



This work is protected by United States copyright laws and is provided solely for the use of instructors in teaching their courses and assessing student learning. Dissemination or sale of any part of this work (including on the World Wide Web) will destroy the integrity of the work and is not permitted. The work and materials from it should never be made available to students except by instructors using the accompanying text in their classes. All recipients of this work are expected to abide by these restrictions and to honor the intended pedagogical purposes and the needs of other instructors who rely on these materials.

Uncertainty and Asymmetric Information

17



CHAPTER OUTLINE

Decision Making Under Uncertainty: The Tools

- Expected Value
- Expected Utility
- Attitudes Toward Risk

Asymmetric Information

- Adverse Selection
- Market Signaling
- Moral Hazard

Incentives

- Labor Market Incentives

Decision Making Under Uncertainty: The Tools

Expected Value

payoff The amount that comes from a possible outcome or result.

expected value The sum of the payoffs associated with each possible outcome of a situation weighted by its probability of occurring.

The expected value (EV) of a coin toss with a payoff of +\$1 for heads and -\$1 for tails and a probability of $\frac{1}{2}$ for heads and $\frac{1}{2}$ for tails is:

$$EV = 1/2 (\$1) + 1/2 (-\$1) = 0$$

The financial value of this deal to me, or its expected value, is \$0. Half the time I win a dollar, and half the time I lose a dollar.

fair game or fair bet A game whose expected value is zero.



Suppose that someone in the gulf coast wants to insure their \$200,000 home against the probability of a hurricane. The policy costs \$300, and the probability of a hurricane is estimated at 0.0002. What is the expected value of the policy for the insurance company?

- \$339.94
- \$40
- \$260
- \$200,000

Suppose that someone in the gulf coast wants to insure their \$200,000 home against the probability of a hurricane. The policy costs \$300, and the probability of a hurricane is estimated at 0.0002. What is the expected value of the policy for the insurance company?

- \$339.94
- \$40
- \$260**
- \$200,000



In a fair game, the expected value equals:

- a. Zero.
- b. One.
- c. 100%
- d. A positive value, because the gains are expected to be greater than the losses.

In a fair game, the expected value equals:

- a. **Zero.**
- b. One.
- c. 100%
- d. A positive value, because the gains are expected to be greater than the losses.

Expected Utility

diminishing marginal utility The more of any one good consumed in a given period, the less incremental satisfaction is generated by consuming a marginal or incremental unit of the same good.

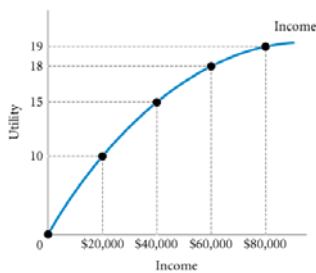


If Sasha receives her income in \$10,000 increments and she is subject to diminishing marginal utility from income, which \$10,000 payment is more important to her?

- a. The first \$10,000 received.
- b. The last \$10,000 received.
- c. None. All payments yield the same amount of utility.
- d. None. Sasha is unable to establish which payment is more important.

► **FIGURE 17.1** The Relationship Between Utility and Income

The figure shows the way in which utility increases with income for a hypothetical person, Jacob. Notice that utility increases with income but at a decreasing rate: the curve gets flatter as income increases. This curve shows diminishing marginal utility of income.



If Sasha receives her income in \$10,000 increments and she is subject to diminishing marginal utility from income, which \$10,000 payment is more important to her?

- a. **The first \$10,000 received.**
- b. The last \$10,000 received.
- c. None. All payments yield the same amount of utility.
- d. None. Sasha is unable to establish which payment is more important.

Rather than earning \$40,000 for sure, at the end of the year, a manager will toss a coin. If it is heads, Jacob will earn \$60,000; but if the coin turns up tails, his earnings will fall to \$20,000. The expected value of the two salaries is the same.

$$EV = 1/2 (\$20,000) + 1/2 (\$60,000) = \$40,000$$

expected utility The sum of the utilities coming from all possible outcomes of a deal, weighted by the probability of each occurring.

In the coin-toss salary offer, the expected utility (EU) is

$$EU = 1/2 U(\$20,000) + 1/2 U(\$60,000), \text{ which reduces to} \\ EU = 1/2 (10) + 1/2 (18) = 14$$

Since Jacob's utility from a fixed salary of \$40,000 is 15, he will not take the coin-toss salary alternative.

Attitudes Toward Risk

risk-averse Refers to a person's preference of a certain payoff over an uncertain one with the same expected value.

risk-neutral Refers to a person's willingness to take a bet with an expected value of zero.

risk-loving Refers to a person's preference for an uncertain deal over a certain deal with an equal expected value.

The presence of risk and uncertainty do not by themselves pose a problem for the workings of the market.



Which individual prefers a certain payoff over an uncertain one?

