

Chapter 12

Asymmetric Information

CHAPTER SUMMARY

In situations of asymmetric information, the allocation of resources will not be economically efficient. The asymmetry can be resolved directly through appraisal or indirectly through screening, signaling, or contingent payments. The indirect methods depend on inducing self-selection among parties with different characteristics. Screening is an initiative of the party with less information, while signaling is an initiative of the party with better information.

A key business application of screening is indirect segment discrimination in pricing. A related application is auctions, which exploit strategic interaction among competing bidders to force bidders with higher values to pay higher prices.

When the distribution of information is asymmetric, one or more parties will have imperfect information and hence bear risk. The distribution of risk may conflict with the self-selection needed to resolve the asymmetric information.

KEY CONCEPTS

asymmetric information	adverse selection	nondiscriminatory auction
imperfect information	screening	winner's curse
risk	self-selection	signaling
risk averse	reserve price	contingent payment
risk neutral	discriminatory auction	
insurance		

GENERAL CHAPTER OBJECTIVES

1. Discuss the concepts of imperfect information, risk aversion, and asymmetric information.
2. Appreciate the managerial implications of adverse selection, and, specifically, the possibility of market failure.
3. Analyze how asymmetric information can be resolved through appraisal.
4. Analyze how asymmetric information can be resolved through screening.

5. Discuss two specific applications of screening – indirect segment discrimination and auctions.
6. Analyze how asymmetric information can be resolved through signaling.
7. Analyze how asymmetric information can be resolved through contingent payment.
8. Apply the theory of asymmetric information to lending and insurance markets.

NOTES

1. Asymmetric information.

- (a) Imperfect information: the absence of certain knowledge by a single person or by more than one party.
 - i. **Risk** (uncertainty about benefits or costs) arises whenever there is imperfect information about something that affects benefits or costs.
Note: a person can have imperfect information about something, but if that thing does not affect her/his benefits or costs, it does not impose any risk on her/him.
 - (1). A risk averse person is one who prefers a certain amount to risky amounts with the same expected value.
 - (2). A risk-neutral person is indifferent.
 - (3). Insurance is the business of taking certain payments in exchange for eliminating risk.
 - ii. A market could be perfectly competitive even when buyers and sellers have imperfect information, as long as they all have the same imperfect information.
- (b) Asymmetric information: one party has better information than another, e.g., antiques, insurance, and lending markets.
 - i. When the distribution of information is asymmetric, one or more parties will have imperfect information and hence bear risk.
 - ii. Cannot be a perfectly competitive market.
 - iii. In an imperfectly competitive market, if buyers and sellers can resolve the information asymmetries, they can increase benefits by more than their costs.

2. Equilibrium in a market with asymmetric information.

- (a) The **equilibrium** in a market with asymmetric information may *not* be *economically efficient*. For example, when fakes are introduced in an antiques market:
 - i. Each buyer purchases up to the point where its actual marginal benefit (adjusted down for the probability of getting a fake) balances the market price. Each legitimate seller supplies up to the point where its marginal cost balances market price.

- ii. Buyers who get genuine items have a marginal benefit higher than the legitimate sellers' marginal cost. Buyers who get fakes have a marginal benefit less than the legitimate sellers' marginal cost.
 - iii. At equilibrium, marginal benefit does not equal marginal cost.
 - (1). The quantity traded is not economically efficient.
 - (2). Effect on buyer's surplus is ambiguous. Buyer surplus falls as some buyers get fakes. Buyer surplus rises as market price falls and if sales are higher.
 - (3). Legitimate sellers get a lower price and sell fewer units. Sellers of fakes are the only ones that are better off.
 - iv. Sellers of fakes impose a negative externality on buyers and legitimate sellers.
 - v. By resolving the negative externality (information asymmetry), benefits will increase by more than costs, and a profit can be made.
- (b) **Adverse selection** arises in situations of asymmetric information. In adverse selection, the party with relatively poor information draws a selection with relatively less attractive characteristics. Severe adverse selection can cause a market to fail, and price changes do not help to restore equilibrium. For example, when fakes are introduced in an antiques market:
- i. Antiques buyers with less information draw a mixture of fakes and genuine antiques, which is an adverse selection of items.
 - ii. As market price drops, legitimate sellers supply a smaller quantity. Quantity of fakes is not affected, increasing the proportion of fakes, leaving buyers with a worse adverse selection. A price reduction cuts demand and supply and does not necessarily restore the equilibrium.
 - iii. In the extreme, so many fakes flood the market that actual demand curve drops to zero and the **market fails** (there is no sale at all).

