Reading: NCCI.Circular

NCCI_BasicPremFactorPractice (Problem 1)

Model: Source Text

Problem Type: Calculate the basic premium factor

Given

Retrospective Rating Plan Parameters

(a)	Estimated Standard Premium	$750,000	
(b)	Max. Retrospective Premium Factor	125%	
(c)	Min. Retrospective Premium Factor	25%	
(d)	Loss Conversion Factor	1.23	<= c
(e)	Tax Multiplier	1.14	<= T
(f)	Loss Limit	$100,000	
(g)	Expense Ratio	0.189	
(h)	Expected Unlimited Losses	$153,750	

Find

Using the NCCI Circular CIF-2018-28 calculate the basic premium factor.
You may use the information provided below.

The risk is also experience rated with experience modification factor = 0.75

State	Hazard Group	Modified Expected Loss	Excess Ratio at Loss Limit	Manual Premium	Average Cost per Case
X	C	32,074	0.09	208,613	10,000
X	G	106,179	0.11	690,596	21,000
Y	A	15,496	0.38	100,790	2,000

Extract from the Table of Expected Claim Count Groups in Appendix A

Expected Claim Count Group	Expected Number of Claims
51	14.3 – 15.6
50	15.7 – 17.3
49	17.4 – 19.1
48	19.2 – 21.1

Extract from the Table of Policy Excess Ratio Ranges in Appendix A

Sub-table	Excess Ratio Range
5	0.078 – 0.110
6	0.111 – 0.145
7	0.146 – 0.181

Extract from Table of Aggregate Loss Factors: Sub-Table 6

Aggregate Excess Loss Factors by Expected Claim Count Group

	Expected Claim Count Group		
Entry Ratio	51	50	49
0.16	0.8719	0.8699	0.8678
0.17	0.8649	0.8627	0.8605
0.18	0.8580	0.8557	0.8534
…	…	…	…
4.17	0.0772	0.0654	0.0545
4.18	0.0768	0.0649	0.0541
4.19	0.0763	0.0644	0.0537

Solution NCCI_BasicPremFactorPractice (Solution 1)

Alice: "This is a long calculation that consists of 21 steps which are illustrated below. Work through this example carefully, referring to the wiki article when needed for explanations of each line item."

Item	Value	Description	Calculation/Notes
(1.)	$750,000	Estimated Standard Premium	
(2.)	$153,750	Expected (Unlimited) Losses	
(3.)	20.5%	Expected (Unlimited) Loss Ratio	(3) = (2) / (1)
(4.)	0.133	Policy Excess Ratio	See sub-calculation below. Yields sub-table 6.
(5.)	0.027	Excess Loss Factor	(5) = (3) * (4)
(6.)	17.8%	Expected Limited Loss Ratio	(6) = (3) - (5)
(7.)	16.01	Expected Number of Claims	See sub-calculation below. Yields count group 50.
(8.)	$141,750	Expense, Profit & Contingency excluding Taxes	(8) = (1) * (g)
(9.)	0.394	Expected Loss Plus Expense Ratio	(9) = [(2) + (8)] / (1)
(10.)	0.252	Loss & Expense in Converted Losses	(10) = (3) * (d)
(11.)	0.142	Expense, Profit & Contingency in Basic Premium	(11) = (9) - (10)
(12.)	0.219	Minimum Retrospective Premium excl. Taxes	(12) = (c) / (e)
(13.)	1.096	Maximum Retrospective Premium excl. Taxes	(13) = (b) / (e)
(14.)	0.7993	Table of Aggregate Loss Factors Value Difference*	(14) = [(9) - (12)] / [(d) * (6)]
(15.)	4.01	Table of Aggregate Loss Factors Entry Difference**	(15) = [(13) - (12)] / [(d) * (6)]
(16.)	0.17	Ratio of Losses for Minimum Retrospective Premium to Expected Limited Losses	See line-by-line wiki discussion for this figure.
(17.)	4.18	Ratio of Losses for Maximum Retrospective Premium to Expected Limited Losses	See line-by-line wiki discussion for this figure.
(18.)	0.0649	Table of Aggregate Loss Factors – Aggregate **Excess** Loss Factor for (17.)	AELF for (17), found in Appendix B.
(19.)	0.0327	Table of Aggregate Loss Factors – Aggregate **Minimum** Loss Factor for (16.)	
(20.)	0.007	Net Aggregate Loss Factor	(20) = [(18) - (19)] * (d) * (6)
(21.)	0.149	Basic Premium Factor	(21) = (20) + (11)

* Calculated to 4 decimal places to match the precision found in the Appendix B tables.

** Calculated to 2 decimal places to match the entry ratio precision found in the Appendix B tables.

Policy Excess Ratio Calculation

This is calculated at the State/Hazard Group level using the table approach below.

State	Hazard Group	Modified Expected Loss	Excess Ratio at Loss Limit	Expected Excess Loss	Policy Excess Ratio
X	C	32,074	0.09	2,887	
X	G	106,179	0.11	11,680	
Y	A	15,496	0.38	5,889	
Total		153,750		20,455	0.133

- The expected excess loss is the product of the modified expected loss and the excess ratio at loss limit.
- The policy excess ratio is the total expected excess loss divided by the total modified expected loss.

- The modified expected loss is the manual premium multiplied by both the experience modification (assuming the risk is also experience rated) and the expected loss ratio.

Expected Number of Claims Calculation

State	Hazard Group	Manual Premium	Experience Modification	Expected Loss Ratio	Modified Expected Loss	Average Cost per Case	Expected Number of Claims
X	C	208,613			32,074	10,000	3.21
X	G	690,596			106,179	21,000	5.06
Y	A	100,790			15,496	2,000	7.75
Total			0.75	20.5%			16.01

Alice: "Remember the NCCI experience mod and expected loss ratio are the same for all states and hazard groups within a risk."