

RMIN 2500 Chapter 1

August 29 & 31

Introduction

- Chapter 1 emphasizes building risk management and insurance vocabulary and concepts.
- It lays the foundation for material covered throughout the course.

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Goals of the Chapter

- **Define** the term insurance - describe the **legal** and **financial** nature of insurance.
- Explain how an **insurance system** operates.
- Distinguish between a **loss**, a **hazard**, and a **peril**.
- Detail the **components** of an insurance premium.
- Discuss the **advantages** and **disadvantages** of insurance transactions from the society's standpoint.

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Financial Definition of Insurance

- Loss redistribution; redistribution of the cost of unexpected losses.
- Works like a financial intermediary.
 - What is a financial intermediary?
 - Insurance companies, mutual funds, banks...
 - How do FIs work? Why do they exist?
- Figure 1-1 (pp. 3) is an excellent illustration.

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Financial Definition of Insurance

- The collection of a small premium payment from all exposed and distributed to the smaller number of insureds suffering loss

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Chance of Loss

- The probability of a loss occurring.

$$COL = \frac{\text{Actual(or expected) losses}}{\text{Number of Exposures}}$$

- Example:
 - Insurance company's estimates of the probability of loss; potential loss expressed in percentage term.
 - We (StateFarm) expect 3 houses out of 1,000 houses in an insurance pool to be destroyed by fire.
 - COL = 3 / 1,000 or 0.003 or 0.3%

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Insurance Companies

Insurance companies truly do not pay losses. They might write the checks and collect and invest funds, but ultimately do not pay claims.

- Now, apply this concept to your local bank

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Law of Large Number

All insurance operations rest on this mathematical law. By combining a sufficiently large number of loss exposures, the insurer is able to predict aggregate dollar losses with considerable accuracy in advance of their occurrence.

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Law of Large Numbers

- Objective risk declines with the number of exposures.
- “Regression to the mean.”
- **Coin toss example:** the more times you toss a coin, the closer the frequency of heads (and tails) approaches 1/2.



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A-Rod Example



- A career 0.305 hitter (as of August 28, 2006)
- He may not always produce 3 hits in every 10 ABs or 6 hits in every 20 ABs.
- But, if we let A-Rod bat 1,000 or 10,000 times, how many hits would we expect from him?

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USING A COIN TOSS TO ILLUSTRATE LAW OF LARGE NUMBERS

If we....	...toss the coin 10 times		...toss the coin 100 times		...toss the coin 10,000 times	
Name	# of Heads	Perceived Probability	# of Heads	Perceived Probability	# of Heads	Perceived Probability
Bob	4	0.4	57	0.57	5228	0.52
Mike	7	0.7	42	0.42	4975	0.50
Jennifer	9	0.9	70	0.70	5099	0.51
Kimberly	5	0.5	51	0.51	4911	0.49
Randy	6	0.6	62	0.62	4990	0.50
Average Probability Result		0.62		0.56		0.50

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Are you risk averse?

- Game 1
 - 10% - \$10,000
 - 90% - none
 or \$1,000
- Game 2
 - 33% - \$100
 - 67% - none
 or \$33
- Game 3
 - 50% - \$900,000
 - 50% - \$100,000
 or \$490,000

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Risk Aversion

Risk averse individuals will be willing to pay more than the "MFP" to transfer risk.

- Mathematically fair price
 - **Example:** 25 houses from a pool of 5,000 DFW households (insured) would burn down this year. Assume each house is valued at \$200,000. What is the mathematically fair price? How much money (premium) will a risk averse individual be willing to pay for such a policy?
- How about insurers' expenses and cost of losses?
- Can you give me another example of risk aversion?

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Legal Definition of Insurance

- The legal definition focuses on a **contractual arrangement** whereby one party agrees to compensate another party for specific losses.
- The financial definition provides for the **funding** of the losses whereas the legal definition provides for the **parameters** to the agreement – the legally enforceable contract that spells out the legal rights, duties and obligations of all the parties to the contract.

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Legal Definition of Insurance

- Insurance is a legal contract.
- One party agrees to compensate another party for losses.
- Insured vs. Insurer
 - What is the difference?

