

Activity 1 — Describing Probability Analysis

Terms	Descriptions
1. Theoretical probability	
2. Empirical probability	
3. Probability analysis	
4. Law of large numbers	
5. Probability distribution	

Terms	Descriptions
6. Discrete probability distributions	
7. Continuous probability distributions	

Answers to Activity 1 — Describing Probability Analysis

Terms	Descriptions
1. Theoretical probability	<ul style="list-style-type: none"> • Probability that is based on theoretical principles rather than on actual experience. • Are constant as long as the physical conditions that generate them remain unchanged.
2. Empirical probability	<ul style="list-style-type: none"> • A probability measure that is based on actual experience through historical data or from the observation of facts. • Empirical probabilities are only estimates. Their accuracy depends on the size and representative nature of the samples being studied.
3. Probability analysis	<ul style="list-style-type: none"> • A technique for forecasting events, such as accidental and business losses, on the assumption that they are governed by an unchanging probability distribution. • Effective for projecting the likelihood and consequences of losses or gains in organizations that have both a substantial volume of data on past losses or gains and fairly stable operations so that (except for price level changes) loss and gain patterns presumably will continue.
4. Law of large numbers	<ul style="list-style-type: none"> • A mathematical principle stating that as the number of similar but independent exposure units increases, the relative accuracy of predictions about future outcomes (losses) also increases. • Can be used to more accurately forecast future events only when the events being forecast meet all three of these criteria: <ul style="list-style-type: none"> ○ The events have occurred in the past under substantially identical conditions and have resulted from unchanging, basic causal forces. ○ The events can be expected to occur in the future under the same, unchanging conditions. ○ The events have been, and will continue to be, both independent of one another and sufficiently numerous.

Terms	Descriptions
5. Probability distribution	<ul style="list-style-type: none"> • A presentation (table, chart, or graph) of probability estimates of a particular set of circumstances and of the probability of each possible outcome. • A properly constructed probability distribution always contains outcomes that are both mutually exclusive and collectively exhaustive. • To provide a mutually exclusive, collectively exhaustive list of outcomes, a distribution’s categories (bins) must be designed so that all outcomes can be included.
6. Discrete probability distributions	<ul style="list-style-type: none"> • A finite number of possible outcomes. • These distributions are typically used to analyze how often something will occur; that is, they are shown as frequency distributions. • Countable number of outcomes.
7. Continuous probability distributions	<ul style="list-style-type: none"> • An infinite number of possible outcomes. • Called probability density functions. • Typically used for the consequences of an event—they depict the value of the loss or gain rather than the number of outcomes.

Trend Analysis

Educational Objective (EO)

Explain how regression analysis can be used to forecast gains or losses.

Instructions

Individual Activity

Ask participants to read the scenario in **Activity 1—Explaining Trend Analysis Case Study**. Engage participants in a discussion to calculate the expected number of construction-site injuries for the year.

1. What is the equation for calculating the number of injuries Charles Construction should expect?
2. Based on the equation, calculate the expected number of construction-site injuries for the year.
3. What is the expected number of construction-site injuries for the year that Charles Construction should expect?

Activity 1 — Explaining Trend Analysis Case Study

Michael, the risk manager for Charles Construction, wants to project the number of employee injuries at construction sites based on its annual income (adjusted for inflation) for the past five years. Michael has constructed a linear regression line and calculated the values of a and b. The value for a indicates that 3.4 injuries occurred for each \$100,000 of income, and the value for b, 0.042, indicates that an additional injury can be expected with each additional \$2,380,095 ($\$100,000 \text{ in income} \times [1 \div 0.042]$). Assume Charles Construction expects \$15 million in income next year.

Answers for Activity 1

1. The equation is: $y = bx + a$.
2. Calculation: y (injuries) = $(0.042 \times 150 \text{ [\$15 million stated in \$100,000s]}) + 3.4 = 9.7$.
3. The company should expect ten injuries next year.

Analyzing Loss Exposures

Activity 1—Analyzing Loss Exposures

Questions	Answers
1. What are the four dimensions when analyzing loss exposures?	
2. What is the purpose of analyzing loss severity?	
3. What two approaches would a risk management professional use when jointly analyzing the loss frequency and loss severity of a loss exposure?	
4. Why is timing an important consideration when analyzing loss exposures?	

