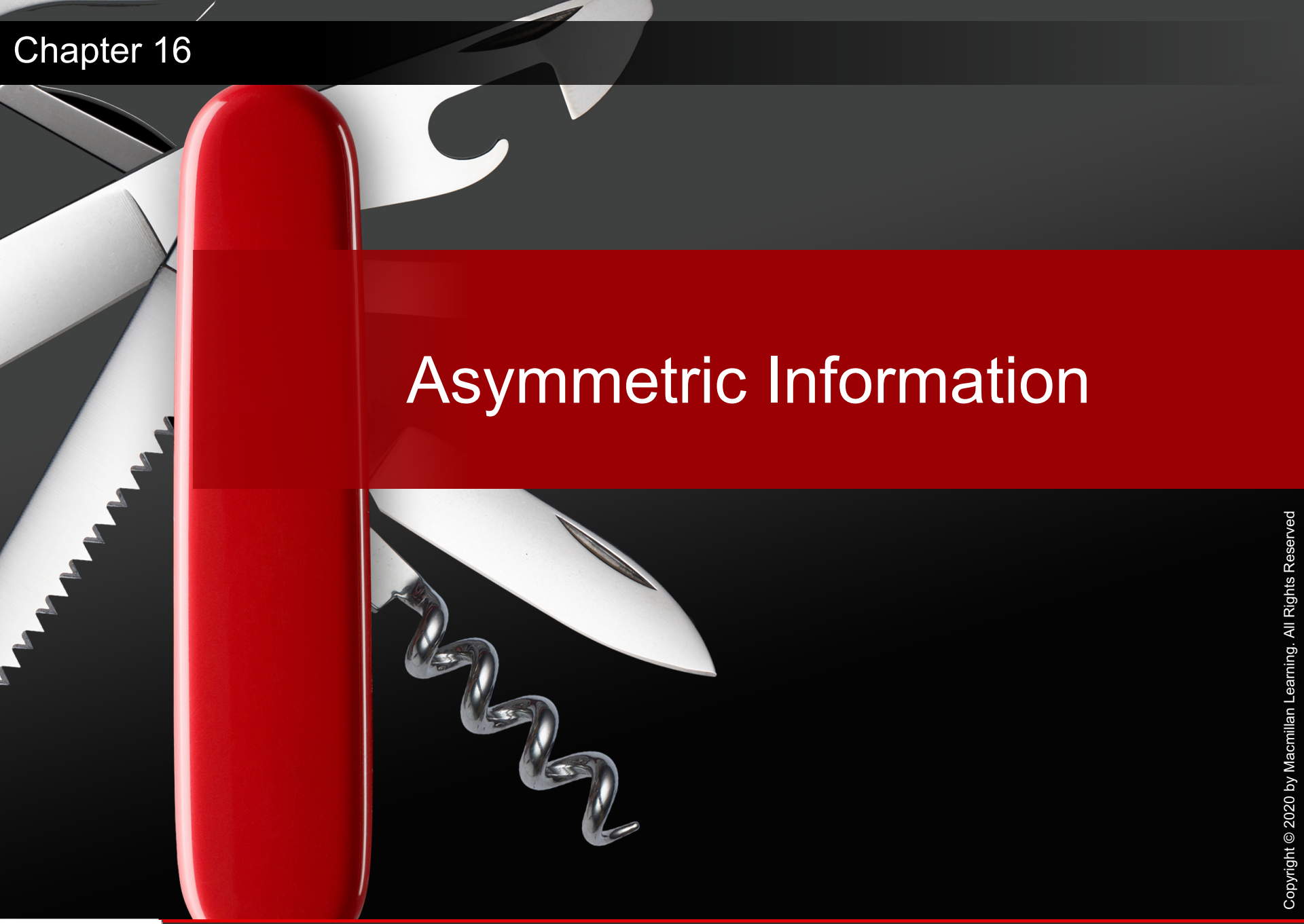


Asymmetric Information

Introduction (1/1)

16

Our analysis of markets, thus far, has assumed that participants have complete information in market transactions.

In reality, many market transactions occur under conditions of **incomplete information**, in which one or more parties to a market cannot determine with certainty all of the important attributes of a market or a particular good.

This is **asymmetric information**—an imbalance of information across participants in a transaction.

Chapter Outline

The Lemons Problem and Adverse Selection (1/13)

16.1

A common manifestation of asymmetric information in markets is the **lemons problem**.