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Legal Definition (cont'd)

- Insurance
- Insurer
- Insured
- Premium
- Policy
- Exposure to Loss
 - The **insured's** possibility of loss.

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Summary

- Buyers TRANSFER risk of loss to the insurer.
- Insurer POOLS those having similar risk.
- Insurer PREDICTS losses the pool will suffer.
- Insurer REDISTRIBUTES the cost of the losses back to members of the pool.

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Examples

- Destruction of an assembly robot in a car factory. The immediate loss or destruction of the robot would be the direct loss.
- The resulting production line shutdown, idled workers, loss of sales, or increased cost of continuing operations at the same level of production is the indirect loss.

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Loss

- Loss: the undesired, unplanned reduction of economic value; the immediate first result of an insured peril .
 - Direct vs. Indirect losses
 - Indirect losses are a result of a direct loss
 - Fire destroys home
 - Direct: The value of the house
 - Indirect: Hotel stays
 - Auto accident
 - Direct: Damages to the car
 - Indirect:

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Peril

- The **cause** of the loss.
- Examples: fire, theft, floods, wind, collision...
- Insurance policies provide financial protection against losses caused by perils => insured perils.
- List/named perils Contracts.
- Open-perils Contracts; all-risk.

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Hazard

- Conditions that increase the frequency and/or the severity of losses.
- Examples:
 - Improper storage of gasoline
 - Driving too fast
 - Smoking

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Types of Hazards

- **Physical hazards:** icy street, old wiring.
- **Moral hazard:** individual characteristics contributing to risk, e.g., arsonist.
- **Morale hazard:** indifference to loss because of insurance.



Moral Hazard

- Moral hazard means that there exists intentional dishonesty and the insured tries to defraud the insurer by deliberately causing losses or by exaggerating claims.

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Illustration of Moral Hazard

- How might moral hazard arise in the case of homeowners insurance?
- How does the corporate form of organization create moral hazard?



Insurance Fraud

- If an individual causes or exaggerates a loss to collect insurance proceeds, this is insurance fraud, and the loss results from the **moral hazard**.
 - Loss results from moral hazard.
 - Burning down a house to collect insurance.

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Risks

- Uncertainty concerning occurrence of a loss.
- Pure risk (- or zero)
- Speculative risk (+, 0, -)
- Subjective risk: perception of risk.
- Objective risk: Prediction (based on probability, statistics) not happen.

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Summary

EXPOSURE TO LOSS	HAZARDS	PERIL THAT CAUSES LOSS
Automobile damage	Icy roads, worn tires	collision
Residence damage	faulty wiring, smoking, leaving an iron on when you leave for work	fire
Loss of health/life	smoking, exposure to radiation, ingesting saccharin,	cancer

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Objective & Subjective Risk

- **Objective Risk**
 - Relative variation of actual from expected loss
 - E.g., there is a 5% chance that you will have 1 auto accident, but in actuality you may have no accidents or multiple accidents.
 - E.g., an insurer insuring 100,000 drivers like you may have 4,000 claims or 6,000 claims.
- **Subjective Risk**
 - Uncertainty based on state of mind
 - Matter of perception, can vary among people

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Questions

- Which involves greater objective risk?
 - investing in one stock
 - investing in a mutual fund of similar stocks
- Which involves greater objective risk?
 - covering the losses of one home
 - covering the losses of 1,000 homes



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Proximate Cause

- The ***first*** insured peril in a (unbroken) chain of events leading to loss.
 - The proximate cause doctrine may require insurers to pay for losses not directly specified in the contract.
- Example: Smoke and water damage after a fire will get paid even if the ***only*** peril insured is fire.

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Major Personal Risks

- ***Personal Risks***
 - premature death
 - old age (i.e., income needs)
 - injuries and health problems
 - unemployment
- ***Potential Losses***
 - loss of income
 - extra expenses
 - depletion of financial assets



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Elements of an Insurance Premium

- The actual cost of the losses.
- Expenses to operate the Pool.
- Allowance for unexpected losses (risk factor).
- Earnings on investment.
- Examples: Hypothetical Homeowners' Insurance Policy on pp. 2 (handout).

