Chapter 1
What is Economics?

Definition of Economics

- All economic questions arise because we want more than we can get.
- **Scarcity** is our inability to satisfy all our wants.
- Faced with scarcity we must make choices.
- **Economics** is the social science that studies the choices that individuals, businesses, governments, and entire societies make as they cope with scarcity and the incentives that influence and reconcile those choices.
- Economics divides into Microeconomics and Macroeconomics.
- **Microeconomics** is the study of the choices that individuals and businesses make, the way these choices interact in markets, and the influence of governments.
- **Macroeconomics** is the study of the performance of the national economy and the global economy.

Two Big Economic Questions

- The two big questions of economics are:
    1. How do choices end up determining *what*, *how*, and *for whom* goods and services are produced?
    2. When do choices made in the pursuit of *self-interest* also promote the *social interest*?
- The objects that people value and produce to satisfy human wants are called **goods and services**.
- Study figure 1.1 on p. 3 of your textbook to determine if Canada is a service economy or a goods economy.
- **Factors of production** are the resources that businesses use to produce goods and services.
- Factors of production are grouped into four categories: land, labour, capital, and entrepreneurship.
    1. The "gifts of nature" that we use to produce goods and services are called **land**.
    2. The work time and work effort that people devote to producing goods and services is called **labour**. The quality of labour depends on **human capital**, which is the knowledge and skill that people obtain from education, on-the-job training, and work experience.
    3. The tools, instruments, machines, buildings, and other constructions that businesses now use to produce goods and services are called **capital**.
    4. The human resource that organizes labour, land, and capital is called **entrepreneurship**.
- To earn an income, people sell the services of the factors of production they own.
    1. Land earns **rent**.
    2. Labour earns **wages**.

3. Capital earns **interest**.
4. Entrepreneurship earns **profit**.

- When we make choices about "what", "how", and "for whom" goods and services are produced, we make the choices in the self-interest or the social interest.
- Choices made in the **self-interest** are choices that are best for the person making them.
- Choices that are the best for society as a whole are said to be in the **social interest**.

The Economic Way of Thinking

- Because we face scarcity, we must make choices.
- Every choice you make is a tradeoff.
- A **tradeoff** is an exchange—giving up one thing to get something else.
- People make rational choices by comparing benefits and costs.
- Benefit is what you gain from something. Cost is what you must give up to get something
- **Opportunity cost** is the highest-valued alternative that we give up to get something.
- All tradeoffs involve an opportunity cost.
- When we make choices we make them at the **margin**—we compare the benefit of a little bit more of something with its cost.
- The benefit that arises from an increase in an activity is called **marginal benefit**.
- The cost of an increase in an activity is called **marginal cost**.
- Our choices respond to incentives. An incentive is an inducement to take a particular action. An incentive can be a benefit or a cost.

Economics: A Social Science

- Economists distinguish between two types of statements: what *is* and what *ought to be*
- Statements about what *is* are called *positive statements* and they might be right or wrong. A positive statement can be tested by checking it against the facts.
- States about *what ought to be* are called *normative* statements. These statements depend on values and cannot be tested.

Chapter 1 Appendix

Graphics in Economics

Graphing Data

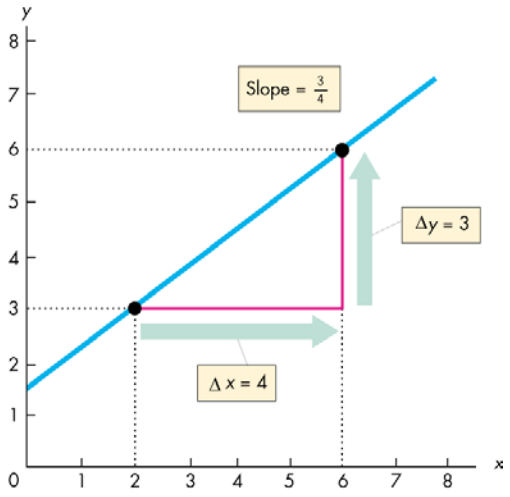
- Making a graph:
  - The horizontal line is the *x*-axis.
  - The vertical line is the *y*-axis.
  - The intersection of the *x*-axis and the *y*-axis is the origin.
- A **scatter diagram** plots the value of one variable against the value of another variable.

Graphs Used in Economic Models

- Variables that move in the same direction
  - A relationship between two variables that move in the same direction is called a **positive relationship** or a **direct relationship**.
  - A relationship shown by a straight line is called a **linear relationship**.
- Variables that move in opposite directions
  - A relationship between variables that move in opposite directions is called a **negative relationship** or an **inverse relationship**.
- Variables that have a maximum or a minimum
  - A relationship that has a maximum slopes upward as it rises to its maximum point, is flat at its maximum, and then slopes downward.
  - A relationship that has a minimum slopes downward as it falls to its minimum point, is flat at its minimum, and then slopes upward.
- Variables that are unrelated
  - Variables that are unrelated are shown on a graph as either a horizontal line or a vertical line.

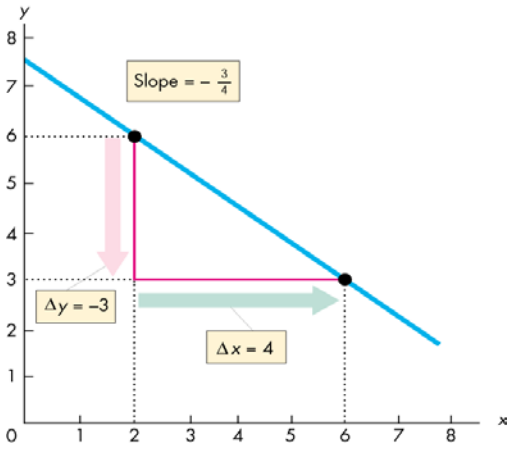
The Slope of a Relationship

- The **slope** of a relationship is the change in the value of the variable measured on the *y*-axis divided by the change in the value of the variable measured on the *x*-axis.
- We use the Greek letter Δ (delta) to represent "change in".
- So the slope of the relationship is Δ*y*/ Δ*x*.
- The slope of a straight line is the same regardless of where on a straight line you calculate it.
- In the figure below, when *x* increases from 2 to 6, *y* increases from 3 to 6.
- Δ*x*=4 and Δ*y*=3, so the slope of the line is ¾.



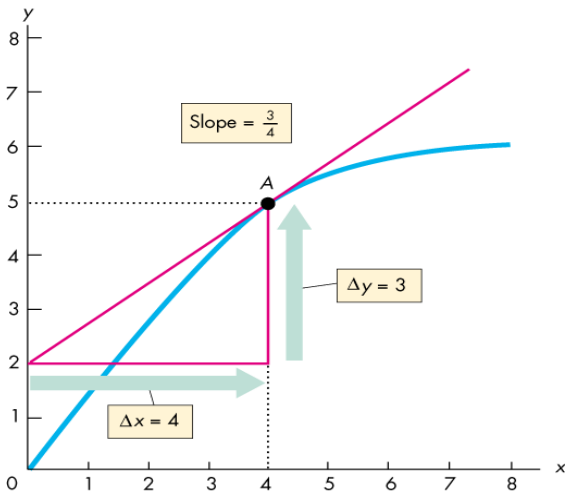
(a) Positive slope

- In the figure below, when *x* increases from 2 to 6, *y* decreases from 6 to 3.
- Δ*x*= 4 and Δ*y*=-3, so the slope of the line is -3/4.

