

# Microeconomics: Principles, Applications, and Tools

NINTH EDITION

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NINTH EDITION

## Chapter 14

### Imperfect Information: Adverse Selection and Moral Hazard

“So, why are you selling this used car?” The buyers of used cars ask this question frequently and then listen carefully to the answer.

# Learning Objectives

**14.1** Explain the notion of adverse selection for buyers.

**14.2** Discuss the possible responses to adverse selection for buyers.

**14.3** Explain the notion of adverse selection for sellers.

**14.4** Explain the notion of moral hazard.

**14.5** Use the marginal principle to describe optimal search by consumers.

# 14.1 ADVERSE SELECTION FOR BUYERS: THE LEMONS PROBLEM

- **Asymmetric information**

A situation in which one side of the market—either buyers or sellers—has better information than the other.

- **Mixed market**

A market in which goods of different qualities are sold for the same price.

- **Adverse selection**

Reluctance on the part of buyers to pay full value in a mixed market which results in all good quality products being withdrawn from the market.



# 14.1 ADVERSE SELECTION FOR BUYERS: THE LEMONS PROBLEM

## Uninformed Buyers and Knowledgeable Sellers

How much is a consumer willing to pay for a used car that could be either a lemon or a plum? To determine a consumer's willingness to pay in a mixed market with both lemons and plums, we must answer three questions:

1. How much is the consumer willing to pay for a plum?
2. How much is the consumer willing to pay for a lemon?
3. What is the chance that a used car purchased in the mixed market will be of low quality?

Consumer expectations play a key role in determining the market outcome when there is imperfect information.

# 14.1 ADVERSE SELECTION FOR BUYERS: THE LEMONS PROBLEM

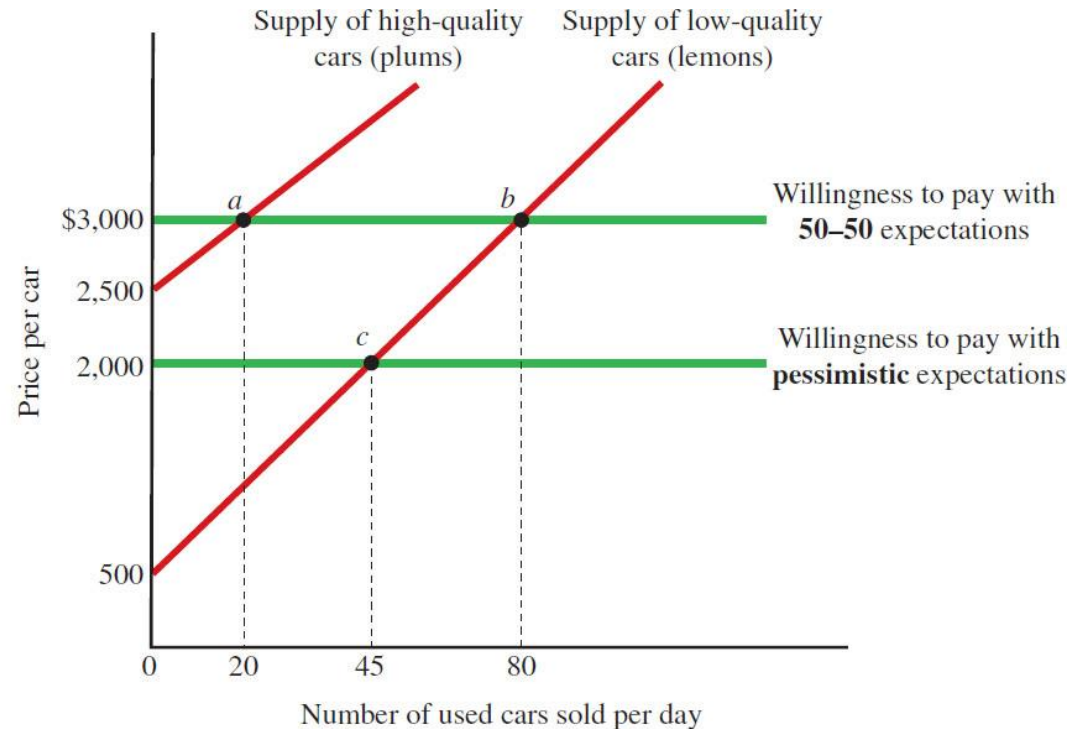
## Uninformed Buyers and Knowledgeable Sellers

If buyers assume that there is a 50–50 chance of a lemon or a plum, they are willing to pay \$3,000 for a used car.

At this price, 20 plums are supplied (point *a*) along with 80 lemons (point *b*). This is not an equilibrium because consumers' expectations of a 50–50 split are not realized.