- A risk-neutral individual.
- A risk-averse individual.
- A risk-loving individual.
- A risk-free individual.

Which individual prefers a certain payoff over an uncertain one?

- A risk-neutral individual.
- A risk-averse individual.**
- A risk-loving individual.
- A risk-free individual.



A risk premium is the maximum price that a _____ person will take to avoid taking a chance.

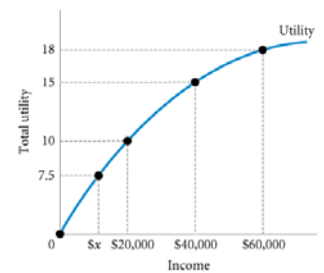
- risk-averse
- risk-neutral
- risk-loving
- risk-savvy

A risk premium is the maximum price that a _____ person will take to avoid taking a chance.

- risk-averse**
- risk-neutral
- risk-loving
- risk-savvy

► **FIGURE 17.2 Risk Aversion and Insurance Markets**

With a 50 percent chance of earning \$40,000 and a 50 percent chance of becoming disabled and earning \$0, Jacob has an EV of income of \$20,000. But his expected utility is halfway between the utility of \$40,000 (15) and the utility of 0 (0), or 7.5. \$x is the amount of certain earnings Jacob would accept to avoid a 50 percent chance of earning \$0.



$$EV = 1/2(\$40,000) + 1/2(\$0) = \$20,000$$

$$EU = 1/2U(\$0) + 1/2U(\$40,000)$$

$$EU = 1/2(0) + 1/2(15) = 7.5$$

Asymmetric Information

asymmetric information One of the parties to a transaction has information relevant to the transaction that the other party does not have.

Adverse Selection

adverse selection A situation in which asymmetric information results in high-quality goods or high-quality consumers being squeezed out of transactions because they cannot demonstrate their quality.

Adverse Selection and Lemons

The used car setting highlights the market failure associated with adverse selection. Because one party to the transaction—the seller—has better information than the other party and because people behave opportunistically, owners of high-quality cars will have difficulty selling them.

Buyers who are interested in peaches (good cars) will find it hard to buy one because they cannot tell a lemon (a bad car) from a peach and thus are not willing to offer a high enough price to make the transaction.

The market, which is normally good at moving goods from consumers who place a lower value on a good to consumers with higher values, does not work properly.



With a fifty-fifty chance of choosing either, suppose that potential buyers are willing to pay \$5,000 for a reliable car, but only \$2,500 for an unreliable one, how much will buyers offer for a car?

- a. \$2,500.
- b. \$3,750.
- c. \$5,000.
- d. \$4,999.

With a fifty-fifty chance of choosing either, suppose that potential buyers are willing to pay \$5,000 for a reliable car, but only \$2,500 for an unreliable one, how much will buyers offer for a car?

- a. \$2,500.
- b. **\$3,750.**
- c. \$5,000.
- d. \$4,999.

Adverse Selection and Insurance

For a given premium level, those who know themselves to be most in need of medical care will be most attracted to the insurance. As unhealthy people swell the ranks of the insured, premiums will rise. The higher the rates, the less attractive healthy people will find such insurance.

Reducing Adverse Selection Problems

Individuals, markets, and the government try to reduce adverse selection problems. The Health Care Reform Act of 2010 began moving the United States toward *universal health coverage*. To the extent that universal coverage reduces choice, it reduces the adverse selection problem.



Asymmetric information problems are particularly severe in the market for insurance. Which of the following is the precise reason for that?

- a. Sellers of insurance will always know more about the likelihood of an event happening than will buyers.
- b. Buyers of insurance will always know more about the likelihood of an event happening than will insurance companies.
- c. Buyers and sellers of insurance cannot distinguish between good and bad information.
- d. Insurance companies are non-depository financial institutions.

Asymmetric information problems are particularly severe in the market for insurance. Which of the following is the precise reason for that?

- a. Sellers of insurance will always know more about the likelihood of an event happening than will buyers.
- b. **Buyers of insurance will always know more about the likelihood of an event happening than will insurance companies.**
- c. Buyers and sellers of insurance cannot distinguish between good and bad information.
- d. Insurance companies are non-depository financial institutions.

ECONOMICS IN PRACTICE

Adverse Selection in the Health Care Market

Health care is one area in which insurers worry about the problem of adverse selection.

A recent study on long-term care insurance and Huntington's disease (HD) illustrates the issue.

Individuals who carry the HD genetic mutation are up to five times as likely as the general population to buy long-term care insurance, indicating that adverse selection is both present and strong.

As genetic testing increases, situations of adverse selection in the health care area are likely to increase and we will be confronted with harder choices on how much genetic testing to reveal.

