

### 3.1 → Risk Classification

3.1.1 → Importance of risk variables

→ Goal is to segment in order to charge the same risks to each group in the premium, thus avoiding pricing selection.

→ To reduce selection effects when you charge the same rate instead of segmenting.

→ In a report, avoid underwriting certain groups & over time your actuaries want more similar patterns.

⇒ Segmentation

⇒ Rate changes

⇒ Report ...

→ Opposite what they do available selection.

→ "Planning the territory is using risk characteristics to identify, estimate, to select the homogeneous territories (variable) (homogeneous).

### 3.1.2 → Criteria for evaluating rating variables

→ The first step in classification methodology is to identify the rating variables that will be used to classify risks. The criteria for evaluating the importance of rating variables can be grouped into four categories:

→ Statistical criteria

→ a) Statistical significance → different levels of the rating variable should have different expected losses that are statistically significant at their own time.

→ b) Heterogeneity → the risks within the same level should have similar expected losses.

→ c) Creditability → Each level should be large enough to allow credible estimates of loss.

→ d) Ability → in terms of how able to make the losses.

→ e) Operational criteria

→ f) Objective → clear & measurable.

→ g) Reliable → information to determine credit to which standards are worth adhered to.

→ h) Versatile → not easily manipulated & easily verifiable.

→ i) Social criteria

→ j) Admissibility → insurance should be admissible for all risks from high-risk to low-risk.

→ k) Consistency → a clear correlation between a rating variable & expense basis will increase its social acceptability.

→ l) Credibility → rating variable generally prior to have some degree of control over the class to which they belong & the ability to influence the premium charged (is it in home insurance whether or not a security system is installed).

→ m) Policy owners → not isolated or unique are insured.

→ n) Political → not to offend or annoy no offend.

→ o) Legal → follows applicable laws.

### 3.1.3 → Univariate classification

→ Goal is to determine relationships for each level of a rating variable.

→ There are three approaches:

→ Pure premium approach

→ The basic pure premium approach determines the indicated relationships by comparing the expected pure premium for each territory with a rating variable.

→ When using the pure premium approach, the need to build & develop the loss model depends on the nature of the portfolio.

→ Data should be adjusted for homogeneity & consistency even prior to a classification analysis.

→ The table below shows the indicated relationship for each territories using the pure premium approach.

(1)	(2)	(3)	(4)	(5)	Indicated		(8) = (5)/(4)
					Loss & ALAE	Pure Premium	
1	300	\$15,698.08	552.33	0.7231			OR
2	390	\$28,221.07	572.36	1.0000			
3	310	\$24,072.96	577.65	1.1421	1.0731		
Total	1,000	\$67,992.11	567.99	1.0000	0.9396		

→ Loss ratio approach

→ The loss ratio approach determines the indicated relationship by comparing the LR's for each territory with a rating variable. When using this approach, LR should be related to the current level for each class in LR.

→ The table below shows the indicated relationship for each territory using the LR approach.

(1)	(2)	(3)	(4)	(5)	Indicated		(8) = (5)/(4)
					Loss & ALAE	Current Relativity	
Territory	Exposures	Current Relativity	Indicated	Indicated			
1	300	1.2000	362.8	\$15,698.08	\$43.27	0.8420	0.4354
2	390	1.0000	572.36	\$28,221.07	\$71.26	0.6400	0.6400
3	310	1.0000	577.65	\$24,072.96	\$81.77	1.2887	1.2887
Total	1,000	1.0497	570.99	\$67,992.11	\$65.45	1.0000	0.9396

→ Adjusted pure premium approach

→ In the LR approach requires to calculate the remaining relationship, which may not always be available or practical to obtain. In such cases, if it is necessary to use the pure premium approach to estimate the impact of our distributional bias, the pure premium approach can be performed using exposures adjusted by the experience-weighted average relationship with other variables.

→ The experience-weighted LR relativity for each territory is calculated as follows:

(AOI)	Charged	Exposures by Territory
AOI Factor		
Low	0.80	10 130 150
Medium	1.00	110 120 120
High	1.36	180 140 140
Wtd Avg AOI Relativity by Territory	1.2093	1.0626 0.9497

→ For example, the weighted average ADR relativity of territory 1 is

$$\frac{10(1.80) + 11(1.00) + 12(1.36)}{10 + 11 + 12} = 1.2083$$

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