If consumers become pessimistic and assume that all cars on the market will be lemons, they are willing to pay \$2,000 for a used car.

At this price, only lemons will be supplied (point *c*). Consumer expectations are realized, so the equilibrium is shown by point *c*, with an equilibrium price of \$2,000.



▲ FIGURE 14.1 All Used Cars on the Market Are Lemons

# SELECTION FOR BUYERS: LEMON

## Quality Goods

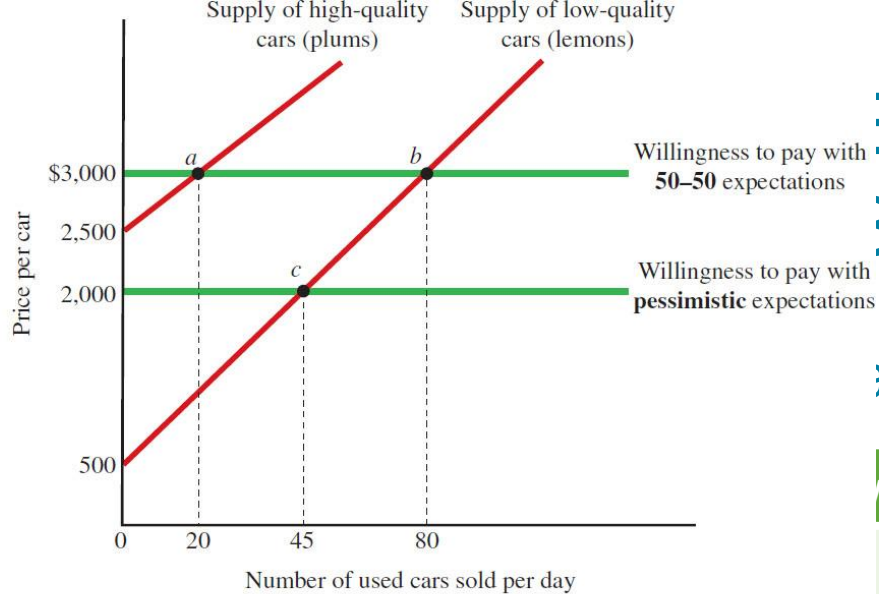


FIGURE 14.1 All Used Cars on the Market Are Lemons

	Quality Goods	
	Buyers Initially Have 50-50 Expectations	Equilibrium: Pessimistic Expectations
<b>Demand Side of Market</b>		
Amount buyer is willingness to pay for a lemon	\$2,000	\$2,000
Amount buyer is willingness to pay for a plum	\$4,000	\$4,000
Assumed chance of getting a lemon	50%	100%
Assumed chance of getting a plum	50%	0%
Amount buyer is willing to pay for a used car in mixed market	\$3,000	\$2,000
<b>Supply Side of Market</b>		
Number of lemons supplied	80	45
Number of plums supplied	20	0
Total number of used cars supplied	100	45
Actual chance of getting a lemon	80%	100%

# 14.1 ADVERSE SELECTION FOR BUYERS: THE LEMONS PROBLEM

## Equilibrium with All Low-Quality Goods

- **Adverse-selection problem**

A situation in which the uninformed side of the market must choose from an undesirable or adverse selection of goods.

The asymmetric information in the market generates a downward spiral of price and quality:

The presence of low-quality goods on the market pulls down the price consumers are willing to pay.

A decrease in price decreases the number of high-quality goods supplied, decreasing the average quality of goods on the market.

The decrease in the average quality of goods on the market pulls down the price consumers are willing to pay again.

# 14.1 ADVERSE SELECTION FOR BUYERS: THE LEMONS PROBLEM

## A Thin Market: Equilibrium with Some High-Quality Goods

- **Thin market**

A market in which some high-quality goods are sold but fewer than would be sold in a market with perfect information.