THINKING PRACTICALLY

1. Economists have found that many young single people do not buy health care insurance. Why not?

ECONOMICS IN PRACTICE

How to Read Advertisements

Recognizing that profit-seeking individuals place ads lets us draw conclusions about the information they do not provide.

This same logic can be used in a corporate setting. In 2002, Congress and the president passed new accounting rules that require firms to inform shareholders of the stock options they give to their executives and the effect of those options on the firms' costs.

Not surprisingly, those firms for whom options costs were large chose to place information in footnotes, while firms with fewer options to disclose were more forthcoming.

Lack of information sometimes serves as a signal.

THINKING PRACTICALLY

If a box of raisins claims it contains at least 100 raisins, do you think it is likely that there are 200?

Market Signaling

market signaling Actions taken by buyers and sellers to communicate quality in a world of uncertainty.

Moral Hazard

moral hazard Arises when one party to a contract changes behavior in response to that contract and thus passes on the costs of that behavior change to the other party.



In the job market, which of the following is a strong signal on the part of a job applicant?

- a. Asking for a high wage.
- b. Asking for a low wage.
- c. Having finished a college degree.
- d. Having experience that closely matches the job description.

In the job market, which of the following is a strong signal on the part of a job applicant?

- a. Asking for a high wage.
- b. Asking for a low wage.
- c. **Having finished a college degree.**
- d. Having experience that closely matches the job description.



Life insurance companies do not pay off in the case of suicide during the first two years the policy is in force. This action guards against the possibility of:

- a. Risk aversion.
- b. Adverse selection.
- c. Market signaling.
- d. Moral hazard.

Life insurance companies do not pay off in the case of suicide during the first two years the policy is in force. This action guards against the possibility of:

- a. Risk aversion.
- b. Adverse selection.
- c. Market signaling.
- d. **Moral hazard.**

Incentives

mechanism design A contract or an institution that aligns the interests of two parties in a transaction. A piece rate, for example, creates incentives for a worker to work hard, just as his or her superior wants. A co-pay in the health care industry encourages more careful use of health care, just as the insurance company wants.

Labor Market Incentives

Variable compensation can help firms get better performance from their workforce.

One reason that many companies design compensation with a component that varies with performance is that they want to attract the right kind of employees and *screen out* poor workers.

Many have argued that compensation in the financial industry can be traced to excess risk taking.



What is the effect of adopting deductibles and co-payments for all holders of insurance policies?

- a. Holders will have an incentive to file more claims.
- b. Holders will have an incentive to avoid filing claims.
- c. The moral hazard problem in the insurance market will be greater.
- d. The adverse selection problem in the insurance market will be greater.



What is the effect of adopting deductibles and co-payments for all holders of insurance policies?

- a. Holders will have an incentive to file more claims.
- b. **Holders will have an incentive to avoid filing claims.**
- c. The moral hazard problem in the insurance market will be greater.
- d. The adverse selection problem in the insurance market will be greater.

If the performance of a company CEO involves greater uncertainty, the company is more likely to offer a greater portion of his compensation in the form of:

- a. a fixed salary.
- b. in kind, or non-monetary benefits.
- c. performance compensation.
- d. praise.

If the performance of a company CEO involves greater uncertainty, the company is more likely to offer a greater portion of his compensation in the form of:

- a. a fixed salary.
- b. in kind, or non-monetary benefits.
- c. **performance compensation.**
- d. praise.



Which company is more likely to offer a wellness program for its employees?

- a. A company whose health insurance price depends on the number of medical claims filed by its workers.
- b. A company that does not pay any health insurance for its employees.
- c. A company that pays low insurance premiums for its employees.
- d. A company that offers in-house health care.

Which company is more likely to offer a wellness program for its employees?

- a. **A company whose health insurance price depends on the number of medical claims filed by its workers.**
- b. A company that does not pay any health insurance for its employees.
- c. A company that pays low insurance premiums for its employees.
- d. A company that offers in-house health care.

ECONOMICS IN PRACTICE

How's the Snow?

We can see why resorts might have an incentive to exaggerate the frequency of snowfall. More fresh snow in the report entices more skiers.

Zinman and Zitzewitz realized that the incentive to over-report snow was especially prominent on weekends, when more opportunistic one day skiers are likely to be enticed to a particular area.

There are 23% more reports of natural, new, or fresh snow by resorts on weekends than on weekdays. On average, of course, it snows more or less equally on each day of the week.

But take heart skiers: Zinman and Zitzewitz also found that a new iPhone app that allows skiers at a slope to report conditions to others has dramatically reduced the over-reporting problem.

THINKING PRACTICALLY

1. What do you think stimulated the demand for this new iPhone app?

REVIEW TERMS AND CONCEPTS

adverse selection	mechanism design
asymmetric information	moral hazard
diminishing marginal utility	payoff
expected utility	risk-averse
expected value	risk-loving
fair game or fair bet	risk-neutral
market signaling	risk premium