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The Notebook on

# PRINCIPLES OF ECONOMICS

Citation and interpretation of principles of economics

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# Dedication

Notebook on “Principles of Economics”.



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# Chapter 1

## Ten principles of economics

The word economy comes from the Greek word for “one who manages a household.” Economics is the study of how society manages its scarce resources.

### 1.1 How people make decisions

#### **PRINCIPLE 1: PEOPLE FACE TRADEOFFS**

To get one thing that we like, we usually have to give up another thing that we like. Making decisions requires trading off one goal against another.

#### **PRINCIPLE 2: THE COST OF SOMETHING IS WHAT YOU GIVE UP TO GET IT**

Because people face tradeoffs, making decisions requires comparing the costs and benefits of alternative courses of action. The opportunity cost of an item is what you give up to get that item.

#### **PRINCIPLE 3: RATIONAL PEOPLE THINK AT THE MARGIN**

Economists use the term marginal changes to describe small incremental adjustments to an existing plan of action. Keep in mind that “margin” means “edge,” so marginal changes are adjustments around the edges of what you are doing.

**PRINCIPLE 4: PEOPLE RESPOND TO INCENTIVES**

Because people make decisions by comparing costs and benefits, their behavior may change when the costs or benefits change. That is, people respond to incentives.

**1.2 How people interact****PRINCIPLE 5: TRADE CAN MAKE EVERYONE BETTER OFF**

Trade allows each person to specialize in the activities he or she does best, whether it is farming, sewing, or home building. By trading with others, people can buy a greater variety of goods and services at lower cost. Countries as well as families benefit from the ability to trade with one another. Trade allows countries to specialize in what they do best and to enjoy a greater variety of goods and services.

Thus, it is import to decide what you want to *specialize* in.

**PRINCIPLE 6: MARKETS ARE USUALLY A GOOD WAY TO ORGANIZE ECONOMIC ACTIVITY**

In a market economy, the decisions of a central planner are replaced by the decisions of millions of firms and households. Firms decide whom to hire and what to make. Households decide which firms to work for and what to buy with their incomes. These firms and households interact in the marketplace, where prices and self-interest guide their decisions.

In his 1776 book *An Inquiry into the Nature and Causes of the Wealth of Nations*, economist Adam Smith made the most famous observation in all of economics: Households and firms interacting in markets act as if they are guided by an “invisible hand” that leads them to desirable market outcomes.

Prices are the instrument with which the invisible hand directs economic activity. Prices reflect both the value of a good to society and the cost to society of making the good. Because households and firms look at prices when deciding what to buy and sell, they unknowingly take into account the social benefits and costs of their actions. As a result, prices guide these individual decisionmakers

to reach outcomes that, in many cases, maximize the welfare of society as a whole.

## PRINCIPLE 7: GOVERNMENTS CAN SOMETIMES IMPROVE MARKET OUTCOMES

Although markets are usually a good way to organize economic activity, this rule has some important exceptions. There are two broad reasons for a government to intervene in the economy: to promote efficiency and to promote equity. That is, most policies aim either to enlarge the economic pie or to change how the pie is divided.

The invisible hand usually leads markets to allocate resources efficiently. Nonetheless, for various reasons, the invisible hand sometimes does not work. Economists use the term *market failure* to refer to a situation in which the market on its own fails to allocate resources efficiently.

One possible cause of market failure is an *externality*. An externality is the impact of one person's actions on the well-being of a bystander. Another possible cause of market failure is *market power*. Market power refers to the ability of a single person (or small group of people) to unduly influence market prices.

## 1.3 How the economy as a whole works

### PRINCIPLE 8: A COUNTRY'S STANDARD OF LIVING DEPENDS ON ITS ABILITY TO PRODUCE GOODS AND SERVICES

### PRINCIPLE 9: PRICES RISE WHEN THE GOVERNMENT PRINTS TOO MUCH MONEY

What causes inflation? In almost all cases of large or persistent inflation, the culprit turns out to be the same: growth in the quantity of money. When a government creates large quantities of the nation's money, the value of the money falls.

**PRINCIPLE 10: SOCIETY FACES A SHORT-RUN TRADE-OFF BETWEEN INFLATION AND UNEMPLOYMENT**

If inflation is so easy to explain, why do policymakers sometimes have trouble ridding the economy of it? One reason is that reducing inflation is often thought to cause a temporary rise in unemployment. The curve that illustrates this tradeoff between inflation and unemployment is called the Phillips curve, after the economist who first examined this relationship.

Why do we face this short-run tradeoff? According to a common explanation, it arises because some prices are slow to adjust. Suppose, for example, that the government reduces the quantity of money in the economy. In the long run, the only result of this policy change will be a fall in the overall level of prices. Yet not all prices will adjust immediately. It may take several years before all firms issue new catalogs, all unions make wage concessions, and all restaurants print new menus. That is, prices are said to be sticky in the short run.

Because prices are sticky, various types of government policy have short-run effects that differ from their long-run effects. When the government reduces the quantity of money, for instance, it reduces the amount that people spend. Lower spending, together with prices that are stuck too high, reduces the quantity of goods and services that firms sell. Lower sales, in turn, cause firms to lay off workers. Thus, the reduction in the quantity of money raises unemployment temporarily until prices have fully adjusted to the change.

## Chapter 2

# Thinking like an economist

Every field of study has its own language and its own way of thinking. The most important is to learn the economist's way of thinking.

### 2.1 The economist as scientist

Economists try to address their subject with a scientist's objectivity:

- devise theories
- collect data
- analyze these data in an attempt to verify or refute their theories

The essence of science is the scientific method – the dispassionate development and testing of theories about how the world works.

As Albert Einstein once put it, “The whole of science is nothing more than the refinement of everyday thinking”.

#### 2.1.1 The scientific method

The scientific method:

1. observation
2. theory

### 3. more observation

Although economists use theory and observation like other scientists, they do face an obstacle that makes their task especially challenging: Experiments are often difficult in economics.

## 2.1.2 The role of assumptions

Assumptions can make the world easier to understand. The art in scientific thinking is deciding which assumptions to make. Economists use different assumptions when studying the short-run and long-run effects of a change in the quantity of money.

## 2.1.3 Economic models

Economists use models that are most often composed of diagrams and equations to learn about the world. Economic models omit many details to allow us to see what is truly important. An economist's model does not include every feature of the economy. All models are built with assumptions. Economists assume away many of the details of the economy that are irrelevant for studying the question at hand. All models simplify reality in order to improve our understanding of it.

## 2.1.4 The circular-flow diagram

Circular-flow diagram: a visual model of the economy that shows how dollars flow through markets among households and firms.

## 2.1.5 The production possibilities frontier

Most economics models are built using the tools of mathematics. Here we consider one of the simplest such models, called the production possibilities frontier. The **production possibilities frontier** is a graph that shows the various combinations of output that the economy can possibly produce given the available factors of production and the available production technology that firms can use to turn these factors into output. The graph is shown in Figure 2.2.

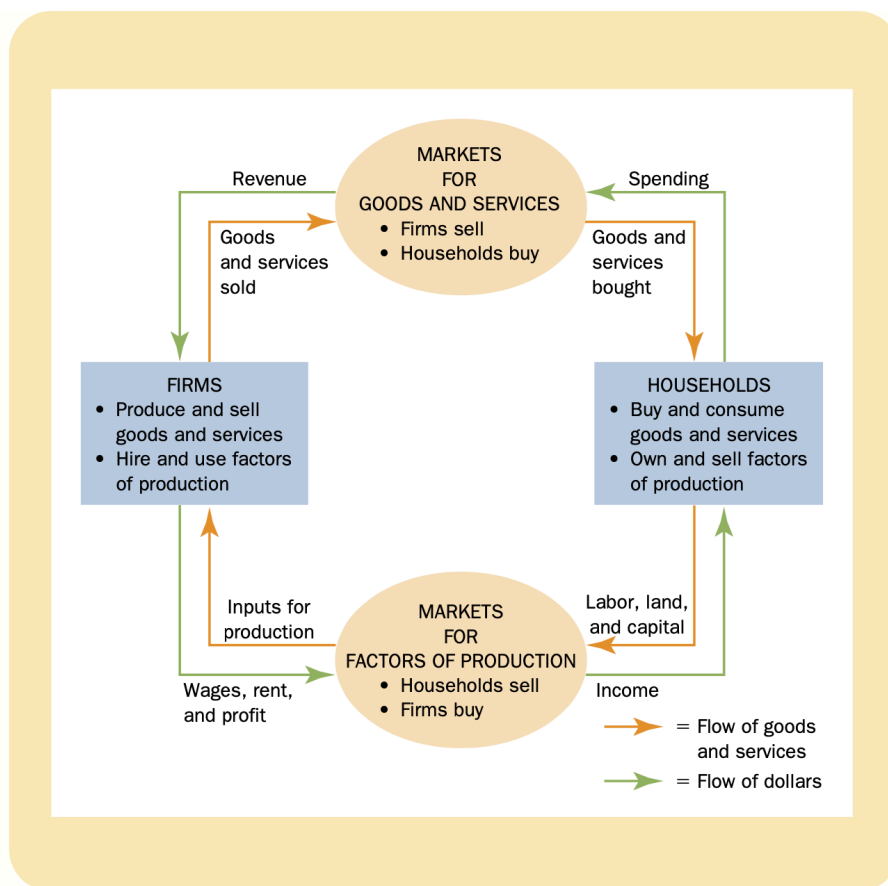


Figure 2.1: The circular flow

An outcome is said to be **efficient** if the economy is getting all it can from the scarce resources it has available. Points on (rather than inside) the production possibilities frontier represent efficient levels of production.

### 2.1.6 Microeconomics and macroeconomics

The field of economics is traditionally divided into two broad subfields. **Microeconomics** is the study of how households and firms make decisions and how they interact in specific markets. **Macroeconomics** is the study of economywide phenomena.

Microeconomics and macroeconomics are closely intertwined. Because changes

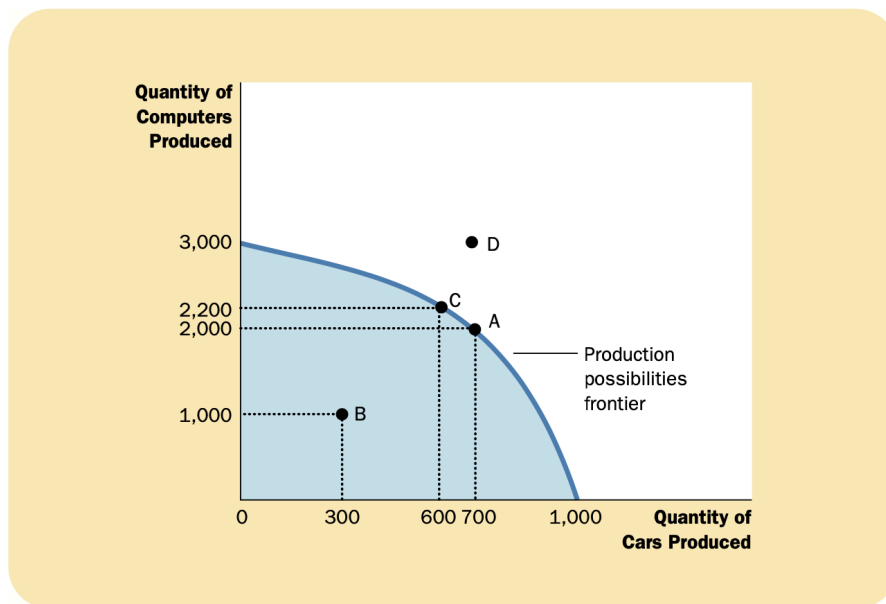


Figure 2.2: The production possibilities frontier

in the overall economy arise from the decisions of millions of individuals, it is impossible to understand macroeconomic developments without considering the associated microeconomic decisions. Despite the inherent link between microeconomics and macroeconomics, the two fields are distinct.

## 2.2 The economist as policy adviser

When economists are trying to explain the world, they are **scientists**. When they are trying to help improve it, they are **policy advisers**.

### 2.2.1 Positive versus normative analysis

Because scientists and policy advisers have different goals, they use language in different ways. In general, statements about the world are of two types. One type is positive. **Positive statements** are descriptive. They make a claim about how the world **is**. A second type of statement is normative. **Normative statements** are prescriptive. They make a claim about how the world **ought to be**.



A key difference between positive and normative statements is how we judge their validity. We can, in principle, confirm or refute positive statements by examining evidence. By contrast, evaluating normative statements involves values as well as facts.

Much of economics just tries to explain how the economy works. Yet often the goal of economics is to improve how the economy works. When you hear economists making normative statements, you know they have crossed the line from scientist to policy adviser.

## 2.3 Why economists disagree

Why do economists so often appear to give conflicting advice to policymakers? There are two basic reasons:

- Economists may disagree about the validity of alternative positive theories about how the world works.
- Economists may have different values and, therefore, different normative views about what policy should try to accomplish.

Because of differences in scientific judgments and differences in values, some disagreement among economists is inevitable. Yet one should not overstate the amount of disagreement. In many cases, economists do offer a united view.

You might find it helpful to keep in mind some advice from the great economist John Maynard Keynes:

The study of economics does not seem to require any specialized gifts of an unusually high order. Is it not . . . a very easy subject compared with the higher branches of philosophy or pure science? An easy subject, at which very few excel! The paradox finds its explanation, perhaps, in that the master-economist must possess a rare combination of gifts. He must be mathematician, historian, statesman, philosopher in some degree. He must understand symbols and speak in words. He must contemplate the particular in terms of the general, and touch abstract and concrete in the same flight of thought. He must study the present in the light of the past for the purposes of the future. No part of mans nature or his institutions must lie entirely outside his regard. He must be purposeful and disinterested in a simultaneous mood; as aloof and incorruptible as an artist, yet sometimes as near the earth as a politician.

## Chapter 3

# Interdependence and the gains from trade

### 3.1 The principle of comparative advantage

#### 3.1.1 Absolute advantage

Economists use the term **absolute advantage** when comparing the productivity of one person, firm, or nation to that of another. The producer that requires a smaller quantity of inputs to produce a good is said to have an absolute advantage in producing that good.