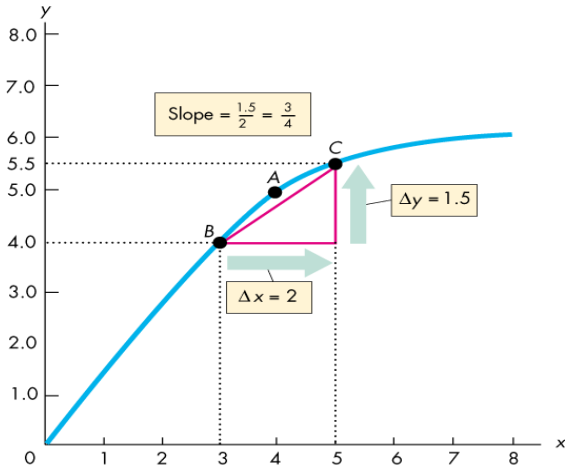


(b) Negative slope

- The slope of a curved line is not constant.
- We calculate the slope of a curved line by calculating the slope at a point or calculating the slope across an arc of the curve.
- To find the slope at point *A* we need a line that has the same slope as the curve at that point.



- To calculate the slope of the curve at point *A*, draw the red line that just touches the curve at *A*—the tangent.
- Calculate the slope of the tangent line.
- The slope of the red line is ¾.
- So the slope of the curve at *A* is ¾.

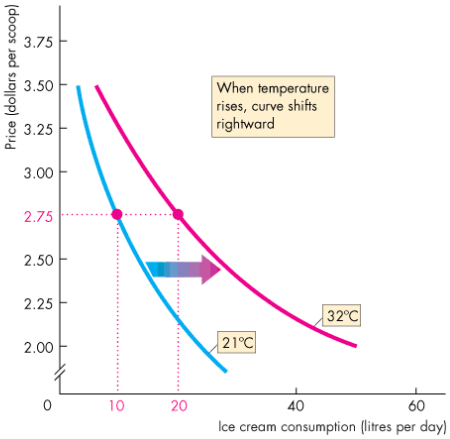


- To find the slope along arc *BC* use the straight line between *B* and *C*.
- The slope of the line *BC* is 1.5 divided by 2, which is ¾.
- So the slope of the curve across the arc *BC* is ¾.

Graphing Relationships Among More Than Two Variables

- To graph a relationship among more than two variables:
  - Hold constant all variables except two
  - Use the *ceteris paribus* assumption
- ***Ceteris paribus*** is a Latin term that means "other things being equal" or "if all other relevant things remain the same." By changing one factor at a time and holding all the other relevant factors constant, we can isolate the factor of interest and investigate its effects.

Price (dollars per scoop)	Ice cream consumption (litres per day)	
	21°C	32°C
2.00	25	50
2.25	18	36
2.50	13	26
2.75	**10**	**20**
3.00	7	14
3.25	5	10
3.50	3	6



- In the figure, the relationship between price and consumption is shown when temperature is held constant.
- One curve keeps the temperature constant at 21°C and the other curve keeps the temperature constant at 32°C.

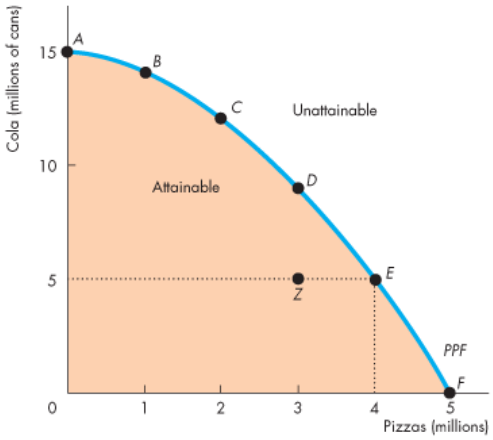
Chapter 2

The Economic Problem

Production Possibilities and Opportunity Cost

- The **production possibilities frontier** (*PPF*) is the boundary between those combinations of goods and services that can be produced and those that cannot.
- The figure below shows the production possibilities frontier for cola and pizza.

Possibility	Pizzas (millions)		Cola (millions of cans)
A	0	and	15
B	1	and	14
C	2	and	12
D	3	and	9
E	4	and	5
F	5	and	0

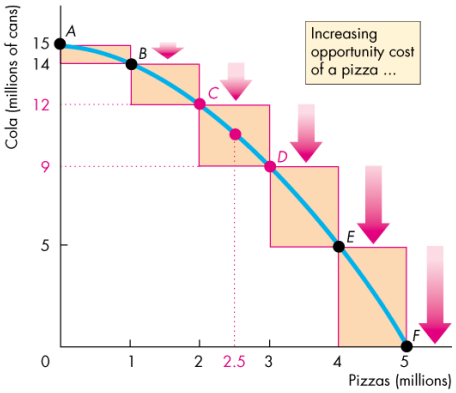


- The table lists some combinations of the quantities of cola and pizza that can be produced given the resources available.
- The dots marked *A*, *B*, *C*, *D*, *E*, and *F* on the *PPF* correspond to the six combinations in the table.
- If we stop producing pizza and move all the people who produce pizza into producing cola, we produce at point *A*.
- If we stop producing cola and move all the people who produce cola into producing pizza, we produce at point *F*.
- We can produce at any point on the *PPF*—on the blue line—or inside the *PPF*—in the orange area.
- We cannot produce at any point outside the *PPF*.
- We achieve **production efficiency** if we produce goods and services at the lowest possible cost.
- Production efficiency occurs at all points on the *PPF*.
- Possible production points inside the *PPF* such as point *Z* are inefficient.
- The *opportunity cost* of an action is the highest-valued alternative forgone.
- If we move from point *C* to point *D*, we must give up 3 million cans of cola to produce 1 million more pizzas. The additional million pizzas cost 3 million cans of cola.
- Opportunity cost is a ratio.
- It is the decrease in the quantity produced of one good divided by the increase in the quantity produced of the other good as we move along the production possibilities frontier.

- The *PPF* reflects increasing opportunity cost.
- The *PPF* is bowed outward because resources are not all equally productive in all activities.

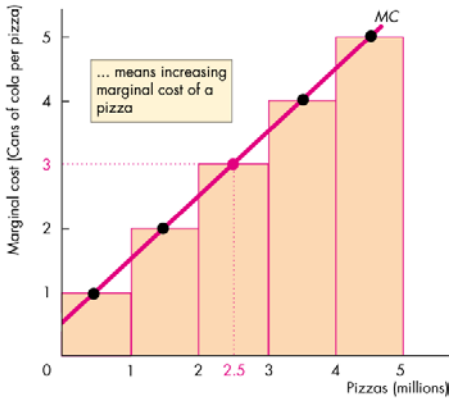
Using Resources Efficiently

- **Marginal cost** is the opportunity cost of producing *one more unit*.
- Let's find the marginal cost of pizza.



(a) *PPF* and opportunity cost

- In figure part (a) above if pizza production increases from zero to 1 million, the quantity of cola decreases from 15 million cans to 14 million cans.
- So the opportunity cost of the first million pizzas is 1 million cans of cola.
- If pizza production increases from 1 million to 2 million, the quantity of cola decreases from 14 million cans to 12 million cans.
- So the opportunity cost of the second million pizzas is 2 million cans of cola.
- If pizza production increases from 2 million to 3 million, the quantity of cola decreases from 12 million cans to 9 million cans.
- So the opportunity cost of the third million pizzas is 3 million cans of cola.
- The opportunity cost of a million pizzas is also the marginal cost of producing a million pizzas.

