Given   An insurance company is using a merit rating plan for drivers in two states.
State **X** has the following claims experience:

Group	Number of Accident-Free Years	Earned Premium at Present Group D Rates	Number of Claims Incurred
A	3 or more	$500,000	240
B	2	$150,000	125
C	1	$200,000	190
D	None	$300,000	300
Total		$1,150,000	855

State **Y** has the following relative claim frequencies for accident-free experience:

Number of Accident-Free Years	Relative Claim Frequencies to Total
3 or more	0.70
2 or more	0.77
1 or more	0.84

Find   Assuming no new risks enter or leave either state, use relative credibility to explain which state has more
variation in an individual insured's probability of an accident.

Solution

We're given earned premiums **at present rates for group D** in State X.

This means we do not need to on-level the premiums or adjust them to account for the differentials between rating groups.

We're interested in the number of years claims-free which means we'll switch from groups A, B, C, and D to considering the sets A, A + B, A + B + C, and A + B + C + D.

First compute the **total claim frequency** for State X: = 855 / 1,150,000 = 0.000743

Then compute the **relative claim frequency** for each grouping of years accident-free in State X as follows:

Relative Claim Frequency = [(Number of Claims Incurred) / (Earned Premium at Present Group D Rates)] / (Total Claim Frequency)

Next, apply the experience mod formula: Mod = ZR + (1-Z)*1. Since we're dealing with past years accident-free, we know R = 0.

Recall the mod is the *Relative Claim Frequency,* so Z = 1 - Mod = 1 - *Relative Claim Frequency*

State X

Group	Number of Accident-Free Years	Relative Claim Frequencies to Total	Credibility	Re-base to 1 or more
A	3 or more	0.646	0.354	2.910
A + B	2 or more	0.755	0.245	2.010
A + B + C	1 or more	0.878	0.122	1.000

We're given most of the work already for State Y

State Y

Number of Accident-Free Years	Relative Claim Frequencies to Total	Credibility	Re-base to 1 or more
3 or more	0.700	0.300	1.875
2 or more	0.770	0.230	1.438
1 or more	0.840	0.160	1.000

By looking at the re-based columns for these two tables, we observe State X has ratios which are much closer to 1.0, 2.0, and 3.0.

This implies State X has more stable experience, and that State Y has more variation.

Model: 2011.Q1

Problem Type: Credibility of a single car-year

Given   An insurance company is using a merit rating plan for drivers in two states.

State X has the following claims experience:

Group	Number of Accident-Free Years	Earned Premium at Present Group D Rates	Number of Claims Incurred
A	3 or more	$414,000	295
B	2	$137,000	130
C	1	$212,000	225
D	None	$285,000	330
Total		$1,048,000	980

State Y has the following relative claim frequencies for accident-free experience:

Number of Accident-Free Years	Relative Claim Frequencies to Total
3 or more	0.65
2 or more	0.76
1 or more	0.86

Find   Assuming no new risks enter or leave either state, use relative credibility to explain which state has more variation in an individual insured's probability of an accident.

Solution

We're given earned premiums **at present rates for group D** in State X.

This means we do not need to on-level the premiums or adjust them to account for the differentials between rating groups.

We're interested in the number of years claims-free which means we'll switch from groups A, B, C, and D to considering the sets
A, A + B, A + B + C, and A + B + C + D.

First compute the **total claim frequency** for State X: = 980 / 1,048,000 =   0.000935

Then compute the **relative claim frequency** for each grouping of years accident-free in State X as follows:

Relative Claim Frequency = [(Number of Claims Incurred) / (Earned Premium at Present Group D Rates)] / (Total Claim Frequency)

Next, apply the experience mod formula: Mod = ZR + (1-Z)*1. Since we're dealing with past years accident-free, we know R = 0.

Recall the mod is the *Relative Claim Frequency,* so Z = 1 - Mod = 1 - *Relative Claim Frequency*

State X

Group	Number of Accident-Free Years	Relative Claim Frequencies to Total	Credibility	Re-base to 1 or more
A	3 or more	0.762	0.238	2.674
A + B	2 or more	0.825	0.175	1.968
A + B + C	1 or more	0.911	0.089	1.000

We're given most of the work already for State Y

State Y

Number of Accident-Free Years	Relative Claim Frequencies to Total	Credibility	Re-base to 1 or more
3 or more	0.650	0.350	2.500
2 or more	0.760	0.240	1.714
1 or more	0.860	0.140	1.000

By looking at the re-based columns for these two tables, we observe State X has ratios which are much closer to 1.0, 2.0, and 3.0.

This implies State X has more stable experience, and that State Y has more variation.