# 14.1 ADVERSE SELECTION FOR BUYERS: THE LEMONS PROBLEM

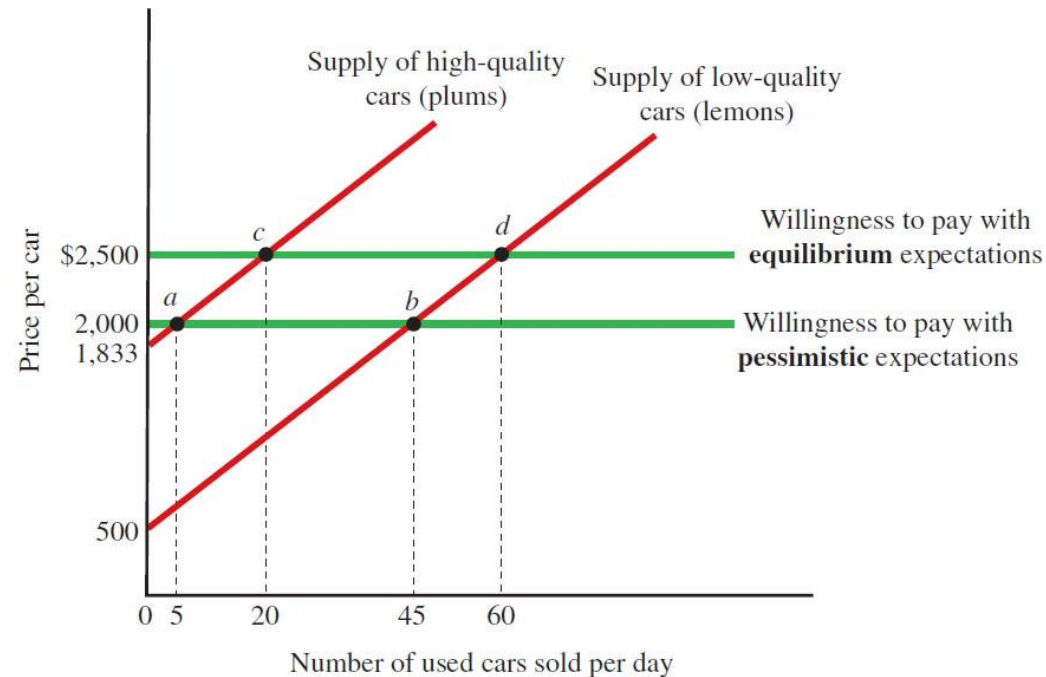
## A Thin Market: Equilibrium with Some High-Quality Goods

If buyers are pessimistic and assume that only lemons will be sold, they are willing to pay \$2,000 for a used car. At this price, 5 plums are supplied (point *a*), along with 45 lemons (point *b*). This is not an equilibrium because 10 percent of consumers get plums, contrary to their expectations.

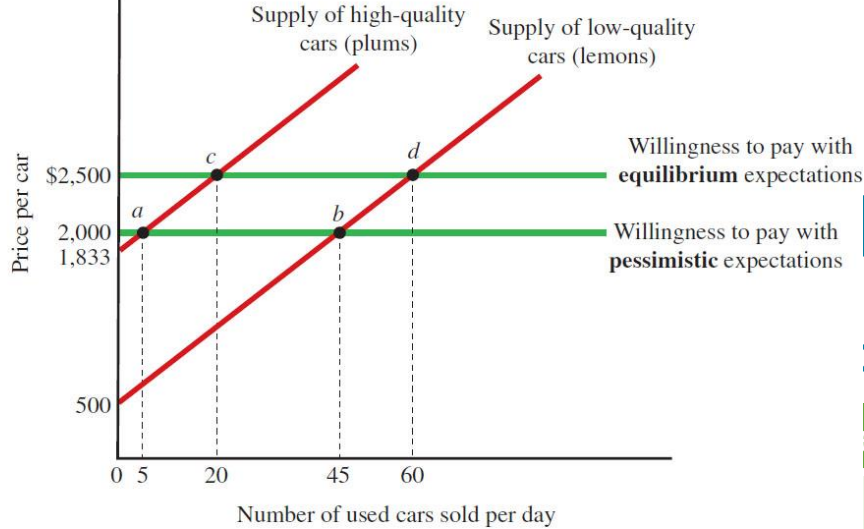
If consumers assume that there is a 25 percent chance of getting a plum, they are willing to pay \$2,500 for a used car. At this price, 20 plums are supplied (point *c*), along with 60 lemons (point *d*).

This is an equilibrium because 25 percent of consumers get plums, consistent with their expectations.

Consumer expectations are realized, so the equilibrium is shown by points *c* and *d*.



▲ **FIGURE 14.2** The Market for High-Quality Cars (Plums) Is Thin



# ACTION FOR BUYERS: LEM

## Some High-Quality Goods

### Quality Goods

▲ FIGURE 14.2 The Market for High-Quality Cars (Plums) Is Thin

#### Demand Side of Market

Amount buyer is willing to pay for a lemon	\$2,000	\$2,000
Amount buyer is willing to pay for a plum	\$4,000	\$4,000
Assumed chance of getting a lemon	100%	75%
Assumed chance of getting a plum	0%	25%
Amount buyer is willing to pay for a used car in mixed market	\$2,000	\$2,500