- An asymmetric information problem occurs when a seller knows more about the quality of the good he is selling than does the buyer.
- First formally analyzed by economist George Akerlof, who studied the used-car market

Consider the market for a used car from a private-party seller.

- Assume there are two types of used cars—good ones (plums) and bad ones (lemons).
- Half of the cars available are plums and half are lemons.
- Potential buyers value plums at $10,000 but place no value on lemons.
- Sellers value plums at $8,000 and also have no value for lemons.

The Lemons Problem and Adverse Selection (2/13)

16.1

Observable Quality

First, think about market outcomes if quality attributes are observable to both sellers and buyers.

- Since sellers value plums at $8,000 and buyers value plums at $10,000, the half of used cars that are plums will sell at prices between these two values.
- Both parties are better off following the trade.
  - Buyers value the cars more than former owners, and former owners are happier with the money.
- Lemons have no value, so none will be sold.

The Lemons Problem and Adverse Selection (3/13)

16.1

Unobservable Quality

Now, consider what happens when *sellers* know whether their offering is a plum or a lemon but buyers do not.

- Buyers know 50% of cars are lemons.
- Therefore, buyers recognize that the probability that they will purchase a lemon is 50%.

What is the most a buyer is willing to pay for a used car?

- Since buyers value plums at $10,000 and lemons at $0 and since there is a 50% chance that a given car is a lemon, the most a buyer is willing to pay is:

$$EV = (\$10{,}000 \times 0.50) + (\$0 \times 0.50) = \$5{,}000$$

- Any buyer who pays more is worse off (in expectation) from engaging in the trade.

The Lemons Problem and Adverse Selection (4/13): Question 1

16.1

Suppose consumers value a genuine antique vase at $5,000, while they value a replica vase at $100. If potential online buyers cannot tell the difference between the two types of vases and they believe there is a 60% chance that a particular vase is genuine and 40% chance that it is a replica, what is the highest price potential buyers would be willing to pay for a vase?

A. $2,060
B. $2,550
C. $3,040
D. $4,250

The Lemons Problem and Adverse Selection (4/13): Question 1 – Correct Answer

16.1

Suppose consumers value a genuine antique vase at $5,000, while they value a replica vase at $100. If potential online buyers cannot tell the difference between the two types of vases and they believe there is a 60% chance that a particular vase is genuine and 40% chance that it is a replica, what is the highest price potential buyers would be willing to pay for a vase?

A. $2,060
B. $2,550
C. $3,040 (correct answer)
D. $4,250

The Lemons Problem and Adverse Selection (5/13)

16.1

Unobservable Quality

Now, think about the owner of a plum who is considering whether to sell.

- The seller values his car at $8,000 but recognizes that, because buyers can't know for sure whether or not his car is a plum, he could never get more than $5,000.
- Therefore, he does not offer the car for sale.

The lemons problem is that market transactions fail to occur because of asymmetric information; this a market failure.

The Lemons Problem and Adverse Selection (6/13): Question 2

16.1

Suppose consumers value a genuine antique vase at $5,000, while they value a replica vase at $100. If potential online buyers cannot tell the difference between the two types of vases, they believe there is a 60% chance that a particular vase is genuine and 40% chance that it is a replica. If a seller of a genuine antique vase values her vase at $4,000, which of the following is true?

A. The seller will offer the vase for sale and receive $4,000.
B. The seller will offer the vase for sale and receive more than $4,000.
C. The vase will be sold, but at a lower price than the seller values it.
D. The seller will not offer the vase for sale.

The Lemons Problem and Adverse Selection (6/13): Question 2 – Correct Answer

16.1

Suppose consumers value a genuine antique vase at $5,000, while they value a replica vase at $100. If potential online buyers cannot tell the difference between the two types of vases, they believe there is a 60% chance that a particular vase is genuine and 40% chance that it is a replica. If a seller of a genuine antique vase values her vase at $4,000, which of the following is true?

A. The seller will offer the vase for sale and receive $4,000.
B. The seller will offer the vase for sale and receive more than $4,000.
C. The vase will be sold, but at a lower price than the seller values it.
D. The seller will not offer the vase for sale. (correct answer)

The Lemons Problem and Adverse Selection (7/13)

16.1

Adverse selection: a situation where there are stronger incentives for "bad" types of a product to be involved in a transaction than "good" types of the product

The existence of quality differences is not by itself a market failure; instead, it is a lack of information.