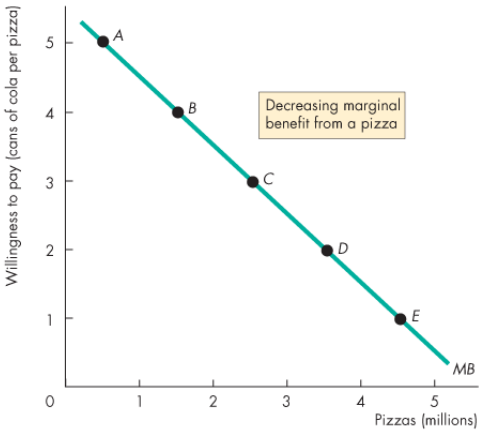


(b) Marginal cost

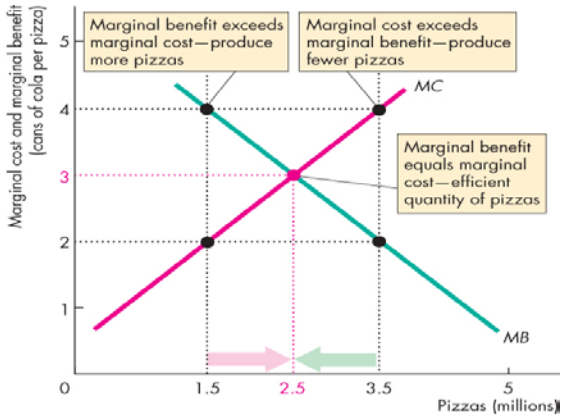
- Figure part (b) graphs this marginal cost.

- **Preferences** are a description of a person's likes and dislikes.
- To describe preferences, economists use marginal benefit.
- **Marginal benefit** of a good or service is the benefit received from consuming one more unit of it.
- The **marginal benefit curve** shows the relationship between marginal benefit of a good and the quantity of that good consumed.
- The more we have of any good or service, the smaller its marginal benefit and the less we are willing to pay for an additional unit of it.
- We call this tendency the *principle of decreasing marginal benefit*.
- The figure below shows the marginal benefit curve.

Possibility	Pizzas (millions)	Willingness to pay (cans of cola per pizza)
A	0.5	5
B	1.5	4
C	2.5	3
D	3.5	2
E	4.5	1



- The points on the marginal benefit curve correspond to the table.
- For example, in the table people are willing to pay 5 cans of cola per pizza when pizza production is 0.5 million. This is point *A* in the figure.
- When goods and services are produced at the lowest possible cost and in the quantities that provide the greatest possible benefit, we have achieved **allocative efficiency**.
- At *any* point on the *PPF*, we cannot produce more of one good without giving up some other good.
- At the *best* point on the *PPF*, we cannot produce more of one good without giving up some other good that provides greater benefit—we are producing at the point of allocative efficiency.



(b) Marginal benefit equals marginal cost

- In the figure above, if we produce 1.5 million pizzas, the marginal benefit from a pizza is greater than the marginal cost.
- Someone values an additional pizza more highly than it costs to produce, so resources are used more efficiently if pizza production increases and cola production decreases.
- If we produce 3.5 million pizzas, the marginal benefit from a pizza is less than the marginal cost.
- Because the additional pizza costs more to produce than anyone thinks it is worth, we can get more value from our resources by moving some of them away from producing pizza and into producing cola.
- If we produce 2.5 million pizzas, marginal cost and marginal benefit are equal and this allocation of resources is efficient. This is the point of allocative efficiency.

Economic Growth

- The expansion of our production possibilities is called **economic growth**.
- The two key factors that influence economic growth are:
    - Technological change
    - Capital accumulation
- **Technological progress** is the development of new goods and better ways of producing goods and services.
- **Capital accumulation** is the growth of capital resources, which include *human capital*.

Gains from Trade

- A person has a **comparative advantage** in an activity if that person can perform the activity at a lower opportunity cost than anyone else.
- **Absolute advantage** occurs when a person is more productive than others.
- Absolute advantage involves comparing production per hour, while comparative advantage involves comparing opportunity costs.
- The tables below show that Liz and Joe can produce smoothies and salads.

TABLE 2.1 Liz's Production Possibilities

Item	Minutes to produce 1	Quantity per hour
Smoothies	2	30
Salads	2	30

- For Liz, the opportunity cost of producing 1 smoothie is 1 salad.
- And the opportunity cost of producing 1 salad is 1 smoothie.

TABLE 2.2 Joe's Production Possibilities

Item	Minutes to produce 1	Quantity per hour
Smoothies	10	6
Salads	2	30

- For Joe, 1 the opportunity cost of producing 1 smoothie is 5 salads.
- And the opportunity cost of producing 1 salad is 1/5 smoothie.
- Liz has a comparative advantage in producing smoothies, and Joe has a comparative advantage in producing salads.

The table below shows that when Liz specializes in producing smoothies and Joe specializes in producing salads and they trade with each other, both of them are better off.

TABLE 2.3 Liz and Joe Gain from Trade

(a) Before trade	Liz	Joe
Smoothies	15	5
Salads	15	5
(b) Specialization	**Liz**	**Joe**
Smoothies	30	0
Salads	0	30
(c) Trade	**Liz**	**Joe**
Smoothies	sell 10	buy 10
Salads	buy 20	sell 20
(d) After trade	**Liz**	**Joe**
Smoothies	20	10
Salads	20	10
(e) Gains from trade	**Liz**	**Joe**
Smoothies	+5	+5
Salads	+5	+5

Economic Coordination

- Decentralized coordination requires:
  - Firms
  - Property rights
  - Markets
  - Money
- A **firm** is an economic unit that hires factors of production and organizes those factors to produce and sell goods and services.
- **Property rights** are social arrangements that govern the ownership, use, and disposal of resources, goods, and services.
- A **market** is any arrangement that enables buyers and sellers to get information and to do business with each other.
- **Money** is a commodity or token that is generally acceptable as a means of payment.

Chapter 3
Demand and Supply

Markets and Prices

- A **competitive market** is a market that has many buyers and many sellers, so that no single buyer or seller can influence the price.
- The ratio of one price to another is called a **relative price**, and a relative price is an opportunity cost.

Demand

- The **quantity demanded** is the amount of a good or service that consumers plan to buy in a given time period at a particular price.
- The law of demand states: **Other things remaining the same, the higher the price of a good, the smaller is the quantity demanded; and the lower the price of a good, the greater is the quantity demanded.**

- **Demand** refers to the entire relationship between the price of the good and the quantity demanded of the good.
- Demand is illustrated by a:
    - Demand schedule
    - Demand curve

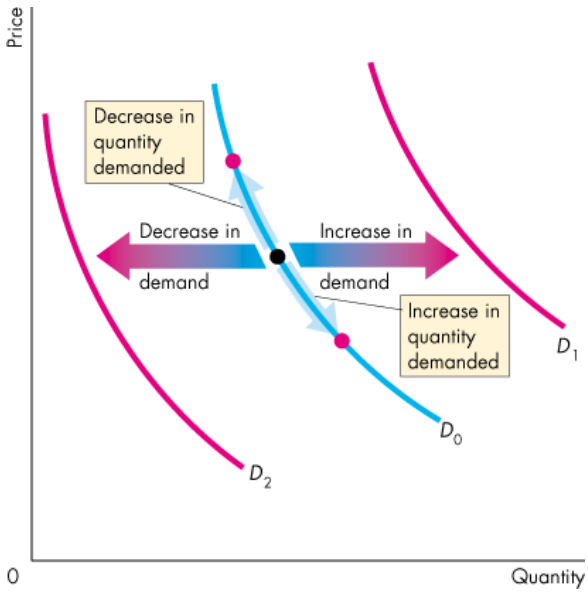
- A **demand curve** shows the relationship between the quantity demanded of a good and its price when all other influences on consumers' planned purchases remain the same.

- When any factor that influences buying plans other than the price of the good changes, there is a **change in demand**.

- There are six key factors that change demand:
    1. The prices of related goods
        - A substitute is a good that can be used in place of another good. If the price of a substitute rises, people buy less of the substitute and more of the other good.
        - A complement is a good that is used in conjunction with another good. If the price of a donut, a complement of coffee, rises, people buy less coffee.
    2. Expected future prices
    3. Income
        - A **normal good** is one for which demand increases as income increases.
        - An **inferior good** is one for which demand decreases as income increases.

