(a) Calculate the variable expense provision using the All Variable Method. Justify any selections you make.

(b) Calculate the fixed and variable expense provisions using the Premium-Based Projection Method.

→ a)

→ b)

	Annual Policy Period			
	2021	2022	2023	
Countrywide Other Acquisition	$10,000	$11,100	$10,500	
Statewide Taxes, Licenses, and Fees	$900	$888	$965	
Statewide Commissions and Brokerage	$9,000	$2,850	$3,000	
Countrywide General Expenses	$40,800	$36,500	$32,200	
Statewide Earned Premium	$32,000	$33,500	$37,000	
Statewide Written Premium	$33,000	$36,000	$38,500	
Countrywide Earned Premium	$500,500	$513,000	$518,500	
Countrywide Written Premium	$545,000	$560,000	$565,000	
	Annual Policy Period			
	2021	2022	2023	
Countrywide Other Acquisition	1.83%	1.98%	1.86%	=E4/E$11
Statewide Taxes, Licenses, and Fees	2.73%	2.47%	2.51%	=E5/E$9
Statewide Commissions and Brokerage	27.27%	7.92%	7.79%	=E6/E$9
Countrywide General Expenses	8.15%	7.12%	6.21%	=E7/E$10

✱ Divide general expenses by EP because they are incurred throughout the policy period, but divide all other expenses by their respective WP because they are incurred at the onset of the policy period
-> Use statewide EP for 'Statewide' expenses obviously ↳ Always

Expense Category	% Fixed
Other Acquisition	60%
Taxes, Licenses, and Fees	40%
Commissions and Brokerage	0%
General Expenses	30%

All-variable expense method

	Selection	Method	Justification
Countrywide Other Acquisition	1.89%	All-year average	Stable over the three years
Statewide Taxes, Licenses, and Fees	2.57%	All-year average	Stable over the three years
Statewide Commissions and Brokerage	7.85%	Average of latest two years	Exclude 2021 because of unusually high expenses, then stable after that
Countrywide General Expenses	6.21%	Latest year's ratio	Expenses continually decrease
Total	18.52%	=SUM(I15:I18)	

Premium-based projection method
< same selections as above, just divvy out between fixed and variable expenses >

	Fixed	Variable	Fixed	Variable
Countrywide Other Acquisition	1.14%	0.76%	=$I15*$C25	=$I15*(1-$C25)
Statewide Taxes, Licenses, and Fees	1.03%	1.54%		
Statewide Commissions and Brokerage	0.00%	7.85%		
Countrywide General Expenses	1.86%	4.35%		
Total	4.02%	14.50%	=SUM(I25:I28)	=SUM(J25:J28)