- This leads to a market price that provides no incentive for plums to be offered for sale but every incentive for lemons to be offered for sale.

Information asymmetries hurt not only those with little information but also those with more information.

- Both sides lose because a lack of complete information prevents trades.
- In this example, buyers and owners of plums are both hurt despite the owners having complete information.

The Lemons Problem and Adverse Selection (8/13)

16.1

Other Examples of the Lemons Problem

Among the many markets characterized by information asymmetries:

- Used merchandise sold online
- Home improvement
- Vehicle repairs
- Labor
- Insurance

The Lemons Problem and Adverse Selection (9/13)

16.1

Mechanisms That Mitigate Lemons Problems

The lemons problem destroys economic value by preventing beneficial exchanges. In response, institutions to mitigate information asymmetries have developed.

These can work in three ways:

1. Address the information asymmetry directly by allowing buyers to observe quality characteristics before a transaction takes place
2. Punish sellers who misrepresent their lemons as plums
3. Use incentives to increase the number of plums brought to market

The Lemons Problem and Adverse Selection (10/13)

16.1

Reducing Asymmetric Information Directly

- Third-party examinations of quality (e.g., mechanics)
- Offering standardized, unbiased information products (e.g., AutoCheck)

Incentives for Truthful Quality Reporting

- Reputation (e.g., online feedback)
- Warranties and return policies (offered by seller)
  - Lemon laws mandate warranties and return policies for new and used vehicles in many states.

Increasing the Average Quality of Cars Placed on the Market

- Leasing can increase the average quality of used cars by encouraging return, regardless of quality.

The Lemons Problem and Adverse Selection (11/13)

16.1

Beyond Used Cars

- Better Business Bureau and Angie's List
- Referrals and references
- Accreditation services

The Lemons Problem and Adverse Selection (12/13)

16.1

Adverse Selection When the Buyer Has More Information: Insurance Markets

Thus far, we have considered the case of the seller having more information than the buyer. However, in some markets the buyer holds the information advantage.

Consider insurance.

- Health, auto, life, others
- Requires the seller to pay the buyer compensation in the event of a covered incident

What information do the buyers have that sellers lack?

- Risk! Sellers are unable to determine quality, or the likelihood that a buyer will have claims.
- Thus, insurance buyers are adversely selected in insurance markets.

The Lemons Problem and Adverse Selection (13/13)

16.1

Mitigating Adverse Selection in Insurance

A number of mechanisms have emerged to deal with adverse selection in insurance markets.

1. **Group policies**
   - Tying insurance to employment removes the link between the individual's riskiness and the decision to purchase insurance.
   - Pooling individuals reduces the effect of any given poor-risk person.
2. **Screening**
   - Detailed questionnaires, health exams, driving records, and so on
2. **Denying coverage**
   - Insurers try to deny coverage to individuals with certain risk factors or pre-existing conditions. This was the reasoning behind the protections provided in the ACA (Affordable Care Act).

Moral Hazard (1/5)

16.2

Moral Hazard

Moral hazard arises when one party to a transaction cannot observe the other party's behavior.

- When quality is difficult to observe, a party to a transaction may have a financial incentive to engage in fraud.
  - For example, money managers handling clients' funds

In insurance markets, **adverse selection** refers to the problem of deciding who to insure and at what price.

Moral hazard refers to the effect of being insured on the behavior of an individual.

- Knowing you are insured may make you more willing to take risks, since part of your risk is being borne by a third party.

Moral Hazard (2/5)

Moral Hazard in Insurance Markets

Consider comprehensive auto insurance.

- Comprehensive insurance compensates drivers in the event their vehicle is stolen (among other things).

How might drivers' behavior change if they know they are covered by a comprehensive insurance policy?

  - The coverage may lead them not to try to prevent theft.