#### Supply Side of Market

Number of lemons supplied	45	60
Number of plums supplied	5	20
Total number of used cars supplied	50	80
Actual chance of getting a lemon	90%	75%

	Initial Pessimistic Expectations	Equilibrium: 75-25 Expectations
Amount buyer is willing to pay for a lemon	\$2,000	\$2,000
Amount buyer is willing to pay for a plum	\$4,000	\$4,000
Assumed chance of getting a lemon	100%	75%
Assumed chance of getting a plum	0%	25%
Amount buyer is willing to pay for a used car in mixed market	\$2,000	\$2,500
Number of lemons supplied	45	60
Number of plums supplied	5	20
Total number of used cars supplied	50	80
Actual chance of getting a lemon	90%	75%

# 14.1 ADVERSE SELECTION FOR BUYERS: THE LEMONS PROBLEM

## Evidence of the Lemons Problem

The lemons model makes two predictions about markets with asymmetric information.

- First, the presence of low-quality goods in a market will at least reduce the number of high-quality goods in the market and may even eliminate them.
- Second, buyers and sellers will respond to the lemons problem by investing in information and other means of distinguishing between low-quality and high-quality goods.

# APPLICATION 1

## ARE BASEBALL PITCHERS LIKE USED CARS?

### APPLYING THE CONCEPTS #1: What is adverse selection for buyers?

- Professional baseball teams compete with each other for players. After six years of play in the major leagues, a player has the option of becoming a free agent. A player is likely to switch teams if the new team offers him a higher salary. One of the puzzling features of the free-agent market is that, on average, pitchers who switch teams spend 28 days per season on the disabled list, compared to only 5 days for pitchers who do not switch teams.
- This puzzling feature of the free-agent market for baseball players is explained by asymmetric information and adverse selection.
- Suppose the market price for pitchers is \$1 million per year, and a pitcher who is currently with the Detroit Tigers is offered this salary by another team.
- If the Tigers think the pitcher is likely to spend a lot of time next season recovering from injuries, they won't try to outbid the other team for the pitcher.
- If the Tigers think the pitcher will be injury-free and productive, he will be worth more than \$1 million to the them, so they will outbid other teams.

# 14.2 RESPONDING TO THE LEMONS PROBLEM

## Buyers Invest in Information

- The more information a buyer has, the greater the chance of picking a plum from the cars in the mixed market.
- *Consumer Reports* publishes information on repair histories of different models and computes a “Trouble” index, scoring each model on a scale of 1 to 5. By consulting these information sources, a buyer improves the chances of getting a high-quality car.
- Another information source is Carfax.com, which provides information on individual cars, including their accident histories.

# 14.2 RESPONDING TO THE LEMONS PROBLEM

## Consumer Satisfaction Scores from ValueStar and eBay

- How can a high-quality service provider distinguish itself from low-quality providers?
- ValueStar is a consumer guide and business directory that uses customer satisfaction surveys to determine how well a firm does relative to its competitors in providing quality service.
- Online consumers help each other by rating online sellers.

# 14.2 RESPONDING TO THE LEMONS PROBLEM

## Guarantees and Lemons Laws

Sellers can identify a car as a plum in a sea of lemons by offering one of the following guarantees:

- ***Money-back guarantees.***
- ***Warranties and repair guarantees.***

# APPLICATION 2

## REGULATION OF THE CALIFORNIA KIWIFRUIT MARKET

### APPLYING THE CONCEPTS #2: How can government solve the adverse-selection problem?

- Kiwifruit is subject to imperfect information because buyers cannot determine its sweetness—its quality level—by simple inspection.
- There is asymmetric information because producers know the maturity of the fruit, but fruit wholesalers and grocery stores, who buy fruit at the time of harvest, cannot determine whether a piece of fruit will be sweet or sour.
- Before 1987, kiwifruit from California suffered from the “lemons” problem. Maturity levels of the fruit varied across producers. On average, the sugar content at the time of harvest was below the industry standard.
- In 1987, California producers implemented a federal marketing order to address the lemon–kiwi problem. The federal order specified a minimum maturity standard, and as the average quality of California fruit increased, so did the price. Within a few years, the gap between California and New Zealand prices had decreased significantly.

# 14.3 ADVERSE SELECTION FOR SELLERS: INSURANCE

A person who buys an insurance policy knows much more about his or her risks and needs for insurance than the insurance company knows. Insurance companies must pick from an adverse or undesirable selection of customers.

## Health Insurance

What is the insurance company's average cost per customer? To determine the average cost in a mixed market, we must answer three questions:

- What is the cost of providing medical care to a high-cost person?
- What is the cost of providing medical care to a low-cost person?
- What fraction of the customers are low-cost people?