#### 3.1.2 Opportunity cost and comparative advantage

The opportunity cost of some item is what we give up to get that item. Economists use the term **comparative advantage** when describing the opportunity cost of two producers. The producer who has the smaller opportunity cost of producing a good is said to have a comparative advantage in producing that good.

#### 3.1.3 Comparative advantage and trade

Differences in opportunity cost and comparative advantage create the gains from trade. When each person specializes in producing the good for which he or she has a comparative advantage, total production in the economy rises, and

this increase in the size of the economic pie can be used to make everyone better off. In other words, as long as two people have different opportunity costs, each can benefit from trade by obtaining a good at a price lower than his or her opportunity cost of that good.

Trade can benefit everyone in society because it allows people to specialize in activities in which they have a comparative advantage.

## Chapter 4

# The market forces and supply and demand

Supply and demand are the two words that economists use most often — and for good reason. Supply and demand are the forces that make market economies work. They determine the quantity of each good produced and the price at which it is sold. If you want to know how any event or policy will affect the economy, you must think first about how it will affect supply and demand.

### 4.1 Market and competition

The terms supply and demand refer to the behavior of people as they interact with one another in markets. A market is a group of buyers and sellers of a particular good or service. The buyers as a group determine the demand for the product, and the sellers as a group determine the supply of the product.

#### 4.1.1 Competitive markets

A competitive market is a market in which there are many buyers and many sellers so that each has a negligible impact on the market price.

#### 4.1.2 Competition: perfect and otherwise

We assume the market is perfectly competitive for study. Perfectly competitive markets are defined by two primary characteristics:

1. the goods being offered for sale are all the same
2. the buyers and sellers are so numerous that no single buyer or seller can influence the market price.

Because buyers and sellers in perfectly competitive markets must accept the price the market determines, they are said to be **price takers**.

Not all goods and services, however, are sold in perfectly competitive markets. Some markets have only one seller, and this seller sets the price. Such a seller is called a **monopoly**.

Some markets fall between the extremes of perfect competition and monopoly. One such market, called an **oligopoly**, has a few sellers that do not always compete aggressively. Airline routes are an example. If a route between two cities is serviced by only two or three carriers, the carriers may avoid rigorous competition to keep prices high. Another type of market is **monopolistically competitive**; it contains many sellers, each offering a slightly different product. Because the products are not exactly the same, each seller has some ability to set the price for its own product. An example is the software industry. Many word processing programs compete with one another for users, but every program is different from every other and has its own price.

## 4.2 Demand

**quantity demand:** the amount of a good that buyers are willing and able to purchase.

### 4.2.1 What determines the quantity an individual demands?

#### Price

**law of demand:** Other things equal, when the price of a good rises, the quantity demanded of the good falls.

#### Income

If the demand for a good falls when income falls, the good is called a **normal good**. If the demand for a good rises when income falls, the good is called an **inferior good**.

### Price of related goods

When a fall in the price of one good reduces the demand for another good, the two goods are called **substitutes**. When a fall in the price of one good raises the demand for another good, the two goods are called complements.

### Tastes

The most obvious determinant of your demand is your tastes. Economists normally do not try to explain peoples tastes because tastes are based on historical and psychological forces that are beyond the realm of economics. Economists do, however, examine what happens when tastes change.

### Expectations

Your expectations about the future may affect your demand for a good or service today.

## 4.2.2 The demand schedule and the demand curve

Imagine that we hold all these variables constant except one — the price. Lets consider how the price affects the quantity of ice cream demanded.

PRICE OF ICE-CREAM CONE	QUANTITY OF CONES DEMANDED
\$0.00	12
0.50	10
1.00	8
1.50	6
2.00	4
2.50	2
3.00	0

Figure 4.1: Demand schedule

Table 4.1 is a **demand schedule**, able that shows the relationship between the price of a good and the quantity demanded. Figure 4.2 graphs the numbers in Table 4.1. By convention, the price of ice cream is on the vertical axis, and

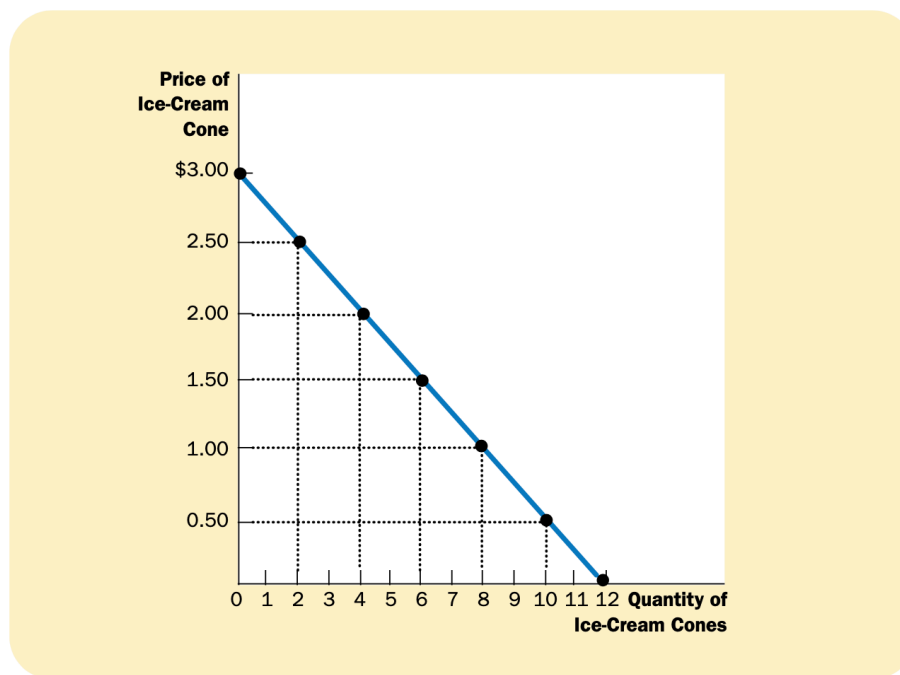


Figure 4.2: Demand curve

the quantity of ice cream demanded is on the horizontal axis. The downward-sloping line relating price and quantity demanded is called the **demand curve**.

### 4.2.3 Ceteris paribus

Economists use the term **ceteris paribus** to signify that all the relevant variables, except those being studied at that moment, are held constant. The Latin phrase literally means “other things being equal.” The demand curve slopes downward because, *ceteris paribus*, lower prices mean a greater quantity demanded.

### 4.2.4 Market demand versus individual demand

To analyze how markets work, we need to determine the **market demand**, which is the sum of all the individual demands for a particular good or service.



### 4.2.5 Shift in the demand curve

Whenever any determinant of demand changes, other than the good's price, the demand curve shifts. As Figure 4.3 shows, any change that increases the quantity demanded at every price shifts the demand curve to the right. Similarly, any change that reduces the quantity demanded at every price shifts the demand curve to the left.

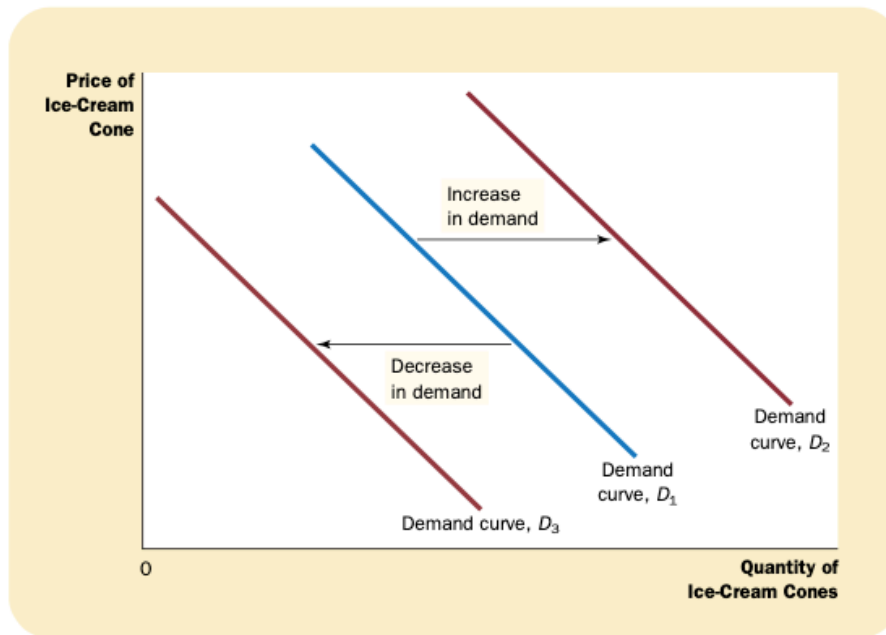


Figure 4.3: Shift in demand curve

The demand curve shows what happens to the quantity demanded of a good when its price varies, holding constant all other determinants of quantity demanded. When one of these other determinants changes, the demand curve shifts.

## 4.3 Supply

The **quantity supplied** of any goods or services is the amount that sellers are willing and able to sell.

### 4.3.1 What determine the quantity an individual supplies?

#### Price

**law of supply:** Other things equal, when the price of a good rises, the quantity supplied of the good also rises.

#### Input prices

The supply of a good is negatively related to the price of the inputs used to make the good.

#### Technology

The advance in technology raised the supply.

#### Expectations

The amount of goods or services you supply today may depend on your expectations of the future.

### 4.3.2 The supply schedule and the supply curve

PRICE OF ICE-CREAM CONE	QUANTITY OF CONES SUPPLIED
\$0.00	0
0.50	0
1.00	1
1.50	2
2.00	3
2.50	4
3.00	5

Figure 4.4: Supply schedule

Table 4.4 is called the **supply schedule**. Figure 4.5 is called the **supply curve**.

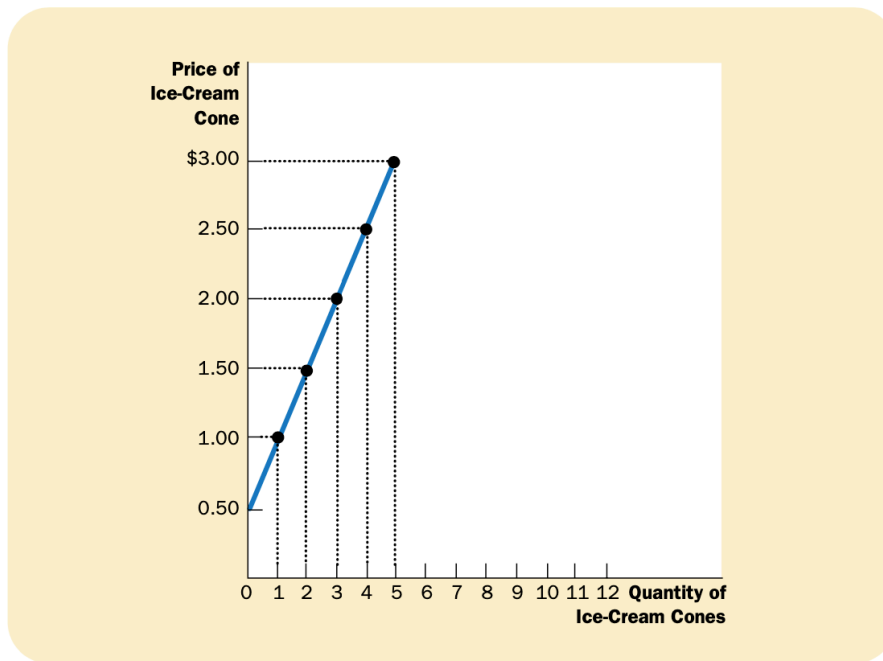


Figure 4.5: Supply curve

### 4.3.3 Market supply vs individual supply

Market supply is the sum of the supplies of all sellers.

### 4.3.4 Shifts in the supply curve

Whenever there is a change in any determinant of supply, other than the goods price, the supply curve shifts. As Figure 4.6 shows, any change that raises quantity supplied at every price shifts the supply curve to the right. Similarly, any change that reduces the quantity supplied at every price shifts the supply curve to the left.

The supply curve shows what happens to the quantity supplied of a good when its price varies, holding constant all other determinants of quantity supplied. When one of these other determinants changes, the supply curve shifts.

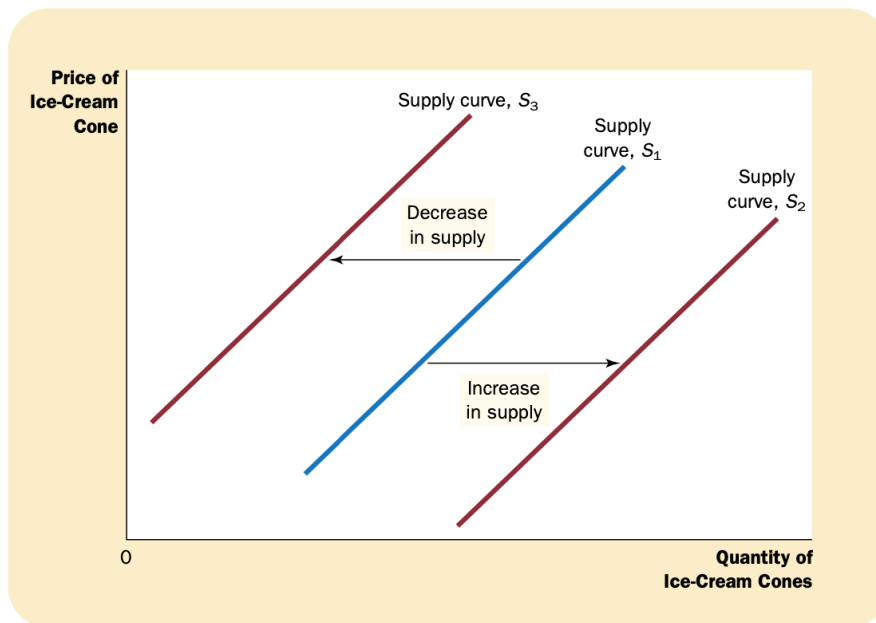


Figure 4.6: Shifts in the supply curve

## 4.4 Supply and demand together

4.7 shows the market supply curve and market demand curve together. There is one point at which the supply and demand curves intersect; this point is called the market's **equilibrium**. The price at which these two curves cross is called the **equilibrium price**, and the quantity is called the **equilibrium quantity**.