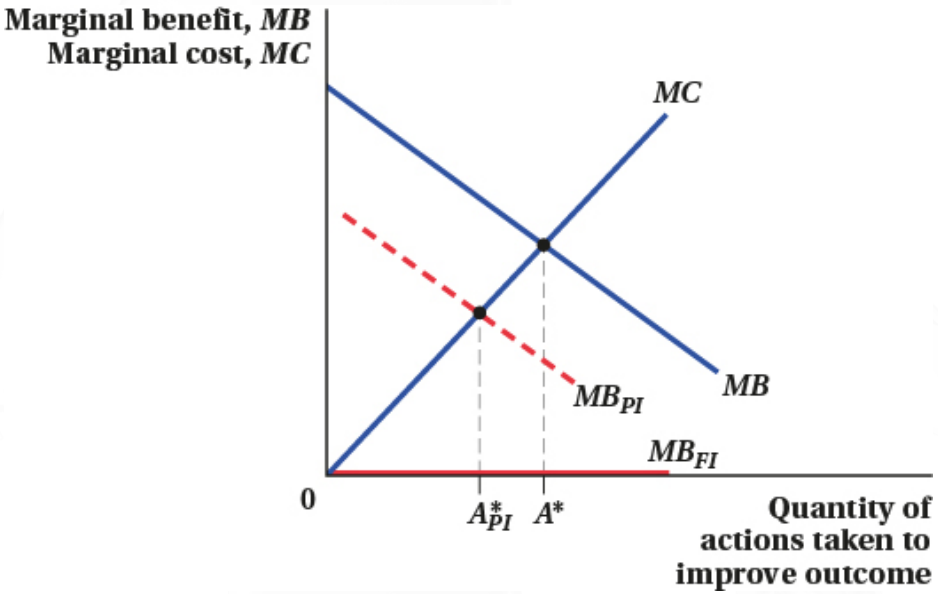
  Examples:

  - Parking on the street instead of a garage
  - Parking in relatively unsafe areas
  - Not locking the car

Moral Hazard (3/5)

16.2

Figure 16.1 Moral Hazard in the Insurance Market



In a market without insurance, an agent will act to improve the potential for a good outcome up until A^*, where the marginal benefit of further action, MB, equals the marginal cost, MC.

If the policy offers partial insurance, the agent will have the incentive to take action—but not to the same degree as in the absence of insurance.

If, instead, the agent obtains full insurance, there is no marginal benefit to acting to improve the potential for a good outcome, because he will be fully compensated for any bad outcome.

Moral Hazard (4/5)

16.2

Moral Hazard Outside of Insurance Markets

Another common instance of moral hazard occurs between borrowers and lenders in financial markets.

- Borrowers' liability may be limited (e.g., in bankruptcy proceedings), meaning they may be willing to take unjustified risks with borrowed funds.

The recent financial crisis has highlighted the issue of "too big to fail."

- Implicit guarantees to large financial institutions may increase risk taking.

Employer–employee relationships often are a source of moral hazard.

- Inability to observe all of employees' activities provides an opportunity and incentive for employees to shirk.

Moral Hazard (5/5)

16.2

Lessening Moral Hazard

Market mechanisms have developed to diminish the effects of moral hazard.

Insurance policies often mandate actions to be taken by the insured.

- Commercial property insurance often requires working smoke detectors and regularly inspected fire extinguishers.

Policies can be structured to encourage good behavior.

- Some auto insurance deductibles fall after each accident-free year.
- Life insurance premiums usually fall when efforts are made to improve health (e.g., quit smoking).

Asymmetric Information in Principal–Agent Relationships (1/5)

16.3

Principal–agent relationships are a set of economic transactions that feature information asymmetry between a principal and his hired agent, whose actions the principal cannot fully observe.

- Involves one party (the principal) hiring a second party (the agent) to perform a task and being unable to completely observe the effort of the agent

Information asymmetry is insufficient to develop a principal–agent problem.

- There must also be a misalignment between the incentives and preferences of the principal and the agent.
- For example, an employer wants her employees to work as hard as possible, but employees want to work as little as possible without being fired.

Asymmetric Information in Principal–Agent Relationships (2/5)

16.3

Principal–Agent and Moral Hazard: An Example

Consider a mall kiosk selling mobile phones.

- The kiosk is owned by Selena (the principal), who hires a single employee (Joe, the agent) to staff the kiosk.
- If Joe works hard, the kiosk earns a daily profit of $1,000 with 80% probability and $500 with 20% probability (expected profit of $900).
- If Joe does not work hard, the probabilities are reversed (expected profit of $600).
- Joe does not like to work hard and requires at least $150 per day to do so.
- Selena cannot observe Joe's effort.

Selena would be happy to pay Joe a flat rate of $150 per day to work hard, but as she cannot observe his effort (and profits are uncertain), she cannot be sure that he will indeed, follow through.

How can Selena encourage Joe to work hard?

Asymmetric Information in Principal–Agent Relationships (3/5)

16.3

Principal–Agent and Moral Hazard: An Example

Rather than paying Joe a flat rate, Selena can instead pay Joe a wage that varies with the profits of the kiosk.