<p>5. Describe data credibility and the two issues that may prevent data from being good indicators of future losses.</p>	
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Answers to Activity 1—Analyzing Loss Exposures

Questions	Answers
<p>1. What are the four dimensions when analyzing loss exposures?</p>	<p>The analysis step of the risk management process involves considering the four dimensions of a loss exposure:</p> <ul style="list-style-type: none"> • Loss frequency—the number of losses (such as fires, auto accidents, or liability claims) that occur during a specific period. • Loss severity—the dollar amount of loss for a specific occurrence. • Total dollar losses—the total dollar amount of losses for all occurrences during a specific period. • Timing—the points at which losses occur and loss payments are made. The period between loss occurrence and loss payment can be lengthy.
<p>2. What is the purpose of analyzing loss severity?</p>	<p>The purpose of analyzing loss severity is to determine how serious a loss might be.</p>
<p>3. What two approaches would a risk management professional use when jointly analyzing the loss frequency and loss severity of a loss exposure?</p>	<ul style="list-style-type: none"> • <u>Prouty Approach</u>—One method of jointly considering both loss frequency and loss severity is the Prouty Approach, which identifies four broad categories of loss frequency and three broad categories of loss severity. • <u>Total Claims Distribution</u>—Another method is more statistically based and involves combining frequency and severity distributions to create a single total claims distribution.
<p>4. Why is timing an important consideration when analyzing loss exposures?</p>	<ul style="list-style-type: none"> • Timing is important to consider when analyzing loss exposures because of the time value of money. • Money held in reserve can earn interest until the payment is made.
<p>5. Describe data credibility and the two issues that may prevent data from being good indicators of future losses.</p>	<ul style="list-style-type: none"> • The term data credibility refers to the level of confidence that available data can accurately indicate future losses. • Two related data credibility issues may prevent data from being good indicators of future losses—the age of the data and whether the data represent actual losses or estimates of losses.

Activity 2—Discussing the Prouty Approach

The Prouty Approach, a method for categorizing loss frequency and severity, can help insurance and risk management professionals justify the priority that should be placed on certain loss exposures.

Loss frequency	
1.	
2.	
3.	
4.	
Loss severity	
1.	
2.	
3.	

Activity 2—Discussing the Prouty Approach

ANSWER

The Prouty Approach, a method for categorizing loss frequency and severity, can help insurance and risk management professionals justify the priority that should be placed on certain loss exposures.

Loss frequency	
1. Almost nil	Extremely unlikely; virtually no possibility
2. Slight	Could happen but has not happened
3. Moderate	Happens occasionally
4. Definite	Happens regularly
Loss severity	
1. Slight	Organization can readily retain each loss exposure.
2. Significant	Organization cannot retain the loss exposure; therefore, some part of it must be financed.
3. Severe	Organization must finance virtually all of the loss exposure or endanger its survival.

Assignment 8

Risk Treatment

Activity 1 — Describing Risk Treatment

Questions	Answers
1. What is residual risk?	
2. What is the difference between speculative risk and pure risk?	
3. This is a method of risk sharing that can be used to transfer noncritical operations to another organization.	
4. What are the general categories of risk treatment options?	
5. Risk treatment decisions are made once an organization's risks have been _____.	
6. What is the goal of risk treatment?	
7. What technique is used for risks that fall within the organization's risk tolerance and for any residual risk?	
8. What is risk avoidance?	
9. Risk treatment is a continuous process consisting of these steps.	

Answers to Activity 1 — Describing Risk Treatment

Questions	Answers
1. What is residual risk?	Risk remaining after risk treatment
2. What is the difference between speculative risk and pure risk?	<ul style="list-style-type: none"> • Speculative risk—A chance of loss, no loss, or gain. • Pure risk—A chance of loss or no loss, but no chance of gain.
3. This is a method of risk sharing that can be used to transfer noncritical operations to another organization.	Outsourcing
4. What are the general categories of risk treatment options?	In general, available risk treatment options fall into the categories of avoidance, reduction, sharing, or retention.
5. Risk treatment decisions are made once an organization's risks have been _____.	Identified, analyzed, and evaluated
6. What is the goal of risk treatment?	To modify identified risks to assist the organization in meeting its objectives.
7. What technique is used for risks that fall within the organization's risk tolerance and for any residual risk?	Risk retention
8. What is risk avoidance?	A technique that involves ceasing or never undertaking an activity so that the possibility of future gains or losses occurring from that activity is eliminated.
9. Risk treatment is a continuous process consisting of these steps.	<ol style="list-style-type: none"> 1. Assessing a specific risk treatment option 2. Determining whether residual risk levels are tolerable 3. Generating new risk treatment options where risk levels are not tolerable 4. Assessing the effectiveness of the chosen risk treatment option