There is asymmetric information in the insurance market because potential buyers know from everyday experience and family histories what type of customer they are, either low cost or high cost.

# 14.3 ADVERSE SELECTION FOR SELLERS: INSURANCE

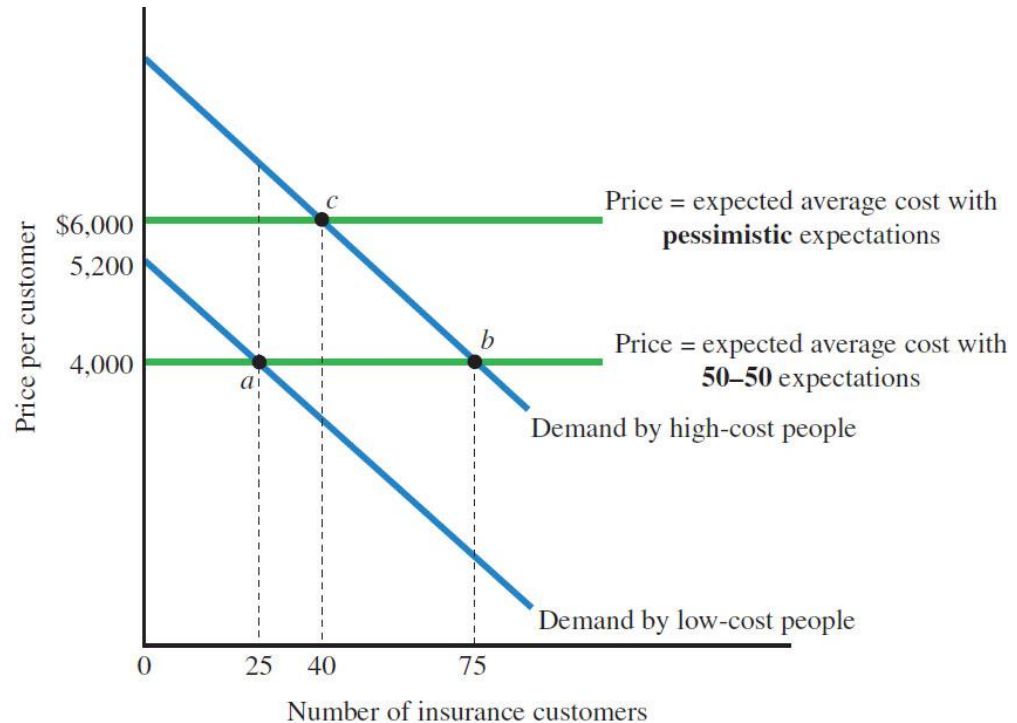
## Equilibrium with All High-Cost Consumers

If insurance companies assume there will be a 50–50 split between high-cost and low-cost customers, the average cost of insurance and its price is \$4,000.

At this price, there are 25 low-cost customers (point *a*) and 75 high-cost customers (point *b*). This is not an equilibrium, because 75 percent of insurance buyers are high-cost customers, contrary to the expectations of a 50–50 split.

If insurance companies become pessimistic and assume that all buyers will be high-cost consumers, the average cost and price is \$6,000.

The insurance company's expectations are realized, so the equilibrium is shown by point *c*.