The dictionary defines the word equilibrium as a situation in which various forces are in balance and this also describes a market's equilibrium. At the equilibrium price, the quantity of the good that buyers are willing and able to exactly balances the quantity that sellers are willing and able to sell. The equilibrium price is sometimes called the **market-clearing price** because, at this price, everyone in the market has been satisfied: Buyers have bought all they want to buy, and sellers have sold all they want to sell.

The actions of buyers and sellers naturally move markets toward the equilibrium of supply and demand.

**surplus:** a situation in which quantity supplied is greater than quantity

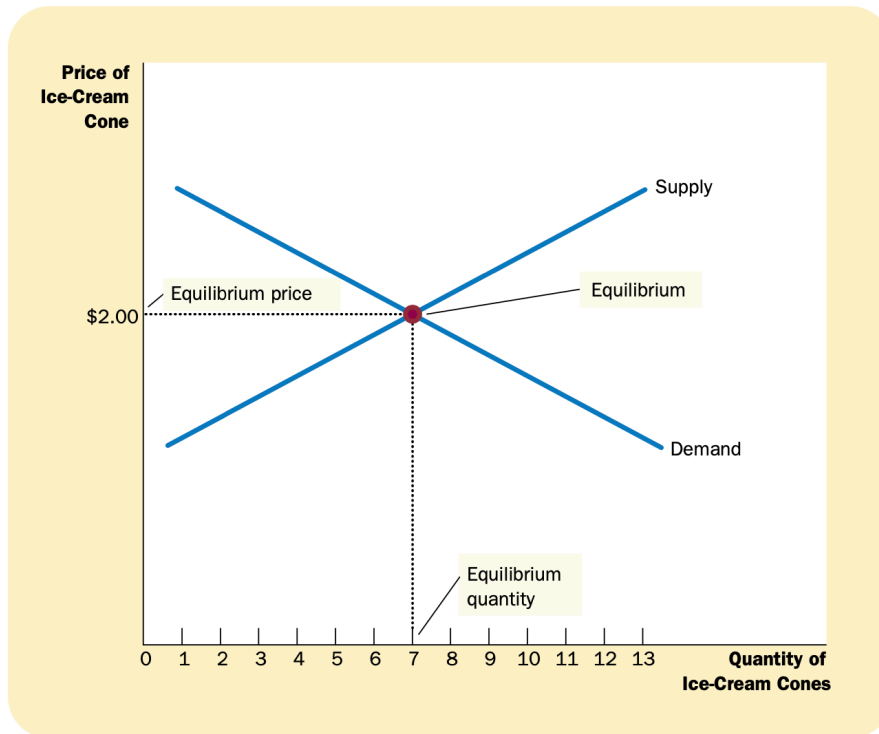


Figure 4.7: The equilibrium of supply and demand

demand.

**shortage:** a situation in which quantity demand is greater than quantity supplied.

**law of supply and demand:** The price of any good adjusts to bring the supply and demand for that good into balance.

#### 4.4.1 Three steps to analyzing changes in equilibrium

The equilibrium price and quantity depend on the position of the supply and demand curves. When some event shifts one of these curves, the equilibrium in the market changes. The analysis of such a change is called **comparative statics** because it involves comparing two static situations — an old and a new equilibrium.

When analyzing how some event affects a market, we proceed in three steps:

1. Decide whether the event shifts the supply curve or demand curve (or perhaps both).
2. Decide which direction the curve shifts.
3. Use the supply-and-demand diagram to see how the shift changes the equilibrium

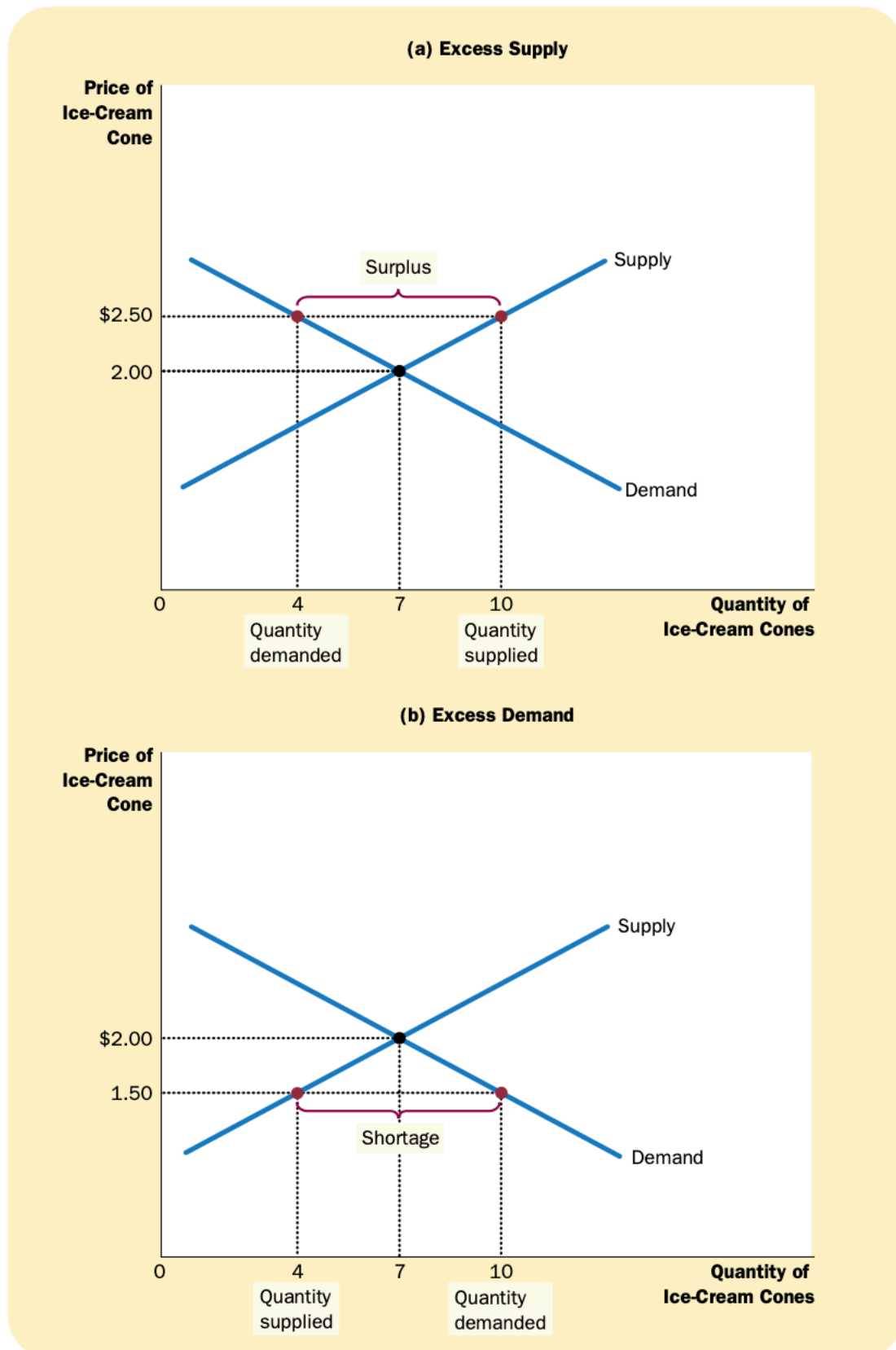


Figure 4.8: Surplus and shortage





## Chapter 5

# Elasticity and its application

### 5.1 The elasticity of demand

To measure how much demand responds to changes in its determinants, economists use the concept of **elasticity**.

#### 5.1.1 The price elasticity of demand and its determinants

The **price elasticity of demand** measures how much the quantity demanded responds to a change in price. Demand for a good is said to be **elastic** if the quantity demanded responds substantially to changes in the price. Demand is said to be **inelastic** if the quantity demanded responds only slightly to changes in the price.

#### Necessities versus luxuries

Necessities tend to have inelastic demands, whereas luxuries have elastic demands.

#### Availability of close substitutes

Goods with close substitutes tend to have more elastic demand because it is easier for consumers to switch from that good to others.

### Definition of the market

The elasticity of demand in any market depends on how we draw the boundaries of the market. Narrowly defined markets tend to have more elastic demand than broadly defined markets, because it is easier to find close substitutes for narrowly defined goods.

### Time horizon

Goods tend to have more elastic demand over longer time horizons.

## 5.1.2 Computing the price elasticity of demand

$$\text{Price elasticity of demand} = \frac{\text{Percentage change in quantity demanded}}{\text{Percentage change in price}} \quad (5.1)$$

### 5.1.3 The midpoint method

If you try calculating the price elasticity of demand between two points on a demand curve, you will quickly notice an annoying problem: The elasticity from point A to point B seems different from the elasticity from point B to point A. One way to avoid this problem is to use the **midpoint method** for calculating elasticities.

We can express the midpoint method with the following formula for the price elasticity of demand between two points, denoted  $(Q_1, P_1)$  and  $(Q_2, P_2)$ :

$$\text{Price elasticity of demand} = \frac{(Q_2 - Q_1)/[(Q_2 + Q_1)/2]}{(P_2 - P_1)/[(P_2 + P_1)/2]} \quad (5.2)$$

### 5.1.4 The variety of demand curves

Economists classify demand curves according to their elasticity. Demand is **elastic** when the elasticity is greater than 1, so that quantity moves proportionately more than the price. Demand is **inelastic** when the elasticity is less than 1, so that quantity moves proportionately less than the price. If the elasticity is exactly 1, so that quantity moves the same amount proportionately as price, demand is said to have **unit elasticity**.

### 5.1.5 Total revenue and the price elasticity of demand

**total revenue** the amount paid by buyers and received by sellers of a good, computed as the price of the good  $P$  times the quantity sold  $Q$

$$\text{total revenue} = P \times Q \quad (5.3)$$

As show in Figure 5.1.

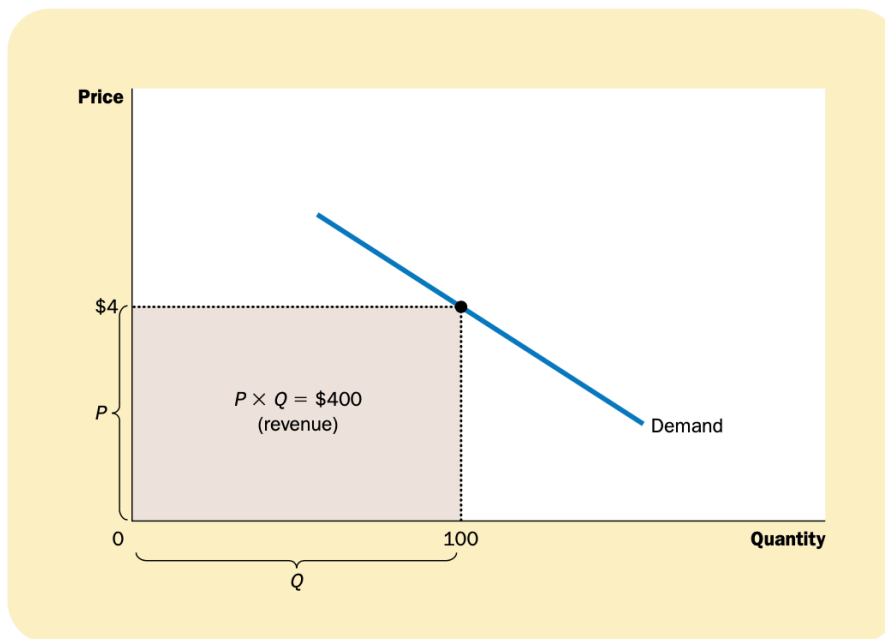


Figure 5.1: Total revenue

General rule:

- When a demand curve is inelastic (a price elasticity less than 1), a price increase raises total revenue, and a price decrease reduces total revenue.
- When a demand curve is elastic (a price elasticity greater than 1), a price increase reduces total revenue, and a price decrease raises total revenue.
- In the special case of unit elastic demand (a price elasticity exactly equal to 1), a change in the price does not affect total revenue.

As shown in Figure 5.2 and 5.3.

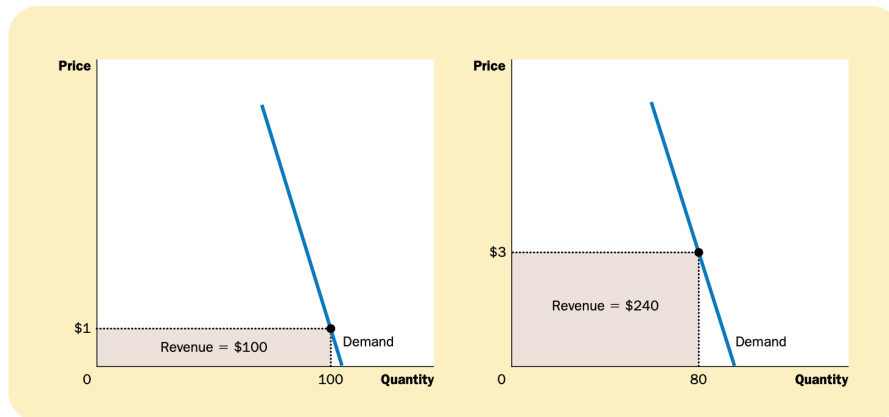


Figure 5.2: Inelastic demand

### 5.1.6 Other demand elasticities

#### The income elasticity of demand

Economists use the **income elasticity of demand** to measure how the quantity demanded changes as consumer income changes.



Figure 5.3: Elastic demand

$$\text{Income elasticity of demand} = \frac{\text{Percentage change in quantity demanded}}{\text{Percentage change in income}} \quad (5.4)$$

### The cross-price elasticity of demand

Economists use the **cross-price elasticity of demand** to measure how the quantity demanded of one good changes as the price of another good changes.

$$\text{Cross-price elasticity of demand} = \frac{\text{Percentage change in quantity demanded of good 1}}{\text{Percentage change in the price of good 2}} \quad (5.5)$$

## 5.2 The elasticity of supply

### 5.2.1 The price elasticity of supply and its determinants

The **price elasticity of supply** measures how much the quantity supplied responds to changes in the price.