- For example, Joe will be paid $255 if daily profits are high ($1,000) and $0 when profits are low ($500).
- If Joe works hard, the 80% probability of high profits yields an expected wage of $204 and a surplus of $54. (Remember, he also suffers an effort cost of $150.)
- If Joe does not work hard, the 20% probability of high profits yields an expected wage of $51, with no cost to him because he need not exert any effort.
- Under this compensation plan, Joe prefers working hard to being lazy.

Asymmetric Information in Principal–Agent Relationships (4/5)

16.3

Principal–Agent and Moral Hazard: An Example

Does Selena prefer this arrangement?

- Paying $255 to Joe for high-profit days yields an expected wage of $204.
- This is less than the increase in expected profits associated with Joe working hard ($300), so she will prefer this compensation plan.
- Expected profits are significantly higher than under the fixed compensation plan of $96 per day.

Asymmetric Information in Principal–Agent Relationships (5/5): Question 1

16.3

Susan recently purchased a high-quality flat screen TV and, because it was expensive, she bought an extended warranty that will replace her TV if it breaks for any reason. While Susan is at home watching her TV, she receives a weather alert informing her that a bad electrical storm is quickly approaching her area. Susan knows that she should unplug the TV to eliminate the possibility of a power surge (which would destroy the TV), but she chooses not to – she reasons that if there is a power surge, she has a warranty. This is an example of:

A. the principal-agent problem.
B. adverse selection.
C. moral hazard.
D. the lemons problem.

Asymmetric Information in Principal–Agent Relationships (5/5): Question 1 – Correct Answer

16.3

Susan recently purchased a high-quality flat screen TV and, because it was expensive, she bought an extended warranty that will replace her TV if it breaks for any reason. While Susan is at home watching her TV, she receives a weather alert informing her that a bad electrical storm is quickly approaching her area. Susan knows that she should unplug the TV to eliminate the possibility of a power surge (which would destroy the TV), but she chooses not to – she reasons that if there is a power surge, she has a warranty. This is an example of:

A. the principal-agent problem.
B. adverse selection.
C. moral hazard. (correct answer)
D. the lemons problem.

Signaling to Solve Asymmetric Information Problems (1/7)

16.4

One major result of principal–agent problems is that good agents or products are not identifiable and, therefore, cannot command full value.

Signaling is a solution to the problem of asymmetric information in which the knowledgeable party alerts the other party to an unobservable characteristic of the good.

Often, economic actors will attempt to communicate their quality via a **signal**.

- A costly action taken by an economic actor to indicate something that would otherwise be difficult to observe
- To signal high quality credibly, a signal must be less costly for high-quality agents than low-quality agents.

Signaling to Solve Asymmetric Information Problems (2/7)

16.4

The Classic Signaling Example: Education

Education—specifically the granting of degrees—is a classic case of signaling.

Highly productive workers like to let employers know they are, indeed, highly productive so they might receive a job offer and/or a higher wage.

- However, simply telling an employer that you are productive is cheap talk.
- A college degree, however, signals that you are, indeed, productive.
- College is difficult. It takes time, a lot of money, and an ability to learn and apply new information.
- These are the same attributes that often make employees productive.
- The fact that a third party (an accredited university) has issued a degree is a credible signal of productivity.

Signaling to Solve Asymmetric Information Problems (3/7)

16.4

The Classic Signaling Example: Education

We can use numbers to make this example clearer.

- Suppose there are two types of workers—high-productivity and low- productivity.
- Each year of higher education costs high-productivity workers $25,000, including psychic costs of going to class, finishing assignments, studying for exams, and so on.
- Each year of higher education costs low-productivity workers $50,000 because of their higher psychic costs.

$$C_H = \$25{,}000y$$
$$C_L = \$50{,}000y$$

Signaling to Solve Asymmetric Information Problems (4/7)

16.4

The Classic Signaling Example: Education

- Over a lifetime, high-productivity workers produce $250,000 worth of value to employers, whereas low-productivity workers produce $125,000 of value, regardless of education.
- Thus, employers are willing to pay high-productivity workers up to $125,000 more in wages. However, employers must be able to tell them apart from the low-productivity workers.
- Suppose employers view a four-year degree as a signal of high productivity and are willing to pay workers with a degree $125,000 more.

Is this an effective strategy?