4. Expected future income and credit
5. Population
6. Preferences

- When demand increases, the demand curve shifts rightward and when demand decreases, the demand curve shifts leftward.
- The figure below shows the distinction between a change in the quantity demanded and a change in demand.



- When the price of a good changes, there is a **change in the quantity demanded**, which is shown by a movement along the demand curve.
- When any other influence on buying plans changes, there is a change in demand, which is shown by a shift of the demand curve.

Supply

- The **quantity supplied** of a good or service is the amount that producers plan to sell during a given time period at a particular price.

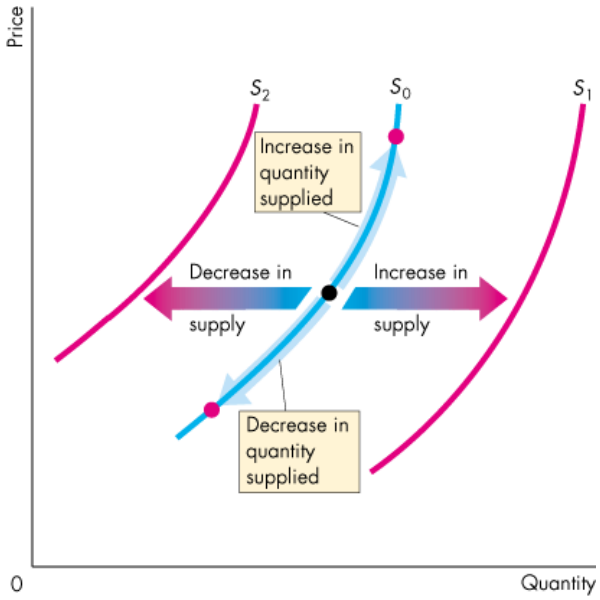
- The law of supply states: **Other thing remaining the same, the higher the price of a good, the greater is the quantity supplied; and the lower the price of a good, the smaller is the quantity supplied.**

- **Supply** refers to the entire relationship between the quantity supplied and the price of a good.
- Supply is illustrated by a:
    - Supply schedule

- Supply curve

- A **supply curve** shows the relationship between the quantity supplied of a good and its price when all other influences on producers' planned sales remain the same.
- When any factor that influences selling plans other than the price of the good changes, there is a **change in supply**.
- There are six key factors that change supply:
  1. The prices of factors of production
  2. Prices of related goods produced
     - Substitutes in production are goods that can be produced by using the same resources.
     - Complements in production are goods that must be produced together.
  3. Expected future prices
  4. The number of suppliers
  5. Technology
  6. The state of nature

- When supply changes, the supply curve shifts.
- When supply increases, the supply curve shifts rightward and when supply decreases, the supply curve shifts leftward.
- The figure below shows the distinction between a change in the quantity supplied and a change in supply.

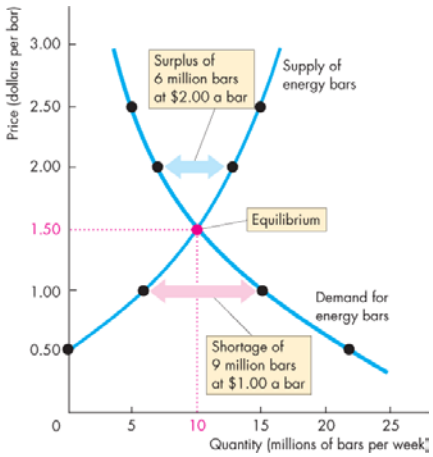


- When the price of a good changes, there is a **change in the quantity supplied**, which is shown by a movement along the supply curve.
- When any other influence on selling plans changes, there is a change in supply, which is shown by a shift of the supply curve.

Market Equilibrium

- At the **equilibrium price**, the quantity demanded equals the quantity supplied.
- The **equilibrium quantity** is the quantity bought and sold at the equilibrium price.
- Above the equilibrium price, there is a surplus—the quantity supplied exceeds the quantity demanded.
- Below the equilibrium price, there is a shortage—the quantity demanded exceeds the quantity supplied.
- The figure below illustrates the equilibrium price, the surplus above the equilibrium price, and the shortage below the equilibrium price.

Price (dollars per bar)	Quantity demanded	Quantity supplied	Shortage (–) or surplus (+)
	(millions of bars per week)		
0.50	22	0	–22
1.00	15	6	–9
1.50	**10**	**10**	**0**
2.00	7	15	+6
2.50	5	5	+10



Predicting Changes in Price and Quantity

- When there is **an increase in demand**:
  - At the original price, there is a shortage.
  - At the original quantity, buyers are willing to pay more than the current price.
  - The price rises.

- As the price rises:
  - The quantity supplied increases.
  - The shortage is eventually eliminated.

- When there is **a decrease in demand**:
  - At the original price, there is a surplus.
  - At the original quantity, buyers are willing to pay less than the current price.
  - The price falls.

- As the price falls:
  - The quantity supplied decreases.
  - The surplus is eventually eliminated.

- When there is **an increase in supply**:
    - At the original price, there is a surplus.
    - At the new quantity supplied, buyers are willing to pay less than the current price.
    - The price falls.

- As the price falls:
    - The quantity demanded increases.
    - The surplus is eventually eliminated.

- When there is **a decrease in supply**:
    - At the original price, there is a shortage.
    - At the original quantity, buyers are willing to pay more than the current price.
    - The price rises.

- As the price rises:
    - The quantity demanded decreases.
    - The shortage is eventually eliminated.

- When **both demand and supply increase**, the equilibrium quantity increases but the price may either rise or fall.

- Whether there is a shortage or a surplus at the original price depends on whether demand or supply has increased most.
- When demand and supply increase by the same amount, there is neither a shortage nor a surplus.
- The price remains constant.
- But the equilibrium quantity increases.

- If demand increases by more than supply, there is a shortage at the original price.
- The price rises.
- And the rise in price eventually eliminates the shortage and restores equilibrium.

- If supply increases by more than demand, there is a surplus at the original price.
- The price falls.
- The surplus is eliminated.

- When **both demand and supply decrease**, the equilibrium quantity decreases but the price may either rise or fall.
- The reasons are analogous to the ones you've just studied.

- When **demand decreases and supply increases**, the price falls and the equilibrium quantity might increase or decrease.

- An increase in supply and a decrease in demand create a surplus at the original price.
- At the new quantity supplied, buyers are not willing to pay the current price.
- So the price falls.
- As the price falls, the surplus is eliminated.
- But whether the quantity increases or decreases depends on the relative magnitude of the change in demand and supply.
- If the increase in supply equals the decrease in demand, the equilibrium quantity does not change.

- If the increase in supply exceeds the decrease in demand, the equilibrium quantity increases.
- If the increase in supply is less than the decrease in demand, the equilibrium quantity decreases.

- When **demand increases and supply decreases**, the price rises and the equilibrium quantity might increase, decrease, or remain the same.

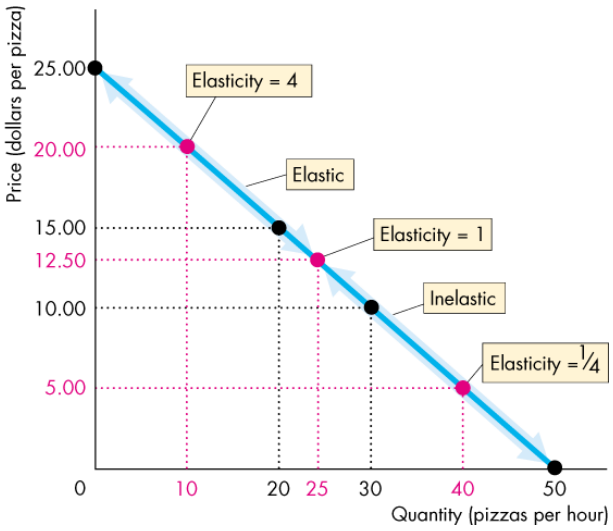
- Work through the relative changes in demand and supply to determine when the equilibrium quantity increases, when it decreases, and when it remains the same.