▲ FIGURE 14.3 All Insurance Customers Are High-Cost People

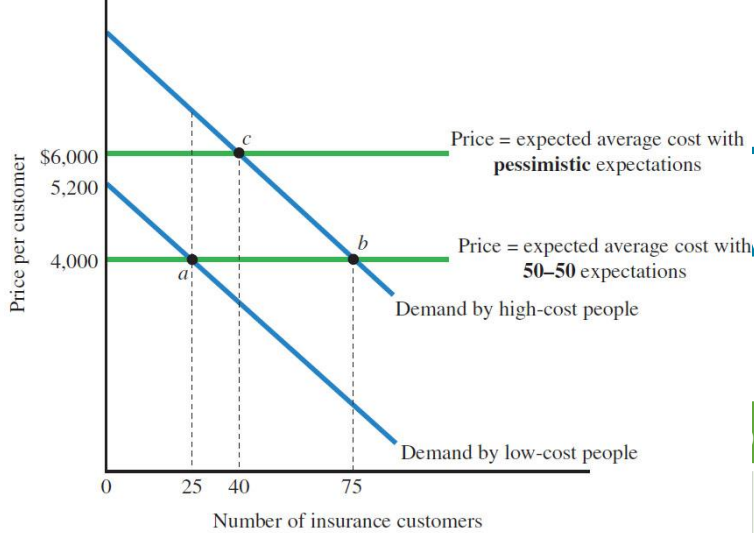
# SECTION FOR PRICE

## Consumers

### Best Customers

	50-50 Expectations	Equilibrium: Pessimistic Expectations
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<b>Supply Side of Market</b>		
Cost of serving a high-cost customer	\$6,000	\$6,000
Cost of serving a low-cost customer	\$2,000	\$2,000
Assumed fraction of high-cost customers	50%	100%
Assumed chance of low-cost customers	50%	0%
Expected average cost per customer (price)	\$4,000	\$6,000
<b>Demand Side of Market</b>		
Number of high-cost customer	75	40
Number of low-cost customers	25	0
Total number of customers	100	40
Actual fraction of high-cost customers	75%	100%
Actual average cost per customer	\$5,000	\$6,000



▲ FIGURE 14.3 All Insurance Customers Are High-Cost People

# 14.3 ADVERSE SELECTION FOR SELLERS: INSURANCE

## Equilibrium with All High-Cost Consumers

- The domination of the insurance market by high-cost people is another example of the adverse-selection problem. The uninformed side of the market (sellers in this case) must choose from an undesirable or adverse selection of consumers.
- The asymmetric information in the market generates an upward spiral of price and average cost of service:
- The presence of high-cost consumers in the market pulls up the average cost of service, pulling up the price.
- An increase in price decreases the number of low-cost consumers who purchase insurance.
- The decrease in the number of low-cost consumers pulls up the average cost of insurance.
- In the extreme case, this upward spiral continues until all insurance customers are high-cost people.

# 14.3 ADVERSE SELECTION FOR SELLERS: INSURANCE

## Responding to Adverse Selection in Insurance: Group Insurance

- **Experience rating**

A situation in which insurance companies charge different prices for medical insurance to different firms depending on the past medical bills of a firm's employees.

# 14.3 ADVERSE SELECTION FOR SELLERS: INSURANCE

## The Uninsured

One implication of asymmetric information in the insurance market is that many low-cost consumers who are not eligible for a group plan will not carry insurance.

## Other Types of Insurance

The same logic of adverse selection applies to the markets for other types of insurance. Buyers know more than sellers about their risks, so there is adverse selection, with high-risk individuals more likely to buy insurance. Because the companies are unable to distinguish between high-risk and low-risk people with sufficient precision, the adverse-selection problem persists.

# APPLICATION 3

## GENETIC DISCRIMINATION

### APPLYING THE CONCEPTS #3: What is adverse selection for sellers?

- Genetic discrimination occurs when an insurance company treats a person differently because he or she has a gene mutation that increases the risk of an inherited disorder.
- At the national level the Genetic Information Nondiscrimination Act 2008 (GINA) is designed to protect people from genetic discrimination. Title I prohibits genetic discrimination in health insurance. GINA does not apply to employers with fewer than 15 employees or for life insurance.
- The information from genetic testing could help estimate the likely cost of health insurance, which would increase insurance costs for high-cost customers and lower it for low-cost customers.
- The ban on genetic discrimination prevents these sorts of price changes.

# 14.4 INSURANCE AND MORAL HAZARD

## Moral hazard

A situation in which one side of an economic relationship takes undesirable or costly actions that the other side of the relationship cannot observe.

## Insurance Companies and Moral Hazard

- Insurance companies use various measures to decrease the moral-hazard problem. Many insurance policies have a deductible—a dollar amount that a policy holder must pay before getting compensation from the insurance company.
- Deductibles reduce the moral-hazard problem because they shift to the policy holder part of the cost of a claim on the policy.

# 14.4 INSURANCE AND MORAL HAZARD

## Deposit Insurance for Savings and Loans

When you deposit money in a Savings and Loan (S&L), the money doesn't just sit in a vault.

- The S&L will invest the money, loaning it out and expecting to make a profit when loans are repaid with interest.
- Unfortunately, some loans are not repaid, and the S&L could lose money and be unable to return your money.

To protect people, the Federal Deposit Insurance Corporation (FDIC) insures the first \$250,000 of your deposit, so if the S&L goes bankrupt, you'll still get your money back.

The government enacted the federal deposit insurance law in 1933 in response to the bank failures of the Great Depression.

# APPLICATION 4

## CAR INSURANCE AND RISKY DRIVING

### APPLYING THE CONCEPTS #4: What is moral hazard in car insurance?

- The theory of moral hazard suggests that an insured driver, who bears less than the full cost of a collision, will drive less carefully than an uninsured driver.
- A recent study suggests that the moral-hazard cost of automobile insurance is substantial. When a state makes car insurance compulsory and thus decreases the number of uninsured drivers, roads become more hazardous: The number of collisions and the number of traffic deaths increase. Roads become more dangerous because the newly insured drivers drive less cautiously.
- The study estimates that a one percentage point decrease in the number of uninsured drivers increases the number of traffic fatalities by 2 percent. Of course, there are benefits associated with compulsory insurance, but in the interests of efficiency, we must compare the benefits to the costs, including the increase in fatalities on more hazardous roads.