3. Appraisal.

- (a) Appraisal (including credit checks, employment records in the lending market) can **directly** resolve asymmetric information, e.g., Moody's appraisals.
- (b) Appraisal works only if:
 - i. The characteristic about which information is asymmetric is objectively verifiable.
 - ii. The potential gain (for buyer: difference between marginal benefit and market price; for seller: difference between market price and marginal cost) covers the cost of appraisal.
- (c) Procuring the appraisal. Seller should procure the appraisal when:
 - i. There are many potential buyers, it is more economical for the seller to obtain the appraisal, which is like a public good.
 - ii. Various potential buyers seek the same information.

4. Screening.

- (a) **Screening**: the initiative of a less-informed party to indirectly elicit the other party's *characteristics*, e.g., points in home mortgages, physical examinations for life insurance applicants.
- i. An indirect way to resolve asymmetric information.
 - ii. It works only if the less informed party can identify and control some **variable** that the better-informed parties are **differentially sensitive** to.
 - iii. The less informed party must design choices/structure a set of **alternatives around that variable** to induce self-selection.
 - iv. In self-selection, parties with *different characteristics* choose different alternatives.
- (b) Differentiating **variable(s)**.
- i. Place more emphasis on the more effective variable: the variable that drives the biggest possible wedge among the better-informed parties with the different characteristics
 - ii. Use a combination of the differentiating variables (e.g., restrictions, advice booking, weekend stay-over to screen between leisure vis a vis business travelers).
- (c) *Multiple unobservable characteristics*.
- i. If a party is uninformed about several characteristics, then screening based on a single differentiating variable may not resolve the asymmetry.
 - ii. To resolve information asymmetries through screening, the less-informed party needs as many **differentiating variables** (e.g., a choice of high and low deductible policies) as there are *characteristics* (e.g., (i) driver's carefulness, (ii) degree of risk aversion) that it cannot observe.
- (d) **Indirect segment discrimination** is an application of screening. A seller who is less informed about how much the buyer is willing to pay for an item uses screening to induce self-selection among buyers with *different characteristics*.
- (e) **Auctions** are another application of screening. A seller who doesn't know buyers' valuations can use an auction to sell, while a buyer doesn't know sellers' costs can use an auction to buy. Auctions exploit strategic interaction among competing bidders to induce self-selection among the participants accordingly to their *respective values* for the item (forcing bidders with higher values to pay higher prices).
- i. The **differentiating variable** is the probability of winning.
 - ii. An auction may be open or sealed.
 - (1). Open bid auctions: higher potential for collusion among bidders.
 - (2). Sellers can counter collusion by applying a reserve price. The reserve price is the price below which the seller will not sell the item. When there are many bidders, it is more likely that

at least one bidder will exceed the reserve price, and the auction will not fail.

- iii. In a discriminatory auction, each winning bidder pays the price that she or he bid. In a nondiscriminatory auction, each winning bidder pays the price bid by the marginal winning bidder.
 - (1). Bidders make relatively higher bids in nondiscriminatory auctions.
 - (2). Sellers' revenues in a nondiscriminatory auction may or may not be higher.
- iv. Uncertainty about the value of the item for sale.
 - (1). The winner's curse in an auction to buy is the phenomenon where the winning bidder over-estimates the true value of the item for sale, and in auction to sell is the phenomenon where the winning bidder under-estimates the true cost of providing the item.
 - (2). The winner's curse is more severe when:
 - a. number of bidders is larger,
 - b. true value of the item is more uncertain, and
 - c. in a sealed-bid as compared with open auction.
 - (3). When the winner's curse is more severe, a bidder should bid more conservatively.