Chapter 4
Elasticity

Price Elasticity of Demand

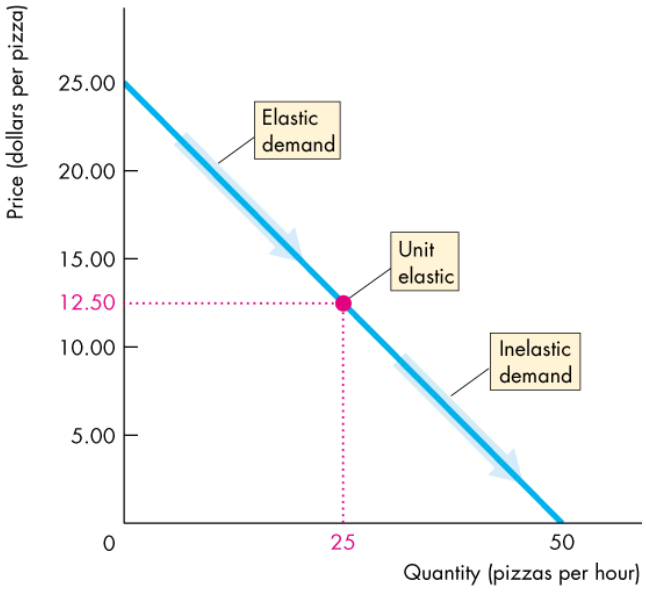
- When supply increases, the equilibrium price falls and the equilibrium quantity increases.
- Sometimes the price change is large and the quantity change is small or sometimes the price change is small and the quantity change is large.
- The size of the change in equilibrium quantity and equilibrium price when supply changes depend on the responsiveness of the quantity demanded to a change in price.
- The **price elasticity of demand** is a units-free measure of the responsiveness of the quantity demanded of a good to a change in its price when all other influences on buyers' plans remain the same.
- Price elasticity of demand is equal to the percentage change in the quantity demanded divided by the percentage change in price.
- Study p. 85 in your textbook. Notice that to calculate the price elasticity of demand, we express the changes in price and quantity demanded as percentages of the average price and the average quantity.
- When the price of a good rises, the quantity demanded decreases along the demand curve.
- So if we consider that the change in price and the change in quantity demanded are in opposite directions, then the price elasticity of demand is a negative number.
- It is the magnitude of the price elasticity of demand that tells us how responsive demand is.
- To compare elasticities, we use the magnitude of the price elasticity of demand and ignore the minus sign. We *always* report the price elasticity of demand as a *positive* number.
- If the quantity demanded remains constant when the price changes, then the price elasticity of demand is zero and the good is said to have **perfectly inelastic demand**.
    - The demand curve is vertical.
- If the percentage change in the quantity demanded equals the percentage change in price, then the price elasticity of demand equals 1 and the good is said to have **unit elastic demand**.
- If the percentage change in the quantity demanded is less than the percentage change in price, the good is said to have **inelastic demand**.
- If the quantity demanded changes by an infinitely large percentage in response to a tiny price change, then the price elasticity of demand is infinity and the good is said to have **perfectly elastic demand**.
    - The demand curve is horizontal.
- If the percentage change in the quantity demanded exceeds the percentage change in price, the good is said to have **elastic demand**.

- The figure below shows the elasticity along a straight-line demand curve.

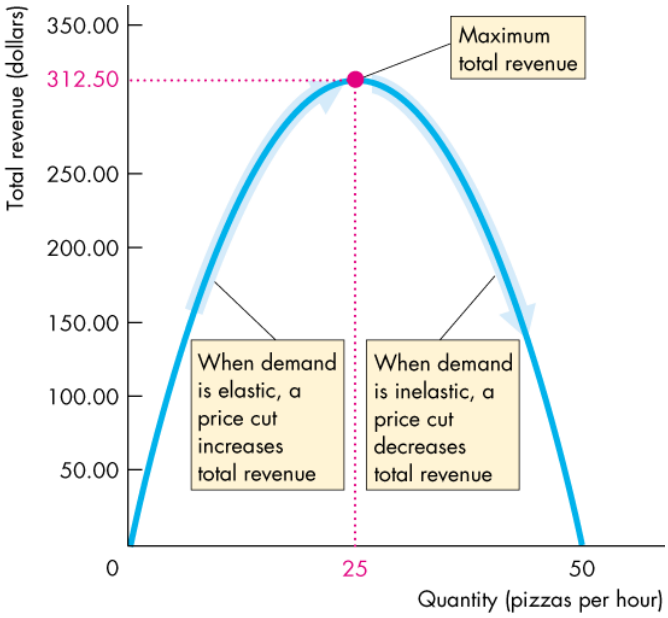


- At a high price and small quantity, elasticity is large.
- At a low price and large quantity, elasticity is small.
- At the mid-point price and quantity, elasticity is 1.
- The **total revenue** from the sale of a good equals the price of the good multiplied by the quantity sold.
- If demand is unit elastic, an increase in price results in an equal percentage decrease in the quantity demanded and total revenue does not change.

- If demand is elastic, an increase in price results in a larger percentage decrease in the quantity demanded and total revenue decreases.
- If demand is inelastic, an increase in price results in a small percentage decrease in the quantity demanded and total revenue increases.
- The figures below show how we can use this relationship between elasticity and total revenue to estimate elasticity using the total revenue test.



(a) Demand



(b) Total revenue

- The **total revenue test** is a method of estimating the price elasticity of demand by observing the change in total revenue that results from a change in the price (when all other influences on the quantity sold remain the same).

- If a price cut increases total revenue, demand is elastic.
- If a price cut decreases total revenue, demand is inelastic.
- If a price cut leaves total revenue unchanged, demand is unit elastic.

- Elasticity depends on three main factors: the closeness of substitutes, the proportion of income spent on the good, and the time elapsed since the price change.
- Study pp. 89-90 to see how each influence changes the price elasticity of demand.

More Elasticities

- The **cross elasticity of demand** is a measure of the responsiveness of the demand for a good to a change in the price of a substitute or complement, other things remaining the same.
- For a substitute, the cross elasticity of demand is positive.
- For a complement, the cross elasticity of demand is negative.
- The **income elasticity of demand** is a measure of the responsiveness of the demand for a good or service to a change in income, other things remaining the same.
- Income elasticities of demand can be positive or negative and fall into three ranges:
    - Greater than 1 (normal good, income elastic);
    - Positive and less than 1 (normal good, income inelastic);
    - Negative (inferior good)

Elasticity of Supply

- The **elasticity of supply** measures the responsiveness of the quantity supplied to a change in the price of a good when all other influences on selling plans remain the same.
- The elasticity of supply is equal to the percentage change in the quantity supplied divided by the percentage change in the price.
- If the quantity supplied is fixed regardless of the price, the supply curve is vertical and the elasticity of supply is zero. Supply is perfectly inelastic.
- When the percentage change in price equals the percentage change in quantity, supply is unit elastic.
- If a supply curve is linear and passes through the origin, supply is unit elastic.
- If there is a price at which sellers are willing to offer any quantity for sale, the supply curve is horizontal and the elasticity of supply is infinite. Supply is perfectly elastic.
- The factors that influence the elasticity of supply are resource substitution possibilities and the time frame for the supply decision.
- Study pp. 95-96 to see how each influence changes the elasticity of supply.
- P. 97 of your text has a glossary of elasticity terms. This table summarizes chapter 4 and will be a valuable study tool for you.