### 5.2.2 Computing the price elasticity of supply

$$\text{Price elasticity of supply} = \frac{\text{Percentage change in quantity supplied}}{\text{Percentage change in price}} \quad (5.6)$$

## Chapter 6

# Supply, demand and government policies

### 6.1 Controls on prices

**price ceiling** a legal maximum on the price at which a good can be sold  
**price floor** a legal minimum on the price at which a good can be sold

#### 6.1.1 How price ceilings affect market outcomes

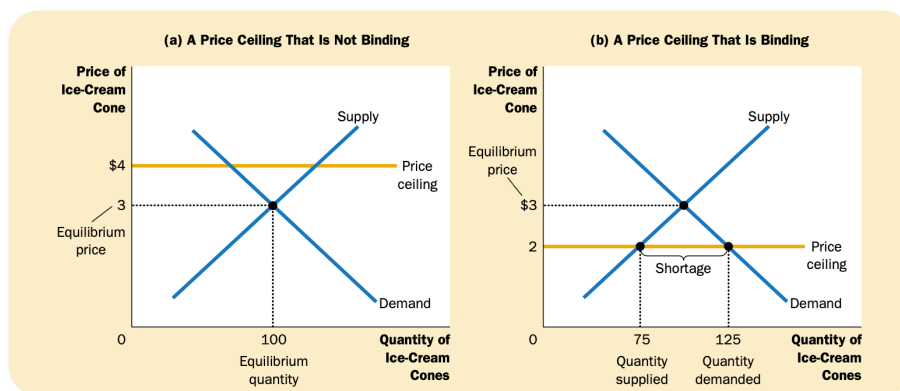


Figure 6.1: A market with price ceiling

When the government imposes a binding price ceiling on a competitive market, a shortage of the good arises, and sellers must ration the scarce goods among the large number of potential buyers.

### 6.1.2 How price floors affect market outcomes

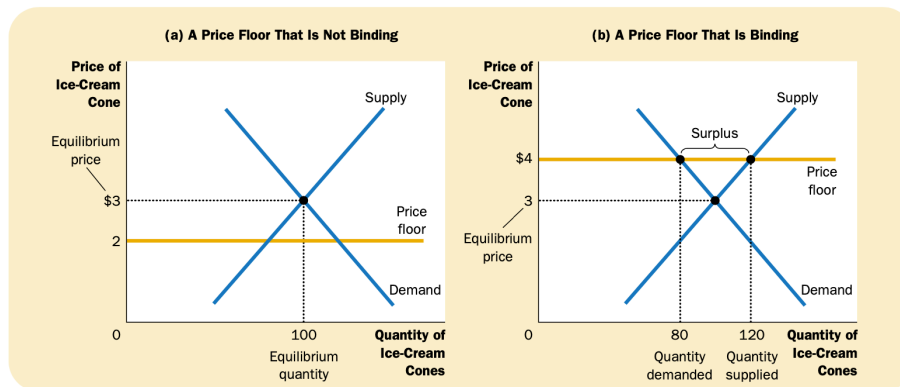


Figure 6.2: A market with price floor

When the government imposes a binding price floor on a competitive market, a surplus of the good arises.

## 6.2 Taxes

**tax incidence:** the study of who bears the burden of taxation

### 6.2.1 How taxes on buyers affect market outcomes

3 steps:

1. the tax affect the demand curve
2. the demand curve shifts left (or download)
3. the new equilibrium

Two general lessons:



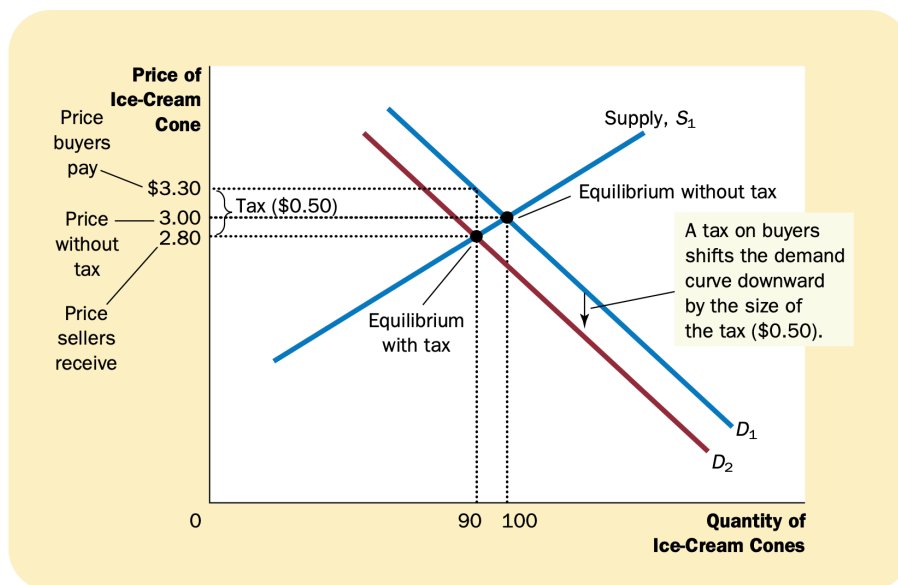


Figure 6.3: A tax on buyers

- Taxes discourage market activity. When a good is taxed, the quantity of the good sold is smaller in the new equilibrium.
- Buyers and sellers share the burden of taxes. In the new equilibrium, buyers pay more for the good, and sellers receive less.

### 6.2.2 How taxes on sellers affect market outcomes

3 steps:

- the tax affect the supply curve
- the supply curve shifts left (or up)
- the new equilibrium

Comparing Figure 6.3 and Figure 6.4 leads to a surprising conclusion: Taxes on buyers and taxes on sellers are equivalent.

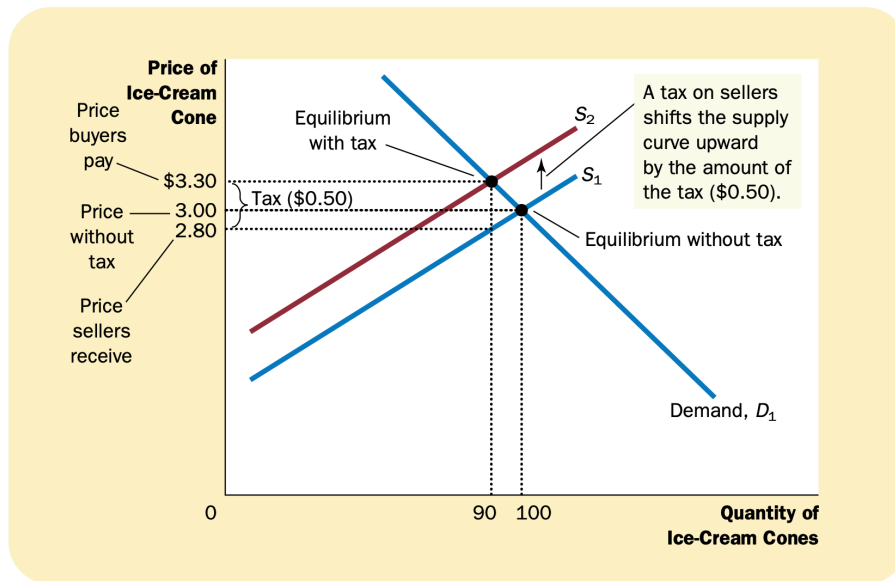


Figure 6.4: A tax on sellers

### 6.2.3 Elasticity and tax incidence

A tax burden falls more heavily on the side of the market that is less elastic.

Why is this true?

In essence, the elasticity measures the willingness of buyers or sellers to leave the market when conditions become unfavorable. A small elasticity of demand means that buyers do not have good alternatives to consuming this particular good. A small elasticity of supply means that sellers do not have good alternatives to producing this particular good. When the good is taxed, the side of the market with fewer good alternatives cannot easily leave the market and must, therefore, bear more of the burden of the tax.

Most labor economists believe that the supply of labor is much less elastic than the demand. This means that workers, rather than firms, bear most of the burden of the payroll tax.

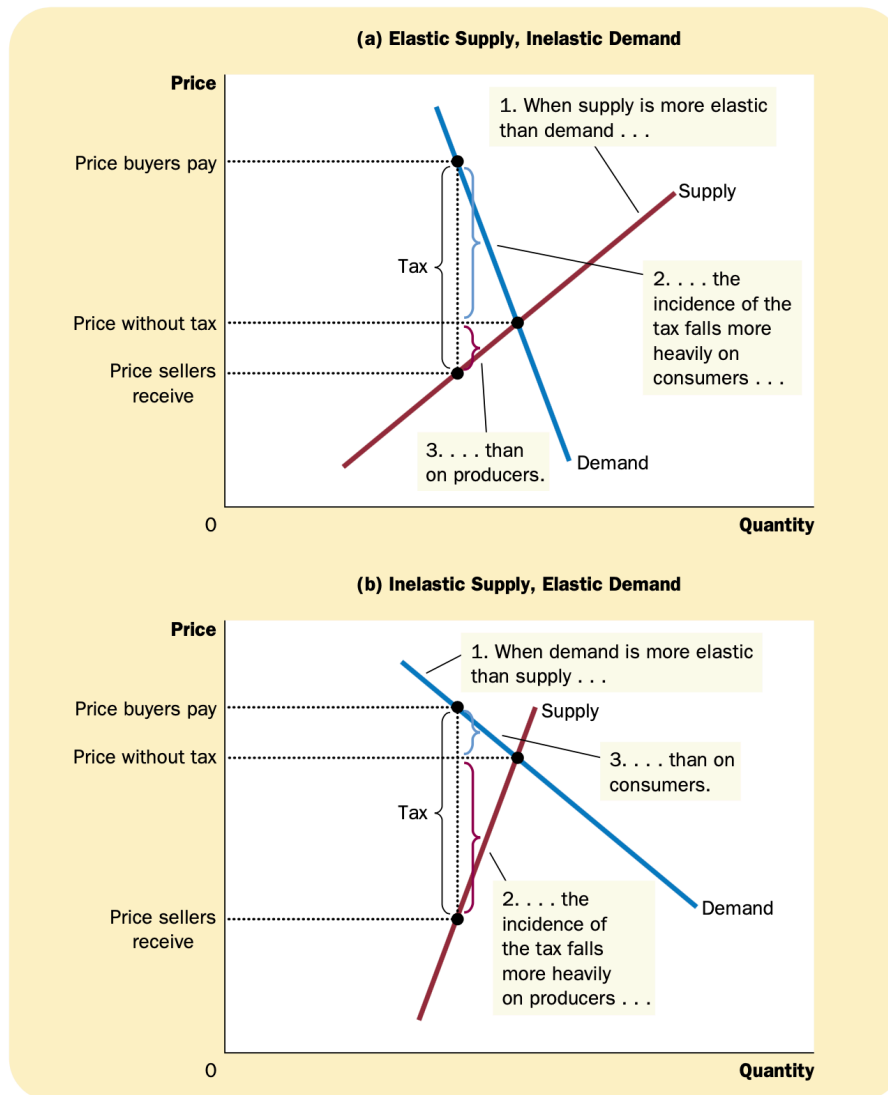


Figure 6.5: How the burden of a tax is divided



## Chapter 7

# Consumers, producers, and the efficiency of markets

**welfare economics:** the study of how the allocation of resources affect economic well-being.

### 7.1 Consumer surplus

#### 7.1.1 Willingness to pay

Each buyer's maximum price is called his **willingness to pay**, and it measures how much that buyer values the good.

**Consumer surplus** is the amount a buyer is willing to pay for a good minus the amount the buyer actually pays for it. Consumer surplus measures the benefit to buyers of participating in a market.

#### 7.1.2 Using the demand curve to measure consumer surplus

The demand curve is shown in Figure 7.1:

At any quantity, the price given by the demand curve shows the willingness to pay of the **marginal buyer**, the buyer who would leave the market first if the price were any higher.

Because the demand curve reflects buyers willingness to pay, we can also use it to measure consumer surplus. Figure 7.2 uses the demand curve to compute

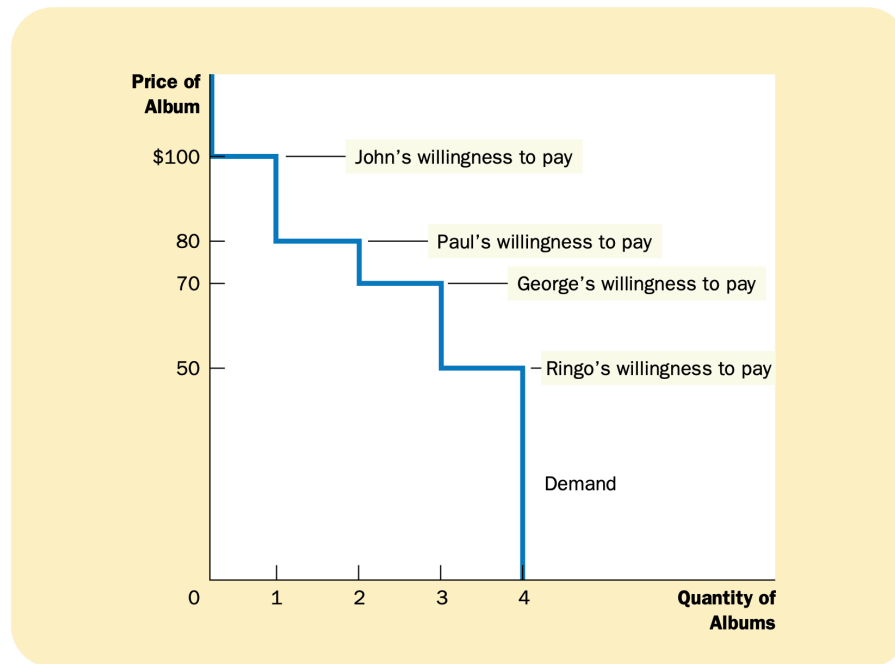


Figure 7.1: The demand curve

consumer surplus. Figure 7.2 shows that: **The area below the demand curve and above the price measures the consumer surplus in a market.**

### 7.1.3 How a lower price raise consumer surplus

### 7.1.4 What does consumer surplus measure?

In most markets consumer surplus does reflect economic well-being. Economists normally presume that buyers are **rational** when they make decisions and that their preferences should be respected. In this case, consumers are the best judges of how much benefit they receive from the goods they buy.