Introduction to Risk Financing

Activity 1— Describing Risk Financing Techniques

Questions	Answers
1. The uncertainty about outcomes, some of which can be negative.	
2. This risk financing technique is often used by organizations that risk losing money when converting from one currency to a different currency.	
3. This type of risk from accidental loss, including the possibility of loss or no loss, is often financed using insurance.	
4. This risk financing technique transfers the potential financial consequences of certain specified loss exposures from the insured to the insurer.	
5. This risk transfer mechanism features a contractual provision that obligates one of the parties to assume the legal liability of another party.	
6. This risk financing activity entails acceptance of the potential benefit of gain, as well as the burden of loss, that arises from a particular risk.	
7. This category of risk is usually financed through hedging instruments such as futures, forwards, options and swaps when insurance products are typically not available.	
8. A deliberate assumption of a risk (and its consequences) that has been identified and analyzed	
9. A bakery may use this contract to hedge its exposure to fluctuations in the prices of wheat by agreeing to buy the wheat in the future at a price agreed	

upon today.	
10. This type of retention is the assumption of a portion of the cost of a loss by the organization and transfer of the remaining portion.	
11. Insurance policies represent a mix of two risk financing techniques for losses: retention of the amount below the deductible and this kind of risk financing technique of the insured portion of loss above the deductible.	
12. Because it can be the most economic risk financing technique, this type of risk financing is sometimes preferred even when insurance or contractual (noninsurance) risk transfer is available.	
13. The International Organization for Standardization (ISO) defines this as a form of risk treatment involving contingent arrangements for the provision of funds to meet or modify the financial consequences should they occur.	
14. This type of retention includes a pre-event arrangement that ensures that funding is available to pay for the consequences of an event after it occurs.	
15. This is the inadvertent assumption of a risk (and any consequences) that has not been identified or accurately analyzed.	

Answers for Activity 1— Describing Risk Financing Techniques

Questions	Answers
1. The uncertainty about outcomes, some of which can be negative.	What is risk?
2. This risk financing technique is often used by organizations that risk losing money when converting from one currency to a different currency.	What is hedging?
3. This type of risk from accidental loss, which includes both the possibility of loss or of no loss, is often financed using insurance.	What is hazard risk?
4. This risk financing technique transfers the potential financial consequences of certain specified loss exposures from the insured to the insurer.	What is insurance?
5. This risk transfer mechanism features a contractual provision that obligates one of the parties to assume the legal liability of another party.	What is a hold-harmless agreement?
6. This risk financing activity entails acceptance of the potential benefit of gain, as well as the burden of loss, that arises from a particular risk.	What is retention?
7. This category of risk is usually financed through hedging instruments such as futures, forwards, options and swaps when insurance products are typically not available.	What is financial risk?
8. A deliberate assumption of a risk (and its consequences) that has been identified and analyzed.	What is a planned retention?
9. A bakery may use this contract to hedge its exposure to fluctuations in the prices of wheat by agreeing to buy the wheat in the future at a price agreed upon today.	What is a futures contract?

10. This type of retention is the assumption of a portion of the cost of a loss by the organization and transfer of the remaining portion.	What is a partial retention?
11. Insurance policies represent a mix of two risk financing techniques for losses: retention of the amount below the deductible and this kind of risk financing technique of the insured portion of loss above the deductible.	What is risk transfer?
12. Because it can be the most economic risk financing technique, this type of risk financing is sometimes preferred even when insurance or contractual (noninsurance) risk transfer is available.	What is retention?
13. The International Organization for Standardization (ISO) defines this as a form of risk treatment involving contingent arrangements for the provision of funds to meet or modify the financial consequences should they occur.	What is risk financing?
14. This type of retention includes a pre-event arrangement that ensures that funding is available to pay for the consequences of an event after it occurs.	What is a planned retention?
15. This is the inadvertent assumption of a risk (and any consequences) that has not been identified or accurately analyzed	What is an unplanned retention?