Chapter 5

Efficiency and Equity

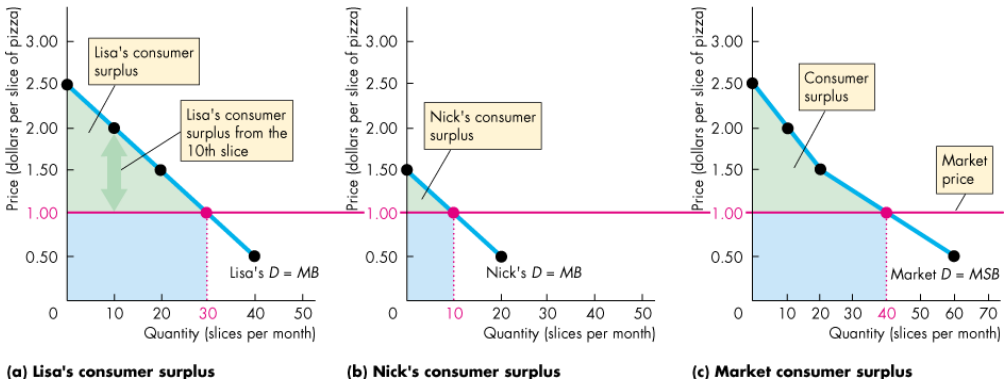
Resource Allocation Methods

- Resources must be allocated by some method.
- Resources can be allocated by:
    - Market price
    - Command
    - Majority rule
    - Contest
    - First-come, first-served
    - Lottery
    - Personal characteristics
    - Force

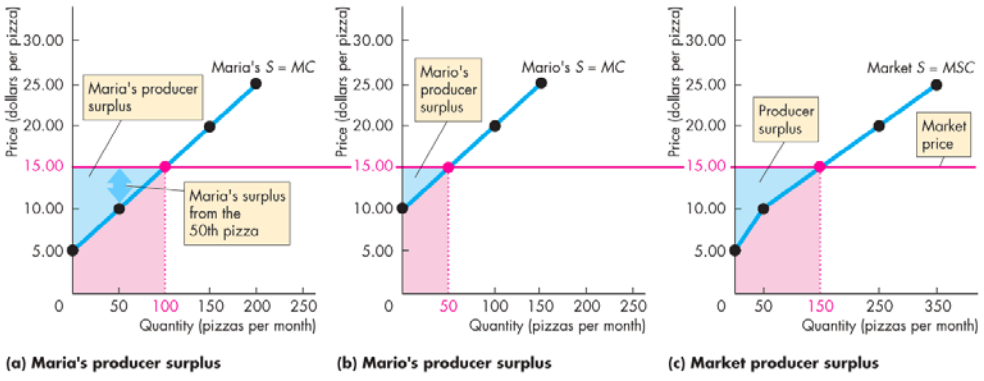
Benefit, Cost, and Surplus

- The value of one more unit of a good or service is its marginal benefit.
- Marginal benefit can be expressed as the maximum price that people are willing to pay for another unit of the good or service.
- A demand curve is a marginal benefit curve.
- A demand curve shows the quantity demanded at each price.
- And a demand curve shows the maximum price consumers are willing to pay for one more unit of the good or service.
- The market demand curve is the horizontal sum of the individual demand curves.
- We find points on the market demand curve by adding together the quantities demanded by all individuals at each price.

- **Consumer surplus** is the excess of the benefit received from a good over the amount paid for it.
- When people buy something for less than it is worth to them, they receive a consumer surplus.



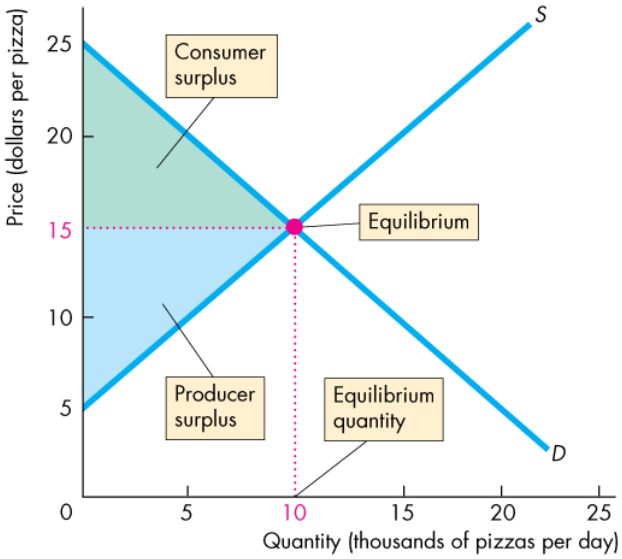
- The left graph shows Lisa's demand curve, the middle graph shows Nick's demand curve, and the right graph shows the market demand curve.
- In each graph, the consumer surplus is the green area.
- Calculate the consumer surplus for each graph.
- Cost is what a producer gives up and price is what a producer receives.
- Marginal cost is the minimum price that producers must receive to induce them to produce another unit of the good or service.
- The supply curve shows the quantity supplied at a given price.
- The supply curve also shows the minimum price that producers must receive to induce them to produce another unit of the good or service, so the supply curve is a marginal cost curve.
- The market supply curve is the horizontal sum of the individual supply curves.
- We find the points on the market supply curve by adding together the quantities supplied by all producers at each price.
- **Producer surplus** is the excess of the amount received from the sale of a good or service over the cost of producing it.



- The left graph shows Maria's supply curve, the middle graph shows Mario's supply curve, and the right graph shows the market supply curve.
- In each graph, the producer surplus is the blue area.
- Calculate the producer surplus for each graph.

Is the Competitive Market Efficient?

- The demand curve tells us the marginal benefit.
- The supply curve tells us the marginal cost.
- Where the demand curve and supply curve intersect, marginal benefit equals marginal cost.
- But this condition—marginal benefit equals marginal cost—is the condition that delivers an efficient use of resources.
- A competitive market puts resources to work in the activities that create the greatest possible value.
- So the competitive equilibrium is efficient.