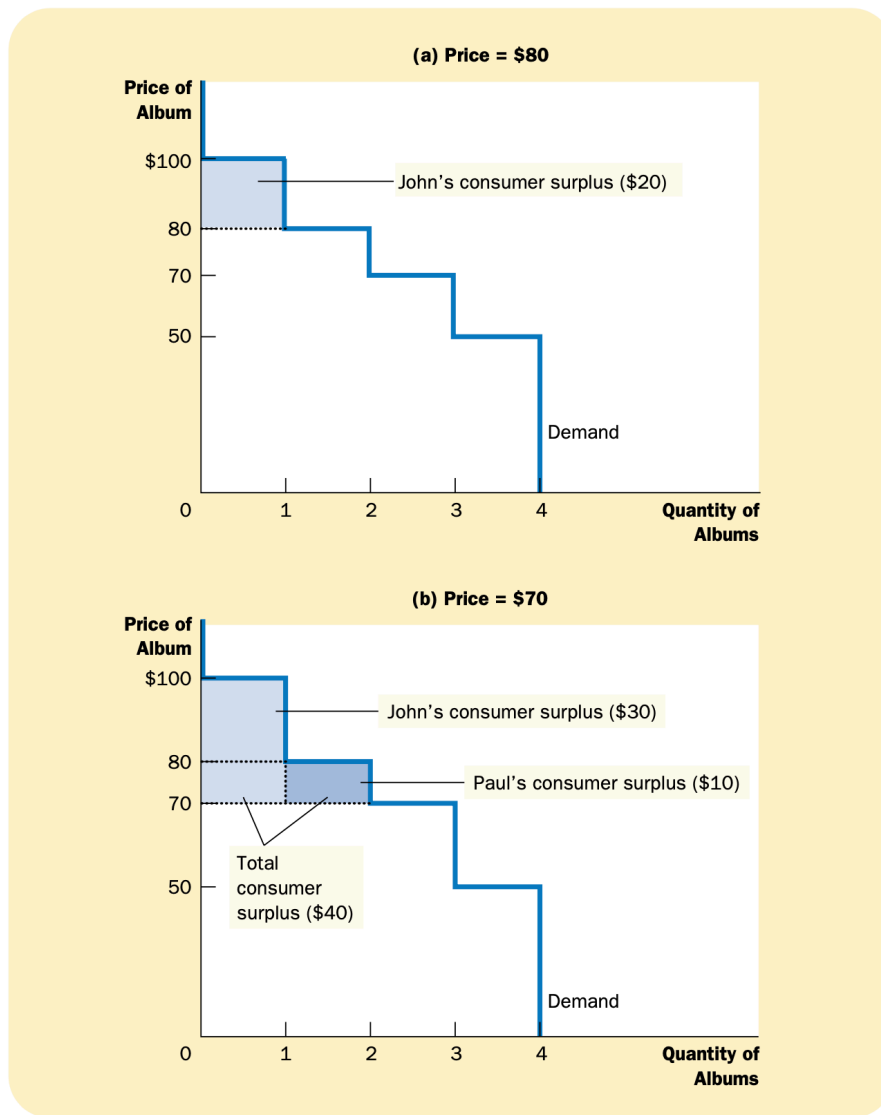


Figure 7.2: Measuring consumer surplus with the demand curve

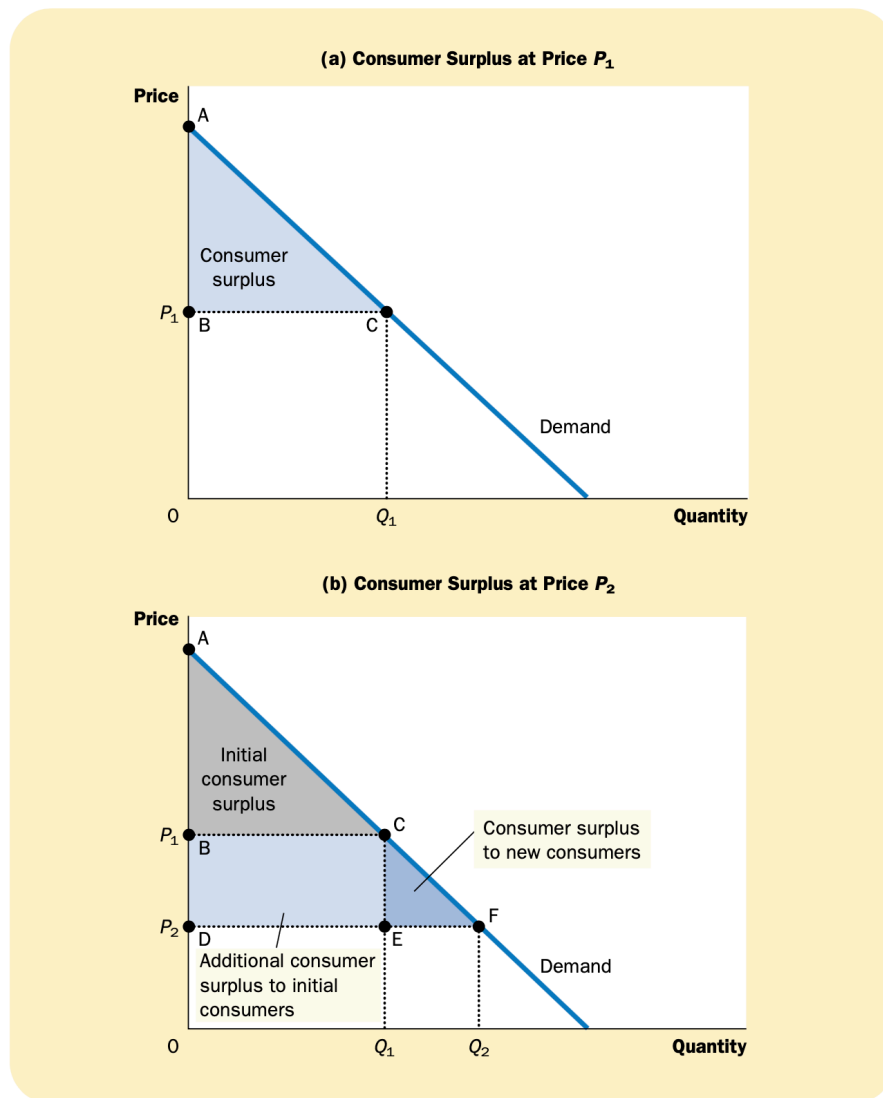


Figure 7.3: How the price affects consumer surplus

## 7.2 Producer surplus

### 7.2.1 Cost and the willingness to sell

**Producer surplus** is the amount a seller is paid minus the cost of production. Producer surplus measures the benefit to sellers of participating in a



market.

### 7.2.2 Using the supply curve to measure producer surplus

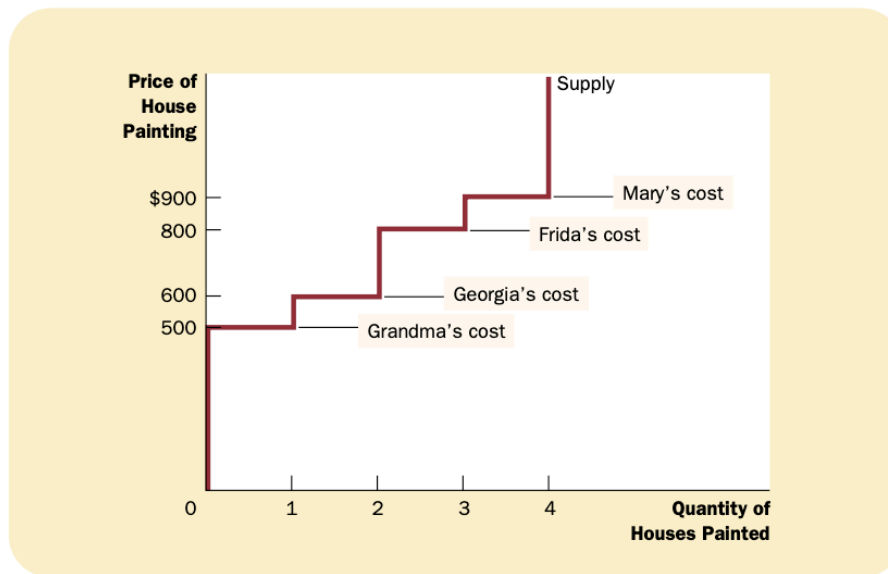


Figure 7.4: The supply curve

Figure 7.4 shows the supply curve. At any quantity, the price given by the supply curve shows the cost of the **marginal seller**, the seller who would leave the market first if the price were any lower.

Because the supply curve reflects sellers costs, we can use it to measure producer surplus. Figure 7.5 uses the supply curve to compute producer surplus in our example. Figure 7.5 shows that: **The area below the price and above the supply curve measures the producer surplus in a market.**

### 7.2.3 How a higher price raises producer surplus

## 7.3 Market efficiency

$$\text{Consumer surplus} = \text{Value to buyers} - \text{Amount paid by buyers.} \quad (7.1)$$

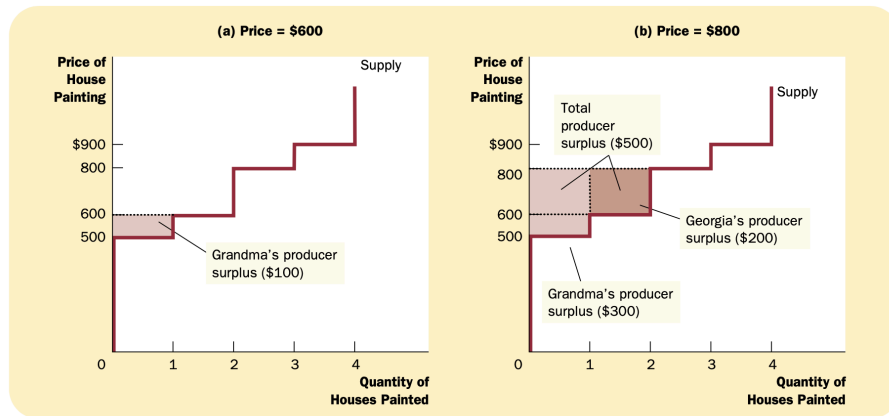


Figure 7.5: The producer surplus

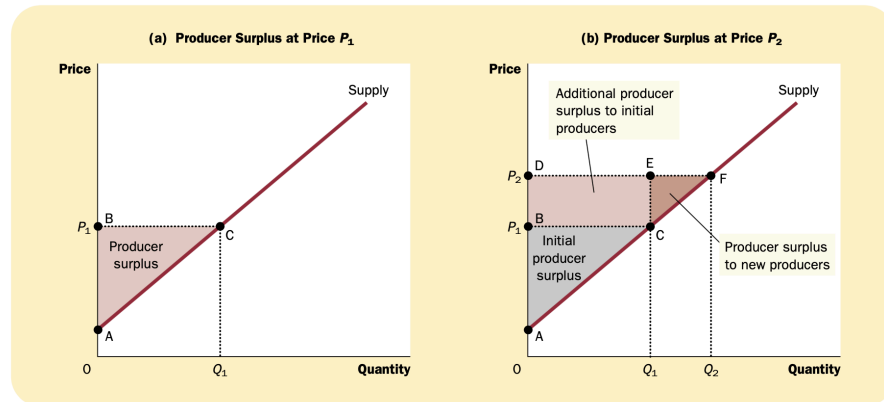


Figure 7.6: HOW a higher price raises producer surplus

$$\text{Producer surplus} = \text{Amount received by sellers} - \text{Cost to sellers.} \quad (7.2)$$

When we add consumer and producer surplus together, we obtain

$$\text{Total surplus} = \text{Value to buyers} - \text{Amount paid by buyers} + \text{Amount received by sellers} - \text{Cost to sellers.} \quad (7.3)$$

The amount paid by buyers equals the amount received by sellers, so the middle two terms in this expression cancel each other. As a result, we can write

total surplus as

$$\text{Total surplus} = \text{Value to buyers} - \text{Cost to sellers.} \quad (7.4)$$

If an allocation of resources maximizes total surplus, we say that the allocation exhibits **efficiency**.

### 7.3.1 Evaluating the market equilibrium

Figure 7.7 shows consumer and producer surplus when a market reaches the equilibrium of supply and demand.

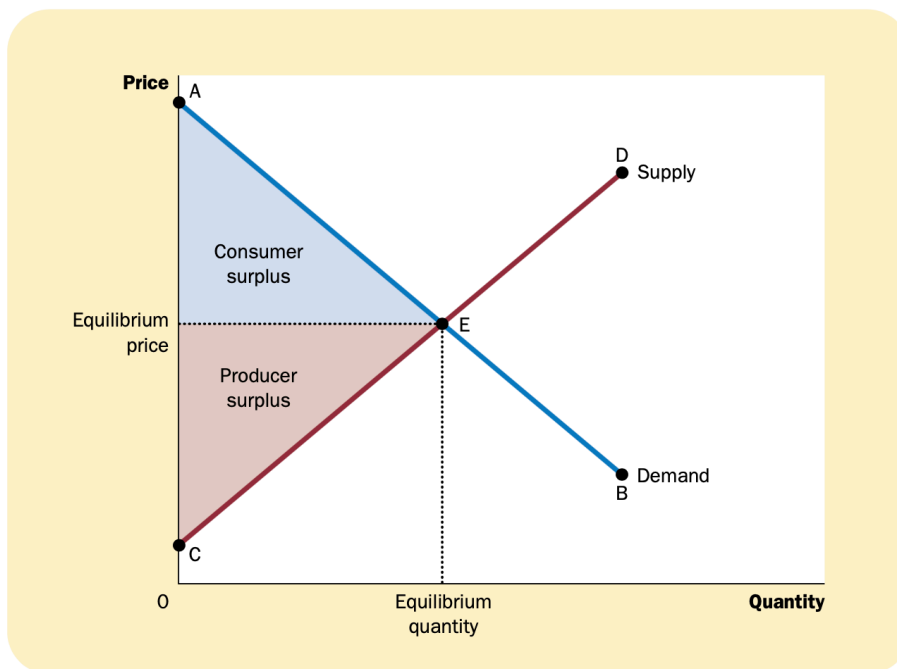


Figure 7.7: Consumer and producer surplus in the market

Is this equilibrium allocation of resources efficient? Does it maximize total surplus?