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Elements of an Insurance Premium

- Four components
 - What are they?
- The hypothetical homeowners' insurance policy example (next slide)
 - Another excellent example in the textbook (pp. 10)

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Elements of an Insurance Premium

- How do insurers make money?
 - Selling insurance policies; underwriting
 - Investing money (money is generated from underwriting)
- How can some insurers provide the same policy at a much lower price (premium)?
 - Economies of Scale
 - The ability to cut costs
 - Operational efficiency

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A HYPOTHETICAL HOMEOWNERS' INSURANCE POLICY

<i>Facts About Our Insurance Pool</i>	
Number of Homes in the Pool =	1,000
Value of Each Home =	\$100,000
Total Value of Property in Pool =	\$100,000,000
Losses We Expect =	
Probability of Loss = 2%	\$2,000,000
Predicted loss per homeowner =	\$2,000
<i>Facts About Our Operations</i>	
Total Expenses =	\$50,000
Expenses PER POLICY =	\$50
Total Investment Income =	\$40,000
Investment Income PER POLICY =	\$40
Risk Reserve PER POLICY (based on the known reliability of our loss data) =	\$100
<i>What Do We Charge Each Insured?</i>	
Cost of Losses =	\$2,000
Expenses =	50
Reserve for Unexpected Losses =	100
Investment Income =	(40)
Premium Charged per Policy =	\$2,110

Cash Flow Underwriting

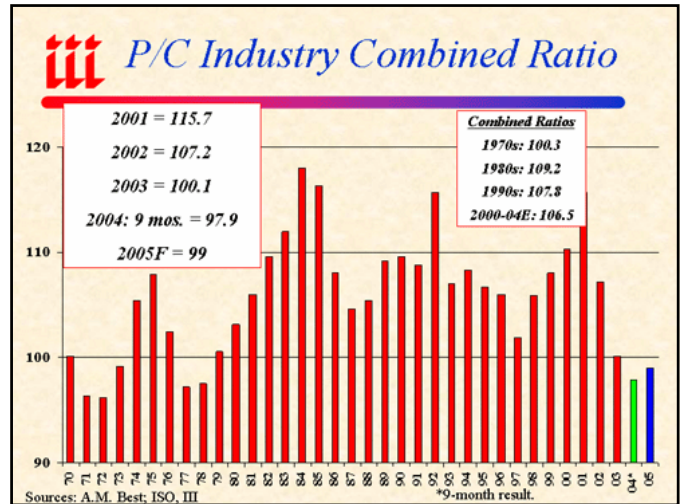
- Pricing insurance **below** the level of anticipated losses while relying on **investment income** to make a profit.
 - Risky practice?

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Property Insurance Ratios

- **Loss ratio:** the loss and loss adjustment expenses divided by earned premium.
- **Expense ratio:** the expenses of the company (excluding loss adjustment) divided by written premium.
- **Combined ratio:** Sum of the two.
 - What does it imply when an insurer has a combined ratio > 1.00?

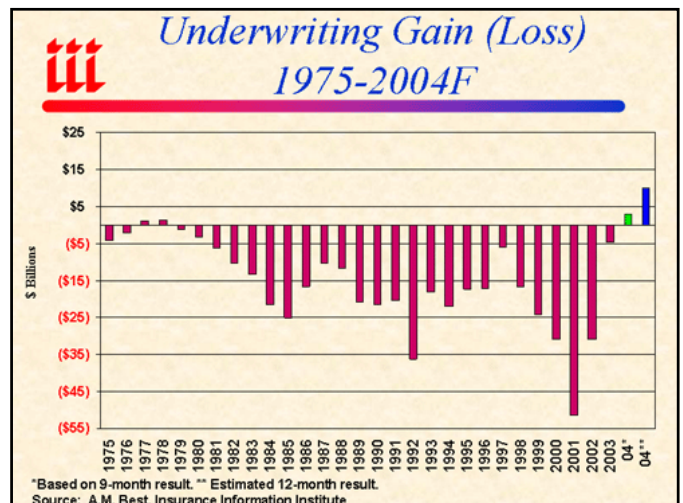
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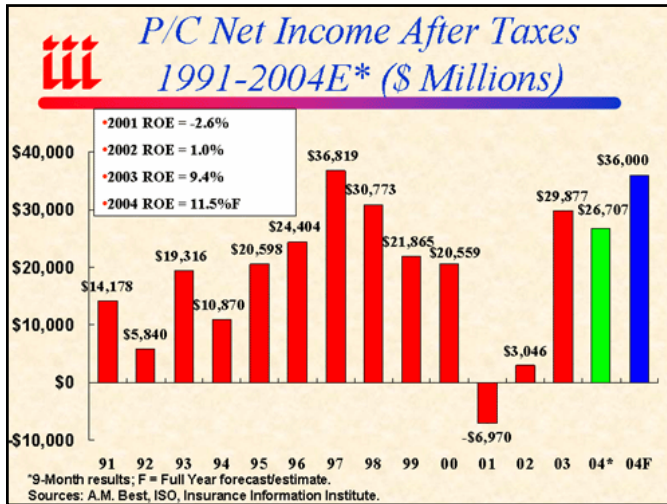