# 14.5 THE ECONOMICS OF CONSUMER SEARCH

## Search and the Marginal Principle

- **Discovered Price**

The lowest price observed so far in a search.

- **Reservation Price**

The price at which a consumer is indifferent about additional search for a lower price.

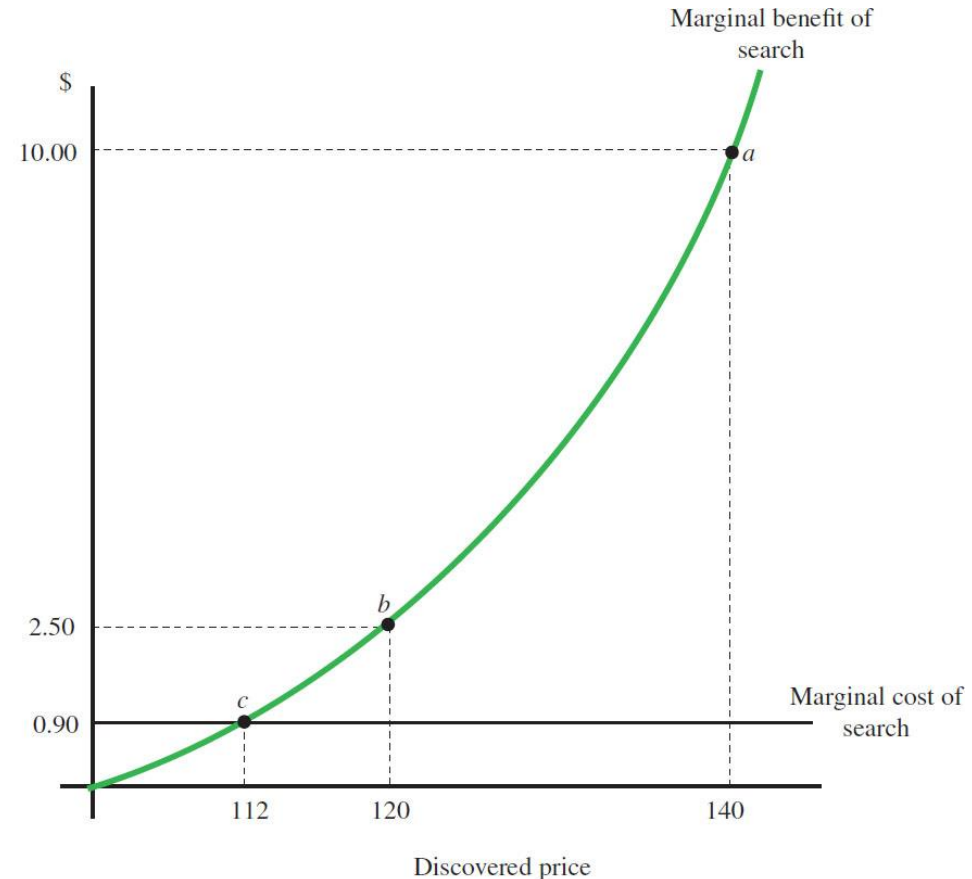
TABLE 14.4 Marginal Benefit of searching for a Lower Price

Discovered price (lowest so far)	\$140	\$120	\$110	\$112
Probability of discovering lower price in next visit	0.500	0.250	0.125	0.150
Best guess of lower price	\$120	\$110	\$105	\$106
Best guess of savings from lower price	\$ 20	\$ 10	\$ 5	\$ 6
Marginal benefit: Expected savings	\$ 10.00	\$ 2.50	\$ 0.625	\$ 0.900

# 14.5 THE ECONOMICS OF CONSUMER SEARCH

The marginal benefit of search increases with the discovered price, while the marginal cost is constant.

If at a particular discovered price, the marginal benefit exceeds the marginal cost, it is sensible to continue the search.