To answer these questions, keep in mind that when a market is in equilibrium, the price determines which buyers and sellers participate in the market. Those buyers who value the good more than the price (represented by the segment AE on the demand curve) choose to buy the good; those buyers who value

it less than the price (represented by the segment EB) do not. Similarly, those sellers whose costs are less than the price (represented by the segment CE on the supply curve) choose to produce and sell the good; those sellers whose costs are greater than the price (represented by the segment ED) do not.

These observations lead to two insights about market outcomes:

1. Free markets allocate the supply of goods to the buyers who value them most highly, as measured by their willingness to pay.
2. Free markets allocate the demand for goods to the sellers who can produce them at least cost.
3. Free markets produce the quantity of goods that maximizes the sum of consumer and producer surplus.

To see why this is true, consider Figure ??.

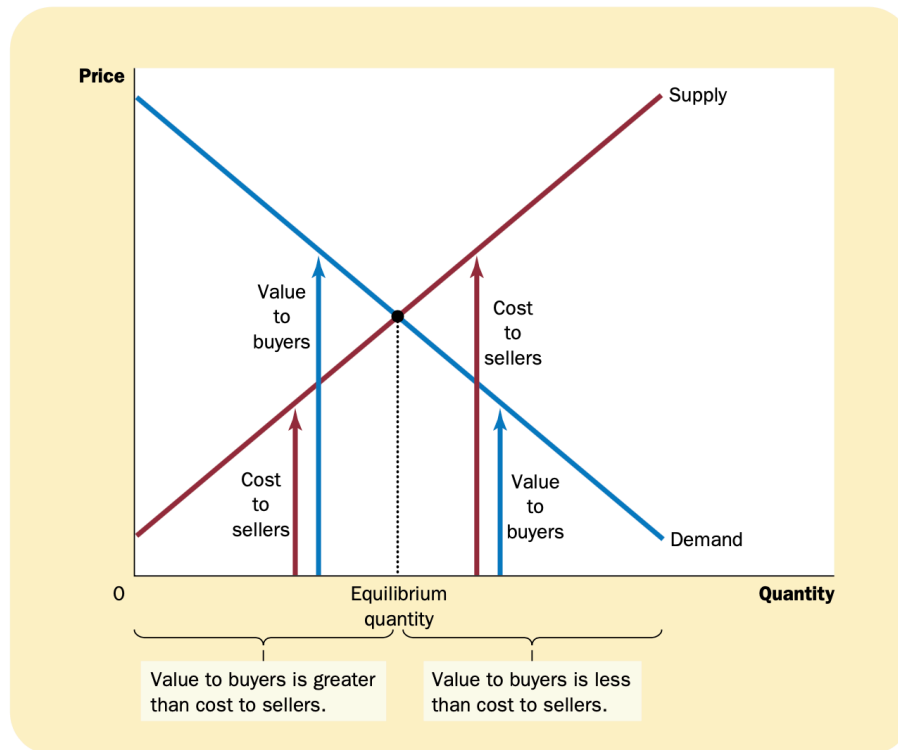


Figure 7.8: The efficiency of the equilibrium quantity

## Chapter 8

# Applications: the costs of taxation

### 8.1 The deadweight loss of taxation

Figure 8.1 show the effect of a tax. A tax on a good causes the size of the market for the good to shrink.

#### 8.1.1 How a tax affects market participants

Figure 8.2 show the tax revenue.

##### **Welfare without a tax**

Figure 8.3 shows the supply-and-demand diagram and marks the key areas with the letters A through F.

Without a tax, the total surplus is :  $A + B + C + D + E + F$ .

##### **Welfare with a tax**

To compute total surplus with the tax, we add consumer surplus, producer surplus, and tax revenue. Thus, we find that total surplus is area  $A + B + D + F$ .

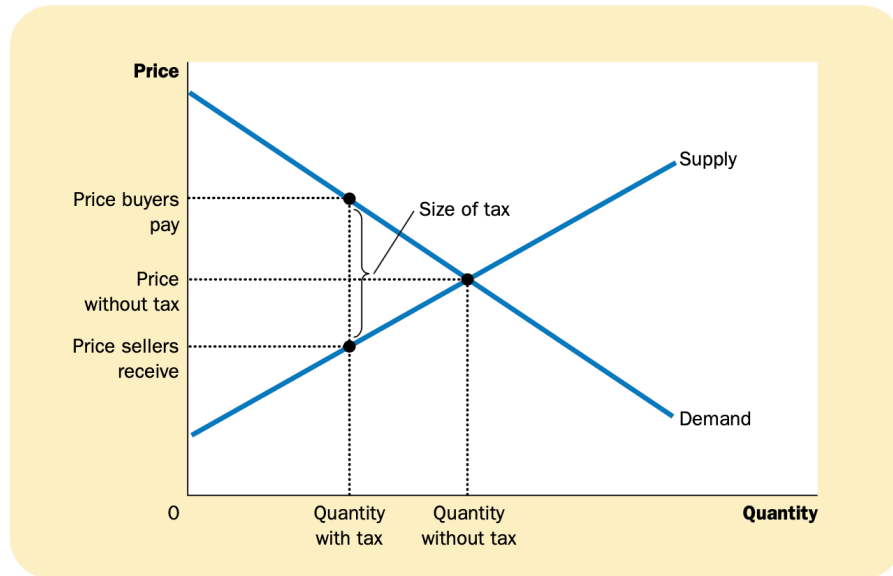


Figure 8.1: The effect of a tax

### Change in welfare

Total surplus in the market falls by the area  $C + E$ . Thus, the losses to buyers and sellers from a tax exceed the revenue raised by the government. The fall in total surplus that results when a tax (or some other policy) distorts a market outcome is called the **deadweight** loss. The area  $C + E$  measures the size of the deadweight loss.

To understand why taxes impose deadweight losses, recall one of the Ten Principles of Economics: People respond to incentives. Markets normally allocate scarce resources efficiently. That is, the equilibrium of supply and demand maximizes the total surplus of buyers and sellers in a market. When a tax raises the price to buyers and lowers the price to sellers, however, it gives buyers an incentive to consume less and sellers an incentive to produce less than they otherwise would. As buyers and sellers respond to these incentives, the size of the market shrinks below its optimum. Thus, because taxes distort incentives, they cause markets to allocate resources inefficiently.

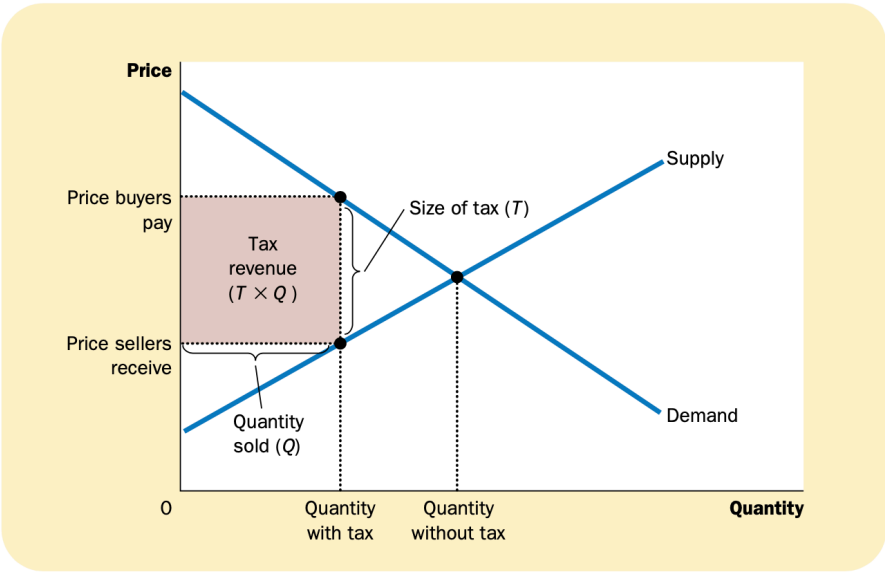


Figure 8.2: Tax revenue

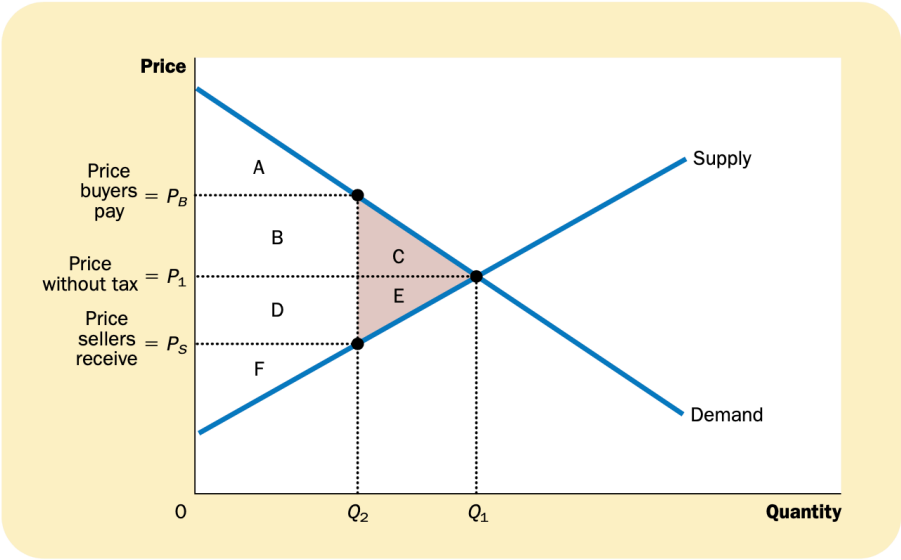


Figure 8.3: How a tax affects welfare

### 8.1.2 Deadweight losses and the gains from trade

To gain some intuition for why taxes result in deadweight losses, consider an example. Imagine that Joe cleans Janes house each week for \$100. The opportunity cost of Joes time is \$80, and the value of a clean house to Jane is \$120. Thus, Joe and Jane each receive a \$20 benefit from their deal. The total surplus of \$40 measures the gains from trade in this particular transaction.

Now suppose that the government levies a \$50 tax on the providers of cleaning services. There is now no price that Jane can pay Joe that will leave both of them better off after paying the tax. The most Jane would be willing to pay is \$120, but then Joe would be left with only \$70 after paying the tax, which is less than his \$80 opportunity cost. Conversely, for Joe to receive his opportunity cost of \$80, Jane would need to pay \$130, which is above the \$120 value she places on a clean house. As a result, Jane and Joe cancel their arrangement. Joe goes without the income, and Jane lives in a dirtier house.

Figure 8.4 show the deadweight loss.

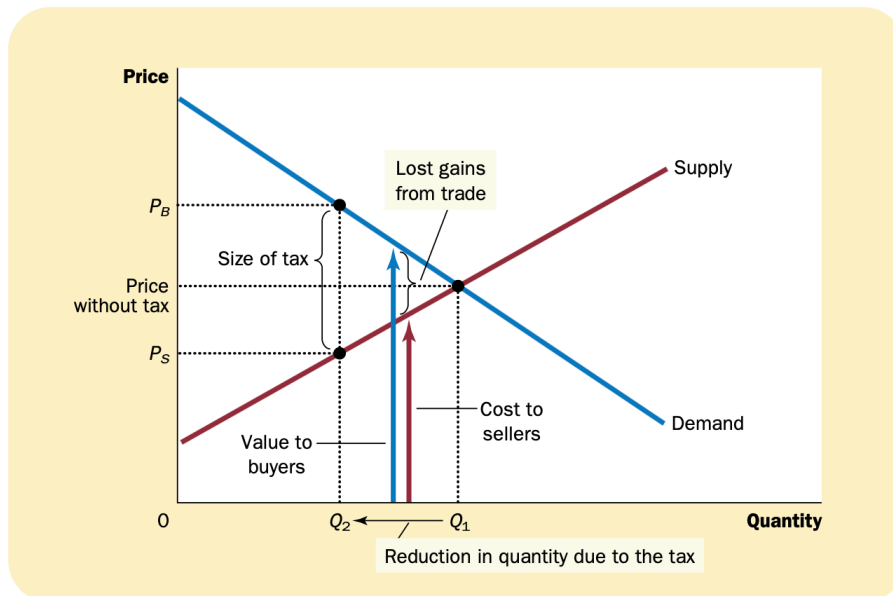


Figure 8.4: The deadweight loss

From this example, we can see the ultimate source of deadweight losses: Taxes cause deadweight losses because they prevent buyers and sellers from



realizing some of the gains from trade.

## 8.2 The determinants of the deadweight loss

What determines whether the deadweight loss from a tax is large or small?

The answer is the price elasticities of supply and demand, which measure how much the quantity supplied and quantity demanded respond to changes in the price. This is shown in Figure 8.5.

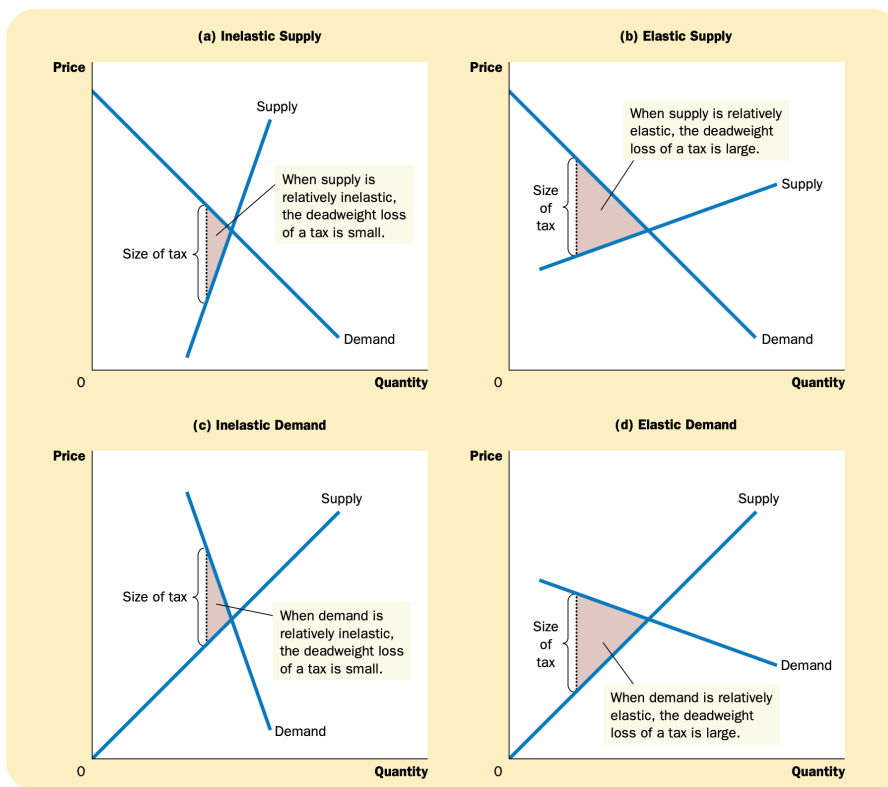


Figure 8.5: Tax distortions and elasticities

### 8.3 Deadweight loss and tax revenue as taxes vary

Figure 8.6 shows the effects of a small, medium, and large tax, holding constant the markets supply and demand curves.