  - For this to be effective, it must be incentive-compatible.
  - High-productivity workers must find it advantageous to use college as a signal, and low-productivity workers must find a college degree to be not worth the effort.

Signaling to Solve Asymmetric Information Problems (5/7)

16.4

The Classic Signaling Example: Education

- To determine whether the strategy is effective, compute the net benefits for each type of worker; ignore discounting.

$$NB_H = Benefit - (C_H \times 4\ years) = 125{,}000 - 100{,}000 = \$25{,}000$$

$$NB_L = Benefit - (C_L \times 4\ years) = 125{,}000 - 200{,}000 = \$ -75{,}000$$

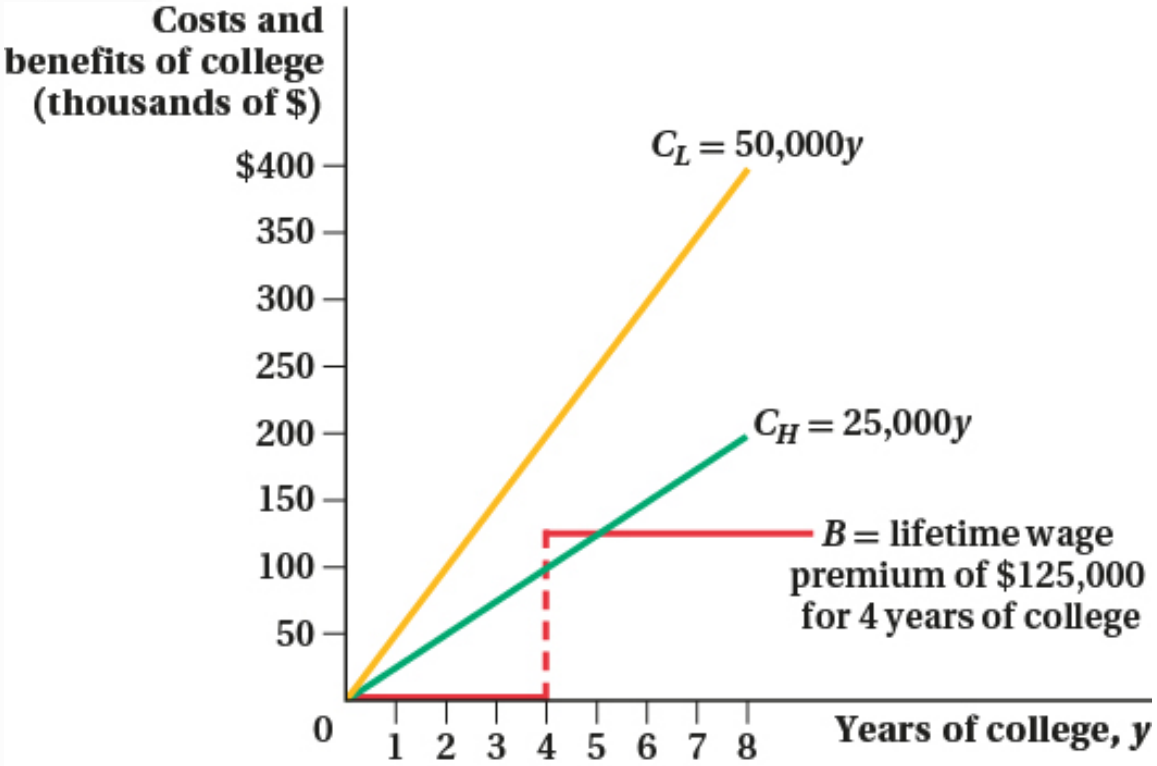
- High-productivity workers earn $25,000 more in surplus with a college degree, while low-productivity workers lose $75,000.

Therefore, this is an effective strategy, as the low-productivity workers will choose not to go to college.

Signaling to Solve Asymmetric Information Problems (6/7)

16.4

Figure 16.2 Education as a Signal on the Job Market



Signaling to Solve Asymmetric Information Problems (7/7)

16.4

Other Signals

How might the following be used as signals?

- Buying an engagement ring for your fiancée
- Offering a 10-year warranty
- Dressing professionally to go to work

Since quality is not always observable, signals are a market mechanism that can overcome some problems associated with information asymmetry.

Conclusion (1/1)

16.5

This chapter has examined asymmetric information.

In a world in which quality is not always observable, signals are a market mechanism that can overcome some problems associated with information asymmetry.

In the next chapter, we examine other market failures related to incomplete property rights, including externalities and public goods.