Combined Ratio

- Money spent on insurance/Premiums received
 - 95: Spent 95 cents for every dollar we made (good)
 - 105: spent \$1.05 for every \$1 we made (bad!)
 - In 2002, US property/casualty industry had combined ratio of 107.2!

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Costs of Insurance to Society

- Frauds
 - pp. 13 (Dorfman)
 - Please read
- Health insurance fraud loss > Property fraud loss.

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Benefits of Insurance to Society

- Benefits:
 - Stability for members of the society.
 - Reduces bankruptcy risk for firms and individuals.
 - Antimonopoly
 - Facilitates credit transactions
 - Lowers firm's cost of capital
 - Loss prevention and medical research.

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Objective Question 1

An insurable loss is:

- An event that has not been predicted.
- An exposure that cannot be easily measured before the event has occurred.
- An unexpected reduction of economic value.
- Being without something one has previously possessed.

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Objective Question 2

Choose the true statement.

- a. Risk averse people are willing to pay more than the mathematically fair price to transfer risk.
- b. Risk seekers are willing to pay more than the mathematically fair price to transfer risk.
- c. Risk neutral people are willing to pay more than the mathematically fair price to transfer risk.
- d. Risk averse people will not pay more than the mathematically fair price to transfer risk.

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Objective Question 4

The moral hazard is:

- a. A loss of faith in the insurance company because of a denial of claims.
- b. Illustrated by the loss of a wallet to a thief.
- c. The increase of loss caused by attempts to defraud the insurer.
- d. The potential for the insurance company to increase premiums after a loss.

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Objective Question 3

The definition of peril is:

- a. An event or condition that increases the chance of loss.
- b. The uncertainty concerning loss.
- c. A measure of the accuracy with which a loss can be predicted.
- d. The actual cause of the loss.

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Objective Question 5

“A financial arrangement that redistributes the costs of unexpected losses,” is the definition of:

- a. Derivative security
- b. Financial guarantee fund
- c. Mutual fund
- d. Insurance

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Objective Question 6

Storing 100 pounds of gun powder in the basement so a person can load his own shotgun shells is an example of a:

- a. a hazard
- b. a peril
- c. a loss
- d. proximate cause

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Objective Question 8

The EXPENSE RATIO is defined as:

- a. Insured expenses divided by insured losses
- b. Total expenses divided by written premiums
- c. Combined expenses and losses divided by net income
- d. Net income divided by total expenses

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Objective Question 7

A PURE RISK is one where:

- a. The result can only be a loss or no change
- b. The result can be a gain or a loss or no change
- c. The result can only be a gain or no change
- d. The result cannot be predicted

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Practice Problem 1

- Assume 1000 students all healthy, all age 22, and all male, form a life insurance pool to pay \$500 to the beneficiaries of any member who dies in the next 365 days. The chance of loss or probability of death for the members of this group is .002. To join the pool a member must pay: (disregard interest earnings and reserves and assume expenses of operating the insurance pool are 30% of losses).
 - a) \$1
 - b) \$1.30
 - c) \$3
 - d) \$2.28
 - e) \$3.30

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Practice Problem 2

Under an open perils insurance policy:

- a) covered perils are spelled out, usually using a numbered list.
- b) any piece of property not excluded is covered.
- c) absolutely all risks of losses are covered, those having an illegal purpose.
- d) all perils not excluded are covered.
- e) all perils and losses are excluded, except those mandated by law.

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