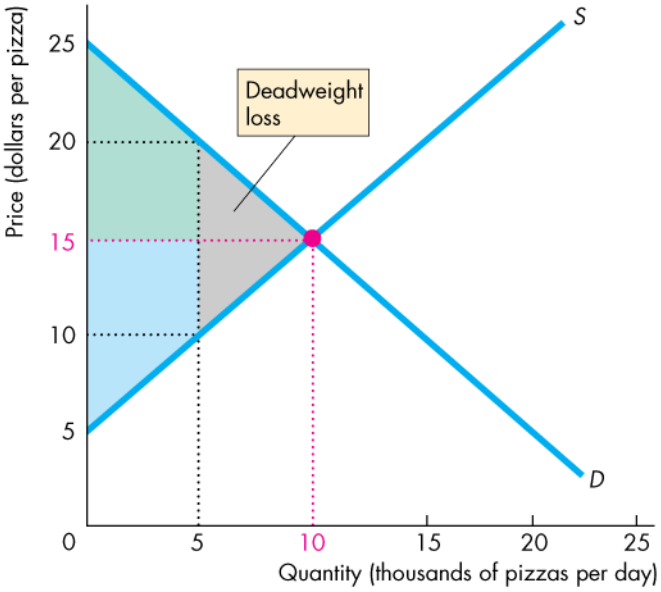


(a) Equilibrium and surpluses

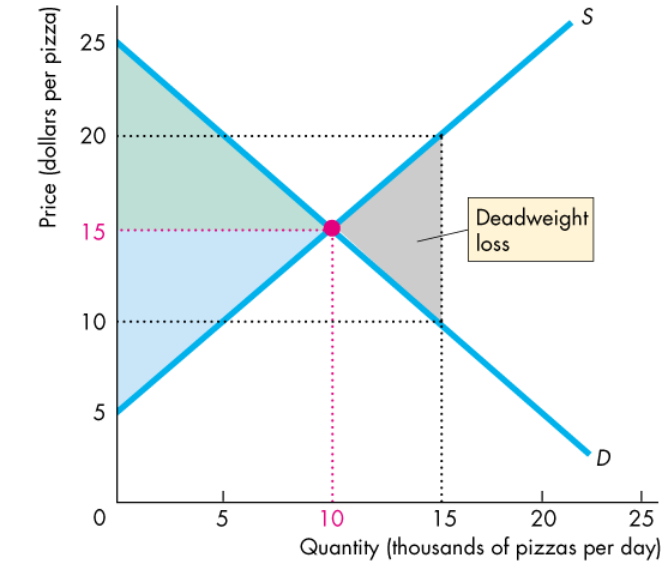
- In the figure, resources are used efficiently when the sum of consumer surplus and producer surplus is maximized.
- The sum of consumer surplus and producer surplus is maximized when 10,000 pizzas a day are produced.
- If production is less than 10,000 pizzas a day, the marginal pizza is valued more highly than its opportunity cost.
- If production exceeds 10,000 pizzas a day, the marginal pizza costs more to produce than the value that consumers place on it.

- The most significant obstacles to efficiency are:
  - Price and quantity regulations
  - Taxes and subsidies
  - Externalities
  - Public goods and common resources
  - Monopoly
  - High transaction costs
- We will be studying these obstacles to efficiency throughout the course.
- These obstacles to efficiency result in two possible outcomes:
  1. Underproduction
  2. Overproduction

- When less than the efficient level of output is produced in part (a) of the figure, there is a gap between what consumers are willing to pay and what producers must be offered.
- The sum of the consumer surplus and producer surplus is decreased.
- This loss is called the deadweight loss.
- **Deadweight loss** is the decrease in consumer surplus and producer surplus that results from an inefficient level of production.
- The deadweight loss is shown by the grey triangle.
- When more than the efficient level of output is produced in part (b) of the figure, there is a gap between the opportunity cost of the last unit of output and what consumers are willing to pay for the last unit of output.
- The deadweight loss is shown by the grey triangle.



(a) Underproduction



(b) Overproduction

Is the Competitive Market Fair?

- Ideas about fairness can be dived into two groups:
    1. It's not fair if the *result* isn't fair
    2. It's not fair if the *rules* aren't fair

- **Utilitarianism** is a principle that states we should strive to achieve "the greatest happiness for the greatest number."
- One big problem with the utilitarian ideal of complete equality is that it ignores the costs of making income transfers.

- Recognizing the cost of making income transfers leads to what is called the **big tradeoff**, which is a tradeoff between efficiency and fairness.
- Income can only be transferred by taxing incomes.
- Taxing income from employment results in an inefficient level of labour.
- Taxing income from capital makes people save less, resulting in an inefficient level of capital.
- With less labour and capital, the "economic pie" shrinks.
- Also, a dollar taken in tax from a rich person does not end up as a dollar in the hands of a poorer person; some of it is spent on administration of the tax and transfer system.

- The **symmetry principle** is the requirement that people in similar situations be treated similarly.
- In economic life, this principle translates into *equality of opportunity*.
- Robert Nozick, the late Harvard philosopher argues that the idea of fairness as an outcome or result cannot work and that fairness must be based on the fairness of the rules.
- He suggests that fairness obeys two rules:
- The state must enforce laws that establish and protect private property.
- Private property may be transferred from one person to another only by voluntary exchange.

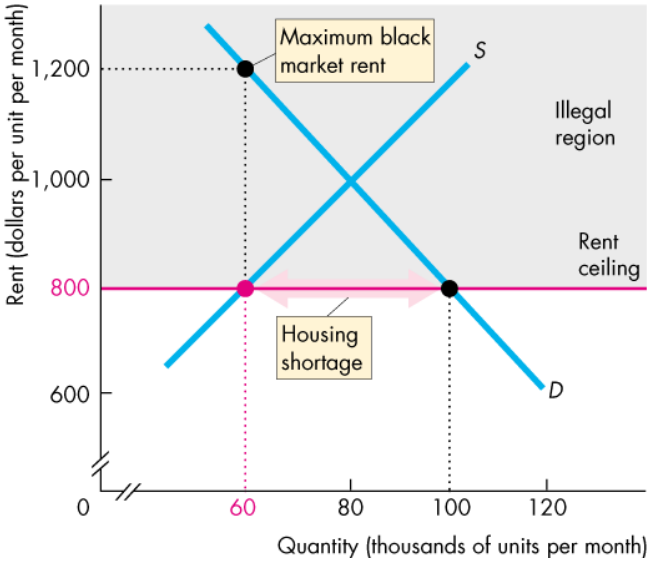
Read the case study on pp. 118-119 of your textbook and determine how you would allocate water in a natural disaster under the fair-rules view and under the fair-results view.

Chapter 6

Government Actions in Markets

A Housing Market with a Rent Ceiling

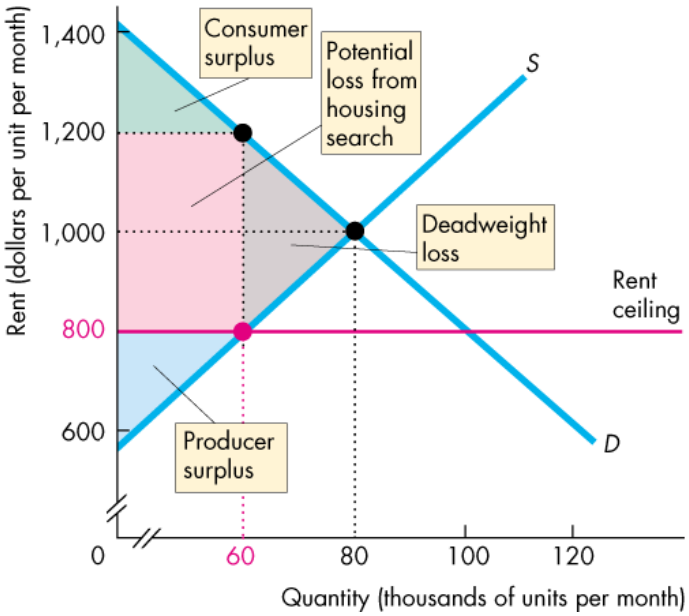
- A **price ceiling** is a regulation that makes it illegal to charge a price higher than a specified level.
- When a price ceiling is applied to housing markets, it is called a **rent ceiling**.



- For a price ceiling to be effective it must be set at a price level below the equilibrium price.
- In the figure, a rent ceiling of $800 a month creates a housing shortage of 40,000 units.
- When a rent ceiling creates a housing shortage, search activity and a black market occur.
- The time spent looking for someone with whom to do business is called **search activity**.

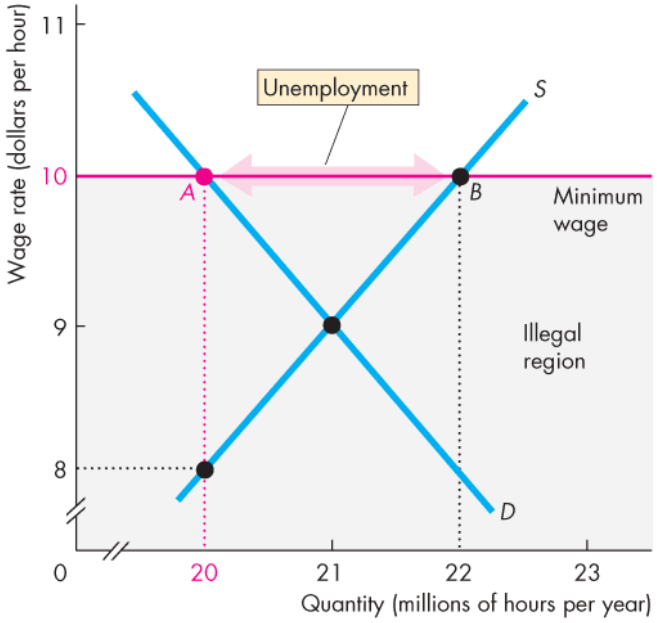
- A **black market** is an illegal market in which the price exceeds the legally imposed price ceiling.

