1.2.3 → Exposures

→ Overview → An exposure is a basic unit that measures a policy's exposure to loss. It is the for the calculation of premium

→ Criteria for Exposure bases

1) Proportional to expected loss
2) Practical
3) Historical precedence

→ 1) Proportional to expected loss

→ The exposure base chosen should be the factor that exhibit the most direct proportional relationship to the losses. Ie directly, assuming all other factors remain constant, the expected loss of a policy w/ two exposures should be double that of a comparable policy w/ a single exposure.

→ e.g) The number of house years is a good exposure base for homeowners insurance bc the expected loss for one home insured for two years is twice the expected loss for the same year insured for one year. while the expected loss for a home will also likely vary by the amount of insurance purchased, the relationship is not as direct. The expected loss for a $700,000 home won't be necessarily twice that of a $350,000 home. Thus, number of house years is a better exposure base.

→ An exposure base that is proportional to the expected loss will be responsive to any change in exposure to risk. It is also easily understood by the insured.

→ Difference between "proportional" & "direct proportional"

↳ not necessarily

10% ↑ in exposure ⟹ 10% ? expected losses

→ 2) Practical

→ The exposure base chosen should be practical, meaning it should be objective & easy & inexpensive to obtain & verify. This ensures that the exposure base can be consistently measured. This prevents insureds & underwriters from intentionally manipulating exposure information for their own benefit.

→ 3) Historical Precedence

→ Another criterion for a good exposure base is it should consider any preexisting exposure base established w/in the industry. Any change in the exposure base should be carefully considered due to the following reasons:

1) It can result in substantial fluctuations in premiums for individual policyholders
2) It requires a change in the rating algorithm, which may require significant adjustments to the rating systems & manuals
3) It may necessitate significant data adjustments for future ratemaking analyses, as these analyses typically rely on several years of data

The table below shows some commonly used exposure bases for different lines of business.

Line of Business	Typical Exposure Bases
Personal Automobile	Earned Car Year
Homeowners	Earned House Year
Workers Compensation	Payroll
Commercial General Liability	Sales Revenue, Payroll, Square Footage, Number of Units
Commercial Property	Amount of Insurance Coverage
Professional Liability	Number of Professionals
Personal Articles Floater	Value of Item

→ Examples of bad ones w/ explanations

→ Homeowners
→ potential exposure base: Amount of insurance purchased
→ Reason not good: not directly proportional to expected loss

→ Personal Auto
→ _ _ _ → miles driven
→ _ _ . → historically hard to measure accurately & subject to moral hazard

→ Products liability
→ _ _ _ → number of current products in use
→ - - - → Difficult to track accurately

→ Workers compensation
→ _ _ _ → Hours worked
→ _ _ _ → Concerns regarding transition; too costly to change from payroll

→ Exposures for large commercial risks

→ Conventional exposure bases may not be suitable for large commercial risks. As a result, ratemaking for large commercial risks is often done using the following methods:

1) Composite rating → The initial premium for a policy is determined by estimating the different exposure measures for each aspect of coverage. Then, instead of auditing the different exposure measures for each coverage at the end of the policy term, a proxy measure is used to estimate the overall change in exposure to loss.

2) Loss-rated composite rating → The premiums for a policy is determined based on the individual risk's historical loss experience, rather than using a rating algorithm, which means the implicit exposure base is the risk

→ these methods will be discussed in a later section

→ Exam questions

→ Format → Common exam questions require:

1) Defining & describing exposure bases as used in the ratemaking process
2) Evaluating & selecting the appropriate exposure base for a given scenario in the ratemaking process (e.g specific line of business or use case)

→ Example → An insurance company is considering changing its exposure base for workers comp from payroll to # of employees. Evaluate the merits of this change based on each of the three criterion for a good exposure base.

→ 1) Proportional to expected loss
→ # of employees → reflects claim frequency, but not severity. More employees means more claims, but the size of claims doesn't change
→ payroll → Reflects both frequency (more employees) & severity (higher wages lead to larger claims). Therefore, payroll has a stronger relationship w/ expected loss)

→ 2) Practical
→ _ _ _ → Can be practical if companies maintain accurate records, but issues can arise w/ counting part-time or seasonal workers
→ _ _ _ → Easy to verify w/ tax forms (e.g W-2s), and auditing processes are already in place, making payroll more straightforward to administer

→ 3) Historical precedence
→ _ _ _ → Switching would require costly system updates & may lead to premium fluctuations due to less reliable historical data
→ _ _ _ → Has been used for a long time in workers comp, w/ established systems & data supporting it

⟹ Payroll is a better exposure base b/c it better reflects expected loss, is easier to verify, & avoids disruptions due to its historical use. Therefore, it is not recommended to switch to the number of employees