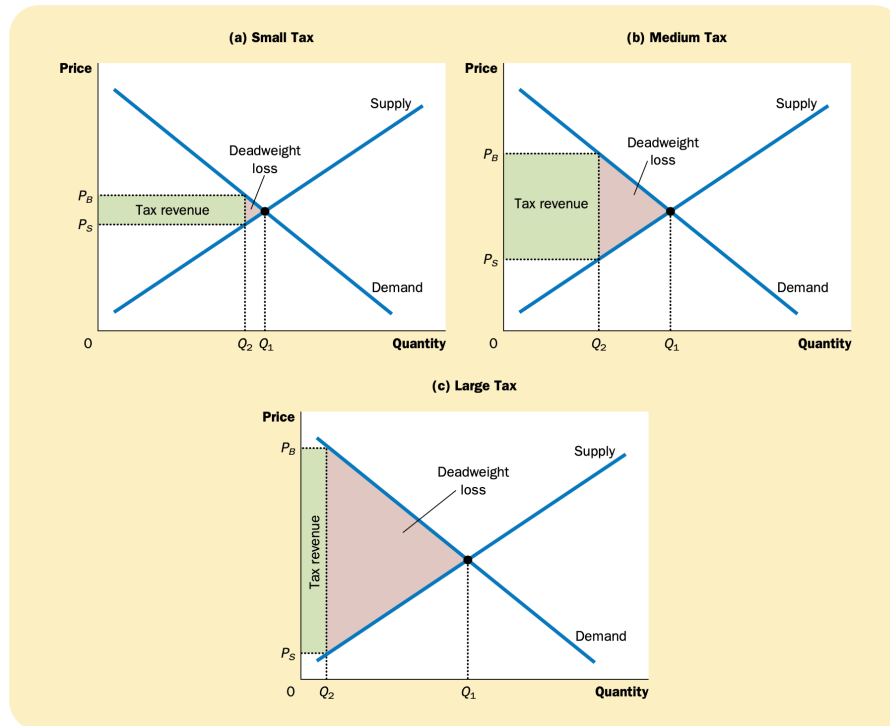


Figure 8.6: Deadweight loss and tax revenue as taxes vary

Figure ?? summarizes these results. In panel (a) we see that as the size of a tax increases, its deadweight loss quickly gets larger. By contrast, panel (b) shows that tax revenue first rises with the size of the tax; but then, as the tax gets larger, the market shrinks so much that tax revenue starts to fall.

### 8.4 Conclusion

Taxes, Oliver Wendell Holmes once said, are the price we pay for a civilized society. Indeed, our society cannot exist without some form of taxes. We all

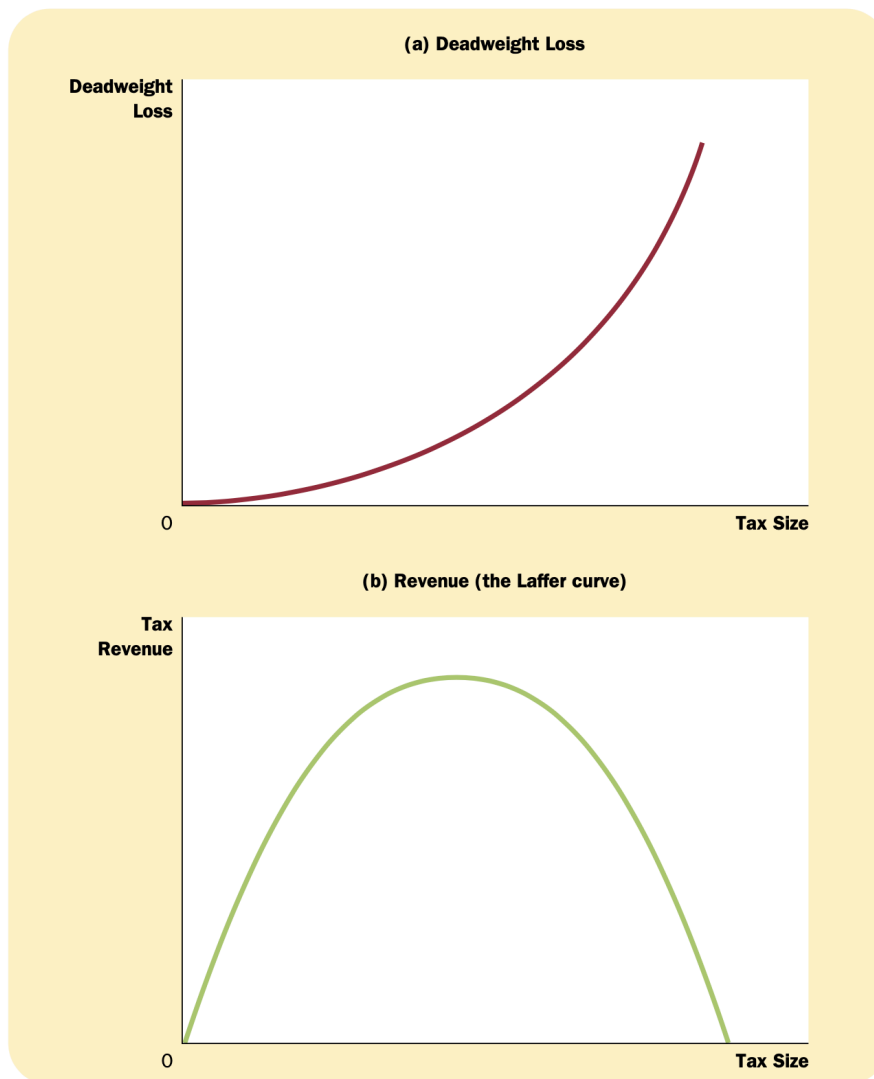


Figure 8.7: How deadweight loss and tax revenue vary with the size of a tax

expect the government to provide certain services, such as roads, parks, police, and national defense. These public services require tax revenue.

Markets are usually a good way to organize economic activity. When the government imposes taxes on buyers or sellers of a good, however, society loses some of the benefits of market efficiency. Taxes are costly to market partici-

pants not only because taxes transfer resources from those participants to the government, but also because they alter incentives and distort market outcomes.

## Chapter 9

# Application: international trade

### 9.1 The determinants of trade

Consider the market for steel. We examine here the steel market in the imaginary country of Isoland.

#### 9.1.1 The equilibrium without trade

Because there is no international trade, the market for steel in Isoland consists solely of Isolandian buyers and sellers. As Figure 9.1 shows, the domestic price adjusts to balance the quantity supplied by domestic sellers and the quantity demanded by domestic buyers.

**world price:** the price of a good that prevails in the world market for that good.

### 9.2 The winners and losers from trade

#### 9.2.1 The gains and losses of an exporting country

Figure 9.2 shows the Isolandian steel market when the domestic equilibrium price before trade is below the world price.

Clearly, not everyone benefits. Trade forces the domestic price to rise to the world price. Domestic producers of steel are better off because they can

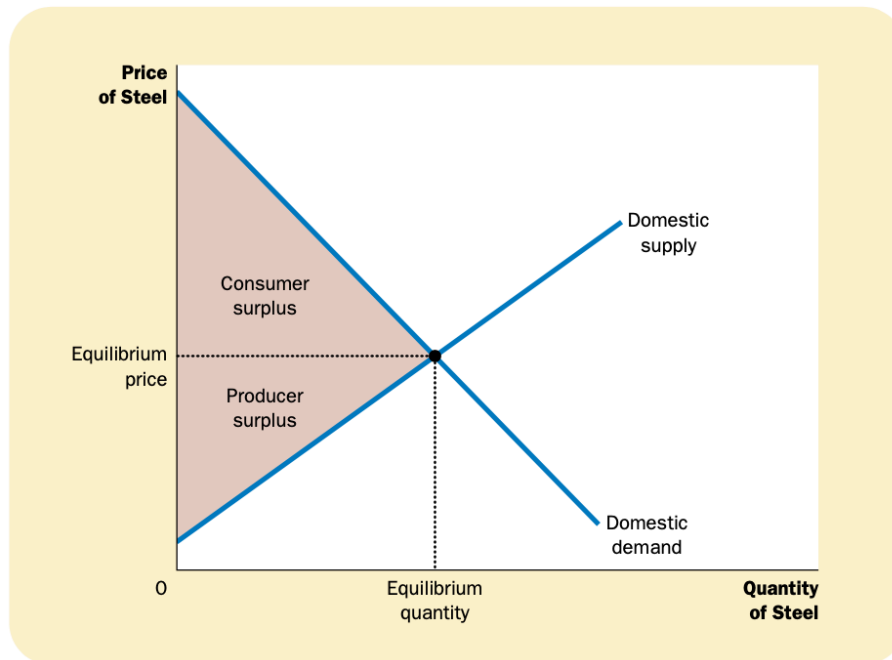


Figure 9.1: The equilibrium without trade

now sell steel at a higher price, but domestic consumers of steel are worse off because they have to buy steel at a higher price.

To measure these gains and losses, we look at the changes in consumer and producer surplus, which are shown in Figure 9.3.

These welfare calculations show who wins and who loses from trade in an exporting country. Sellers benefit because producer surplus increases by the area  $B + D$ . Buyers are worse off because consumer surplus decreases by the area  $B$ . Because the gains of sellers exceed the losses of buyers by the area  $D$ , total surplus in Isoland increases.

This analysis of an exporting country yields two conclusions:

1. When a country allows trade and becomes an exporter of a good, domestic producers of the good are better off, and domestic consumers of the good are worse off.
2. Trade raises the economic well-being of a nation in the sense that the gains of the winners exceed the losses of the losers.

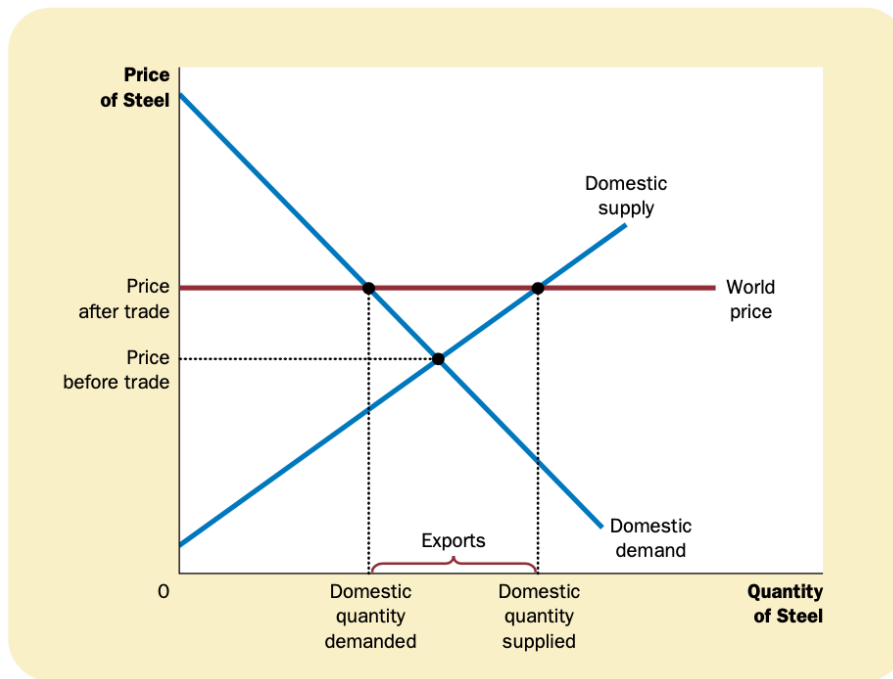


Figure 9.2: International trade in an exporting country

### 9.2.2 The gains and losses of an importing country

Figure 9.2 show the situation.

Now consider the gains and losses from trade. Once again, not everyone benefits. When trade forces the domestic price to fall, domestic consumers are better off (they can now buy steel at a lower price), and domestic producers are worse off (they now have to sell steel at a lower price). Changes in consumer and producer surplus measure the size of the gains and losses, as shown in Figure 9.5.

Buyers benefit because consumer surplus increases by the area  $B + D$ . Sellers are worse off because producer surplus falls by the area  $B$ . The gains of buyers exceed the losses of sellers, and total surplus increases by the area  $D$ .