5. Signaling.

- (a) **Signaling**: an action initiated by the better-informed party to communicate its characteristics in a credible way to the less-informed party.
 - i. An indirect way to resolve asymmetric information.
 - ii. **Signaling** is credible only if it induces self-selection among the better-informed parties (e.g., **buy back offers** by sellers of genuine antiques).
- (b) Costless signaling is not credible. The cost of the signal must be sufficiently lower for parties with *superior characteristics* than for parties with inferior characteristics.
- (c) Three conditions for **advertising** to be a credible signal of product quality:
 - i. Investment must be sunk: a reversible investment is not credible (e.g., reputation built up over a long time).
 - ii. Buyers detect poor quality quickly.
 - iii. The information must negatively affect the seller (word of poor quality must spread and cut into the seller's future business).

6. Contingent payment.

- (a) **Contingent payment**: a payment made if a specific event occurs, e.g., bets.
 - i. An indirect way to resolve asymmetric information.
 - ii. Induces self-selection among the better-informed parties (e.g., sellers offering products of *different quality*).

- iii. May serve as screens or signals (e.g., selling a tract for a **share** of the production).
- (b) Promises and threats may involve contingent payments.
- (c) Insurance compensation is a contingent payment, e.g., in the event of death or illness.

ANSWERS TO PROGRESS CHECKS

- 12A. Hilda has imperfect information but does not face risk. The insurer has imperfect information and faces risk.
- 12B. The market price will be higher, as shown in Figure 12B on page 547 of the text.
- 12C. The percentage of high-risk policyholders will fall.
- 12D. Appraisals will be more common in the market for more expensive antiques.
- 12E. Borrowers who are more willing to repay will be relatively more likely to post collateral.
- 12F. (a) It should provide the information to the bidders. (b) This information would reduce the extent of the winner's curse.
- 12G. Screening is an initiative of the less-informed party, while signaling is an initiative of the better-informed party.

ANSWERS TO REVIEW QUESTIONS

- 1. Imperfect information is the absence of certain knowledge. Risk is uncertainty about benefits or costs. A person can have imperfect information about something, but if that thing does not affect her/his benefits or costs, it does not impose any risk on her/him.
- 2. (a) No asymmetry. (b) The directors of Acquirer have better information than the general investor.
- 3. (a) True. (b) False. Risk neutral persons will not want insurance.
- 4. Yes, this will draw relatively less hardworking persons.

5. The seller has an interest not to reveal negative information about the car.
6. [omitted].
7. Drivers who know that they have a lower probability of accident are more likely to choose the policies with higher deductibles (and lower premiums). Those with higher probability of accident are more likely to choose the policies with lower deductibles (and higher premiums).
8. Drivers whose value of time is less than the toll will not pay, and hence be screened away in favor of those whose value of time exceeds the toll.
9. (a) Open bidding allows the participants to observe the bids of others. This supports collusion. (b) Setting a reserve price will put a limit to collusion.
10. (b).
11. [omitted].
12. Yes.
13. Borrowers who post collateral are less likely to default. The collateral serves as a screening mechanism.
14. Landowners would not under-declare their property value, lest the government decide to purchase their property. They would not over-declare their property value, as that would increase their tax payment.
15. The value of the merged company will depend in part on the true value of Target. If Target turns out to be worthless, the sellers of Target would be penalized by the fall in the value of the merged company. By contrast, if they had received cash, they would not be affected when the true value of Target becomes known.

WORKED ANSWER TO SAMPLE DISCUSSION QUESTION

A life insurance policy provides a payment in case of death of the insured party. Some life insurers require applicants to undergo a medical examination, while other insurers do not. Some life insurers set limits to the amount of the insurance coverage.

- a. Why do some life insurers require applicants to undergo a medical examination?
- b. Explain the adverse selection problem that will arise from offers of life insurance with no medical examination.

- c. How would the premiums (per dollar of coverage) for insurance with no medical examination compare with those of insurers that require a medical examination?
- d. If an insurer does not require a medical examination, should it set a limit to the amount of the insurance coverage?

Answer

- (a) A medical exam is a form of screening. The exam allows a life insurer to collect information about an applicant's health, and hence reduce adverse selection.
- (b) Offering life insurance without a medical exam will create adverse selection, since this will draw people who are relatively in poor health and hence more likely to make claims.
- (c) Premiums for insurance without medical exams must take account of adverse selection, hence will be higher than those for insurance that require medical exams.
- (d) By setting a limit to the amount of insurance coverage, the insurer can limit the losses due to adverse selection.