▲ FIGURE 14.4 Marginal Benefit and Marginal Cost of Search

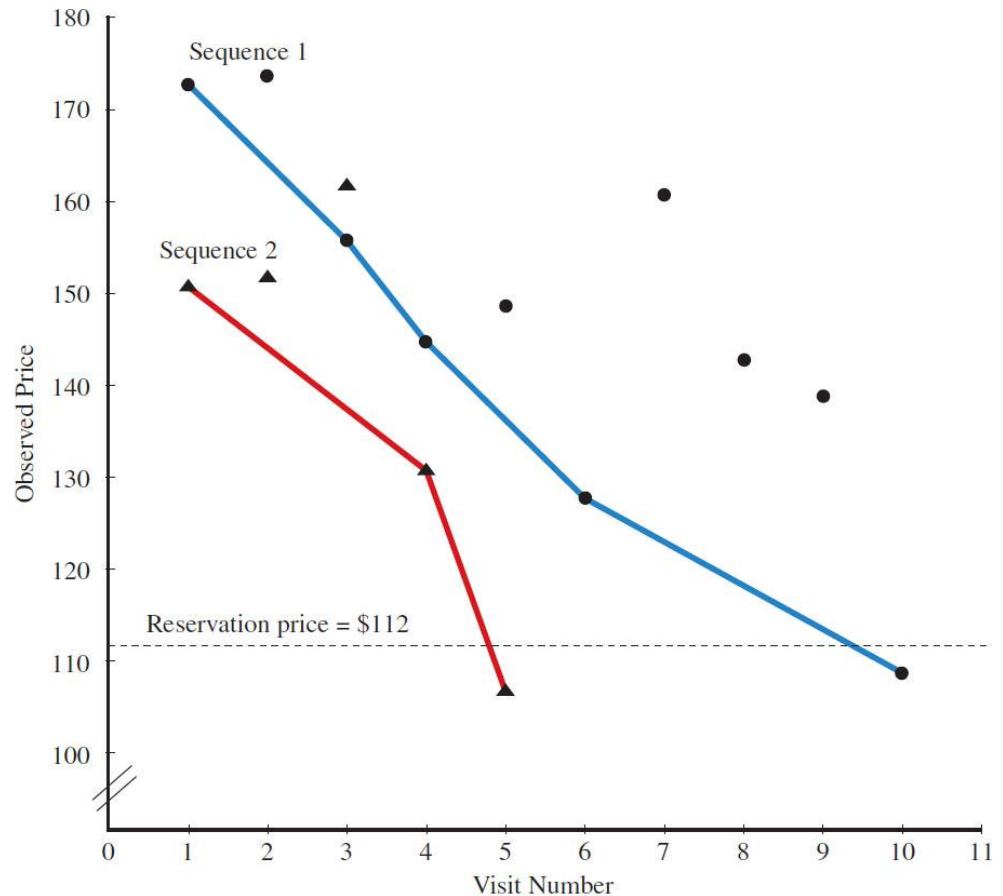
# 14.5 THE ECONOMICS OF CONSUMER SEARCH

## Reservation Prices and Searching Strategy

Each sequence (dots in #1 or triangles in #2 shows prices observed on visits to different stores.

The lines connect the discovered prices.

A rational consumer stops shopping when the discovered price is less than or equal to the reservation price.



▲ FIGURE 14.5 Price Sequences and the Reservation Price

# 14.5 THE ECONOMICS OF CONSUMER SEARCH

## The Effects of Opportunity Cost and Product Prices on Search Effort

- Reservation prices and search efforts vary across consumers
  - Higher opportunity cost of search = higher marginal cost of search = less searching**
- The amount of searching also depends on the price of the product
  - Higher price = bigger payoff for searching**
- The amount of searching also depends on the range of prices
  - Smaller range from lowest to highest = less searching.**

# APPLICATION 5

## INCOME AND CONSUMER SEARCH

### **APPLYING THE CONCEPTS #5: How does opportunity cost affect consumer search?**

- A recent study explores the relationship between consumer search and income. The opportunity cost of search depends on income because one hour of search means one less hour available for earning income.
- The study examines search behavior for liquid detergents, and shows that a doubling of income increases the cost of search and decreases the amount of searching by about 14 percent.
- In addition, consumer search on workdays is more costly and thus less extensive than on weekends.

# Learning Objectives

**14.1** Explain the notion of adverse selection for buyers.

**14.2** Discuss the possible responses to adverse selection for buyers.

**14.3** Explain the notion of adverse selection for sellers.

**14.4** Explain the notion of moral hazard.

**14.5** Use the marginal principle to describe optimal search by consumers.

# KEY TERMS

**Adverse-selection problem**

**Asymmetric information**

**Experience rating**

**Mixed market**

**Moral hazard**

**Thin market**

# Questions?

Homework:  
Ch13, pp 293-294  
1.2-1.4, 2.1  
Ch 14, pp 314-318  
1.1, 5.1, 5.4



**"Turning our dismal performance around might be easier if we eliminated our ethics committee."**