This analysis of an importing country yields two conclusions parallel to those for an exporting country:

1. When a country allows trade and becomes an importer of a good, domestic consumers of the good are better off, and domestic producers of the good

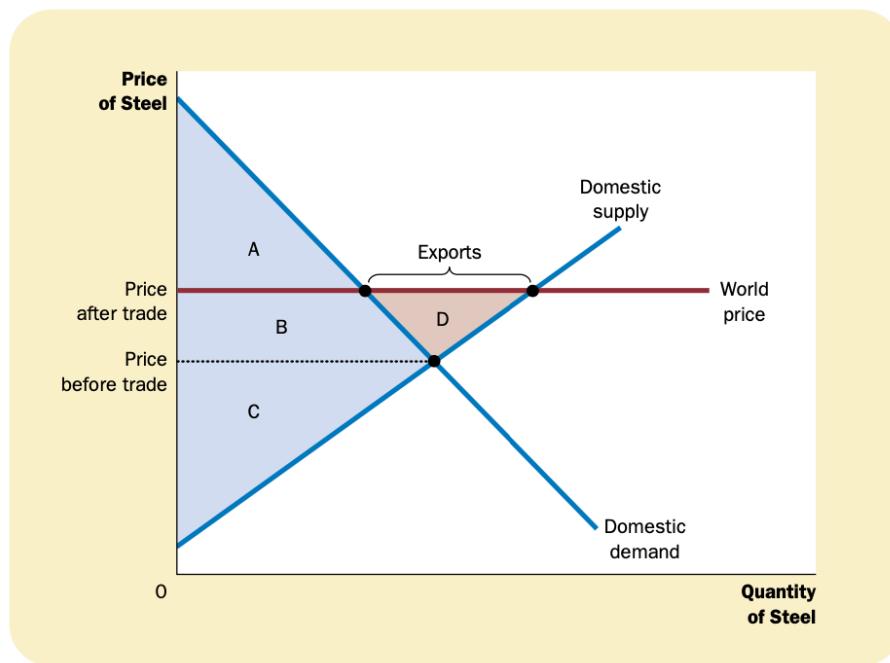


Figure 9.3: How free trade affects welfare in an exporting country

are worse off.

2. Trade raises the economic well-being of a nation in the sense that the gains of the winners exceed the losses of the losers.

### 9.2.3 The effects of a tariff

The economists quickly realize that a tariff on steel will have no effect if Isoland becomes a steel exporter. If no one in Isoland is interested in importing steel, a tax on steel imports is irrelevant. The tariff matters only if Isoland becomes a steel importer.

Figure 9.6 shows the Isolandian market for steel.

The change in price affects the behavior of domestic buyers and sellers. Because the tariff raises the price of steel, it reduces the domestic quantity demanded from  $Q_1^D$  to  $Q_2^D$  and raises the domestic quantity supplied from  $Q_1^S$  to  $Q_2^S$ . Thus, **the tariff reduces the quantity of imports and moves the domestic market closer to its equilibrium without trade.**



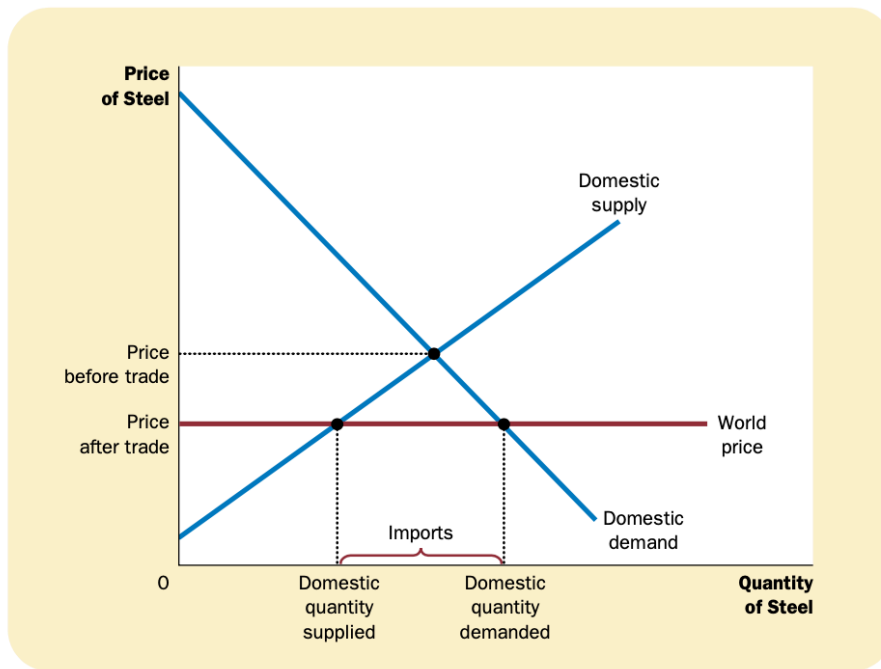


Figure 9.4: International trade in an importing country

The comparison before and after the tariff is shown in 9.7.

#### 9.2.4 The effect of an import quota

**import quota:** a limit on the quantity of a good that can be produced abroad and sold domestically.

Imagine that the Isolandian government distributes a limited number of import licenses. Each license gives the license holder the right to import 1 ton of steel into Isoland from abroad. Figure 9.8 shows how an import quota affects the Isolandian market for steel.

The changes is shown in table 9.9.

Both tariffs and import quotas raise the domestic price of the good, reduce the welfare of domestic consumers, increase the welfare of domestic producers, and cause deadweight losses.

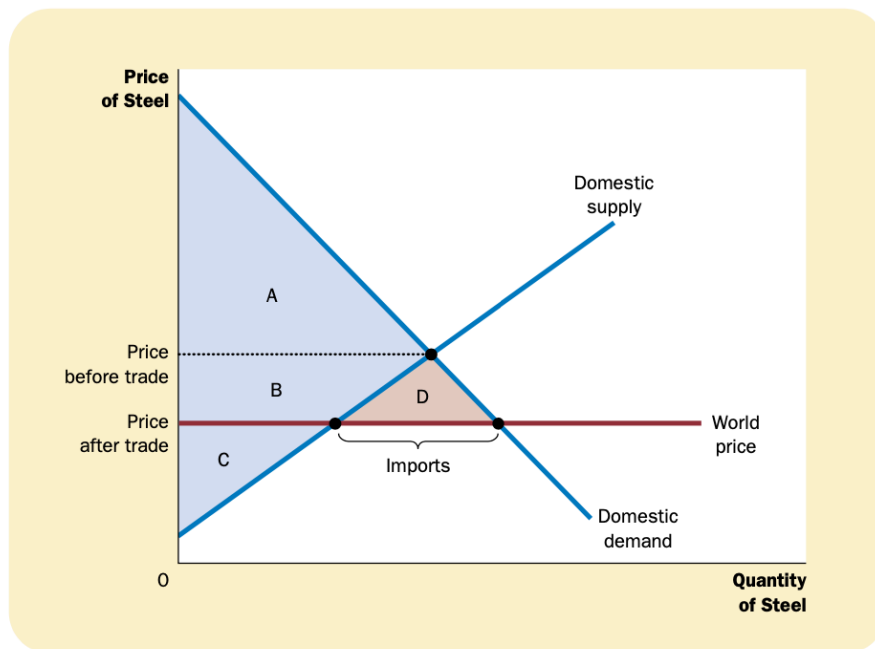


Figure 9.5: How free trade affects welfare in an importing country

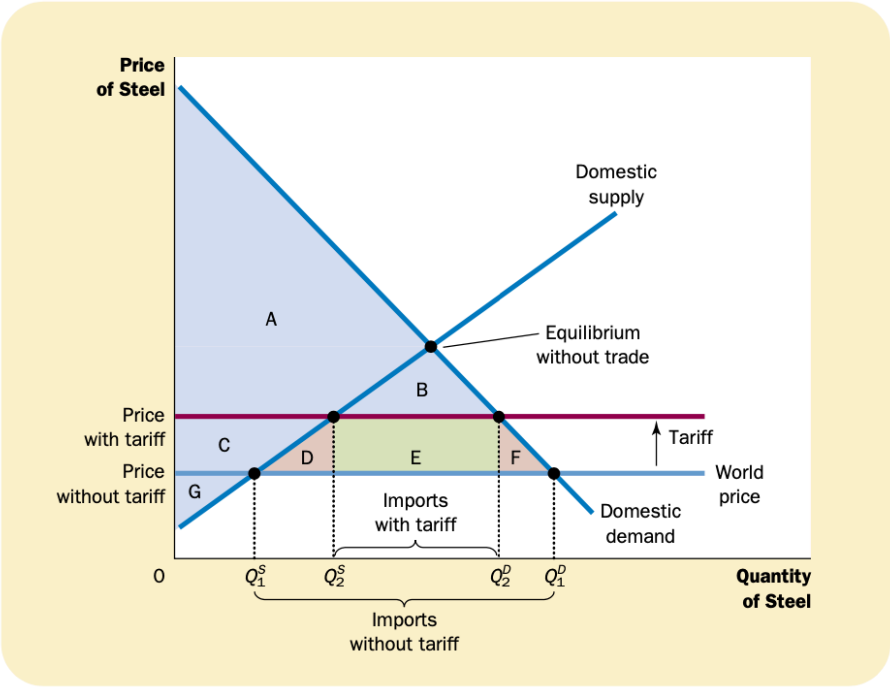


Figure 9.6: The effect of a tariff

	BEFORE TARIFF	AFTER TARIFF	CHANGE
Consumer Surplus	$A + B + C + D + E + F$	$A + B$	$-(C + D + E + F)$
Producer Surplus	$G$	$C + G$	$+C$
Government Revenue	None	$E$	$+E$
Total Surplus	$A + B + C + D + E + F + G$	$A + B + C + E + G$	$-(D + F)$

The area  $D + F$  shows the fall in total surplus and represents the deadweight loss of the tariff.

Figure 9.7: Changes in welfare from a tariff

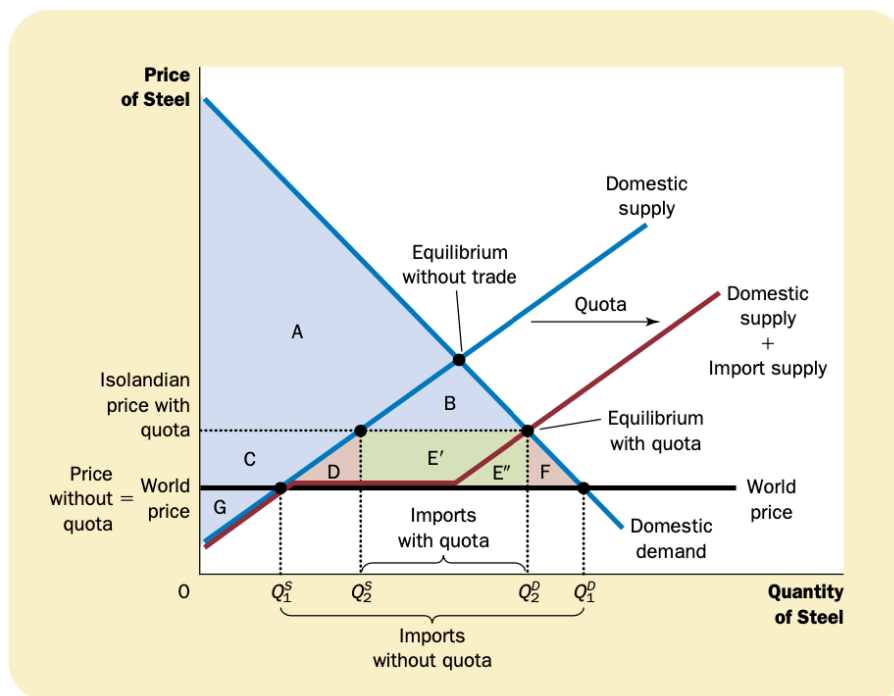


Figure 9.8: The effect of an important quota

	BEFORE QUOTA	AFTER QUOTA	CHANGE
Consumer Surplus	$A + B + C + D + E' + E'' + F$	$A + B$	$-(C + D + E' + E'' + F)$
Producer Surplus	$G$	$C + G$	$+C$
License-Holder Surplus	None	$E' + E''$	$+(E' + E'')$
Total Surplus	$A + B + C + D + E' + E'' + F + G$	$A + B + C + E' + E'' + G$	$-(D + F)$

The area  $D + F$  shows the fall in total surplus and represents the deadweight loss of the quota.

Figure 9.9: Changes in welfare from an import quota

# Chapter 10

## Externalities

Markets do many things well, but they do not do everything well.

The market failures fall under a general category called **externalities**. An externality arises when a person engages in an activity that influences the well-being of a bystander and yet neither pays nor receives any compensation for that effect. If the impact on the bystander is adverse, it is called a negative externality; if it is beneficial, it is called a positive externality.

In the presence of externalities, society's interest in a market outcome extends beyond the well-being of buyers and sellers in the market; it also includes the well-being of bystanders who are affected. Because buyers and sellers neglect the external effects of their actions when deciding how much to demand or supply, the market equilibrium is not efficient when there are externalities. That is, the equilibrium fails to maximize the total benefit to society as a whole.

### 10.1 Externalities and market inefficiency

**internalizing an externality:** altering incentives so that people take account of the external effects of their actions

Negative externalities in production or consumption lead markets to produce a larger quantity than is socially desirable. Positive externalities in production or consumption lead markets to produce a smaller quantity than is socially desirable. To remedy the problem, the government can internalize the externality by taxing goods that have negative externalities and subsidizing goods that have positive externalities.

## 10.2 Private solutions to externalities

### 10.2.1 The types of private solutions

- moral codes
- social sanctions
- charities
- self-interest of the relevant parties
- integrating different types of business
- the interested parties to enter into a contact

### 10.2.2 The coase theorem

**Coase theorem:** the proposition that if private parties can bargain without cost over the allocation of resources, they can solve the problem of externalities on their own.

The Coase theorem says that private economic actors can solve the problem of externalities among themselves. Whatever the initial distribution of rights, the interested parties can always reach a bargain in which everyone is better off and the outcome is efficient.

### 10.2.3 Why private solutions do not always work

Sometimes the interested parties fail to solve an externality problem because of **transaction costs**, the costs that parties incur in the process of agreeing to and following through on a bargain.

## 10.3 Public policies toward externalities

When an externality causes a market to reach an inefficient allocation of resources, the government can respond in one of two ways:

- Command-and-control policies regulate behavior directly.
- Market-based policies provide incentives so that private decisionmakers will choose to solve the problem on their own.

### 10.3.1 Regulation

The government can remedy an externality by making certain behaviors either required or forbidden.

### 10.3.2 Pigovian taxes and subsidies

**Pigovian tax:** a tax enacted to correct the effects of a negative externality

### 10.3.3 Tradable pollution permits

Pollution permits, like Pigovian taxes, are now widely viewed as a cost-effective way to keep the environment clean.

### 10.3.4 Objections to the economic analysis of pollution

People face tradeoffs. Certainly, clean air and clean water have value. But their value must be compared to their opportunity cost—that is, to what one must give up to obtain them.





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