- Rent ceilings are inefficient.
- In the figure, a rent ceiling of $800 a month decreases the quantity of housing supplied to 60,000 units.
- Marginal benefit is greater than marginal cost.
- Producer surplus shrinks, consumer surplus shrinks, and a deadweight loss arises.



A Labour Market with a Minimum Wage

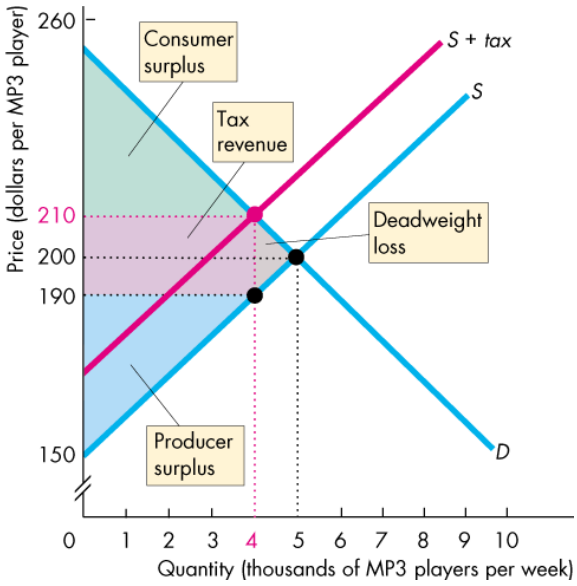
- A **price floor** is a regulation that makes it illegal to trade at a price lower than a specified level.
- When a price floor is applied to labour markets, it is called a **minimum wage**.
- For a price floor to be effective, it must be set above the equilibrium price.
- In the figure below, a minimum wage of $10 an hour creates unemployment of 2 million hours a year.



Taxes

- Who pays a sales tax?
- The demand curve shows the maximum buyers are willing to pay for any given quantity and the supply curve shows the minimum sellers are willing to accept for any given quantity
- A tax on buyers has the same effects as an equivalent tax on sellers.
- Study Figure 6.5 on p. 134 and Figure 6.6 on p. 135 to convince yourself of this fact.
- The division of the tax between the buyer and the seller depends on the elasticity of demand and the elasticity of supply.
    - Perfectly inelastic demand – buyer pays entire tax.
    - Perfectly elastic demand – seller pays entire tax.
    - Perfectly inelastic supply – seller pays entire tax.
    - Perfectly elastic supply – buyer pays entire tax.
- Study Figures 6.7, 6.8, and 6.9 on pages 135-137 of your textbook to see why the elasticities of demand and supply result in these outcomes.

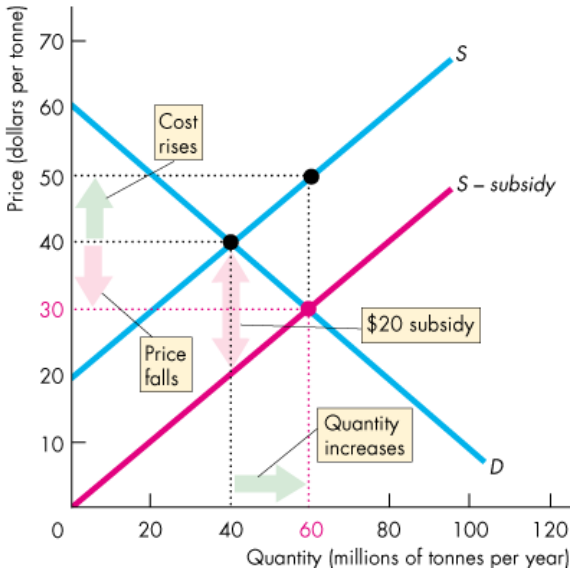
- The figure below shows that a tax places a wedge between the price paid by buyers and the price received by sellers.

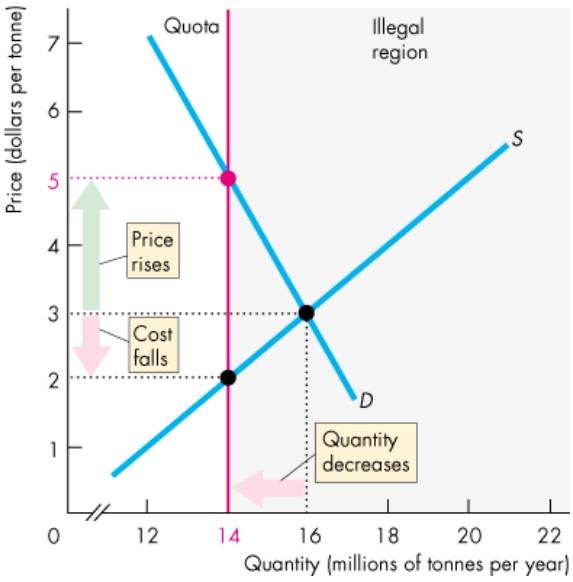


- The tax decreases the quantity produced and consumed and lowers both the consumer surplus and producer surplus.
- Part of the consumer surplus and producer surplus goes to the government as tax revenue.
- And part of each surplus becomes a deadweight loss.

Production Quotas and Subsidies

- A **subsidy** is a payment made to the producer.
- The figure shows a subsidy in the market for grain.
- A subsidy works like a negative tax.
- Producers are willing to supply a given quantity at a price equal to the original price minus the subsidy.
- So, a subsidy increases supply.
- With an increase in supply, the price falls and the quantity increases.



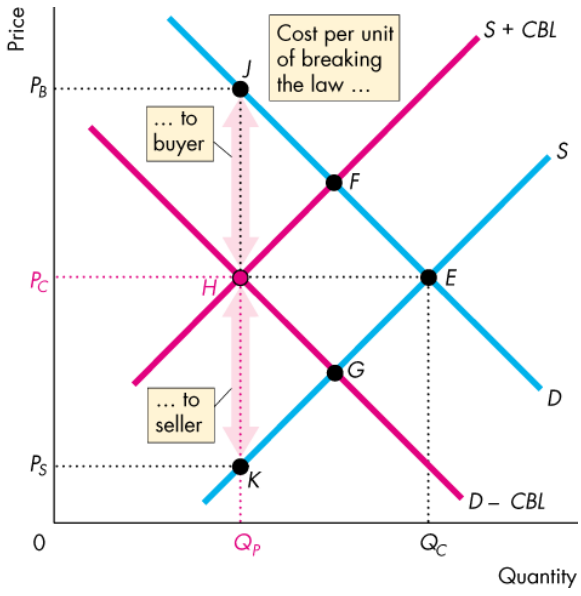


- A **production quota** is an upper limit to the quantity of a good that may be produced in a specified period.
- The figure shows how a quota works in an agricultural market.
- With no quota, the equilibrium quantity is 16 million tonnes and the equilibrium price is $3 a tonne.
- A quota of 14 million tonnes is imposed.
- So the quantity supplied decreases to this amount.
- The price rises to $5 a tonne.

- Producers are willing to supply 14 million kilograms at a price of $5 a kilogram.
- At a market price of $5 a kilogram, farmers will want to increase their output. Why?

Markets for Illegal Goods

- The figure shows the market for an illegal drug.



- If drugs were not illegal, the quantity bought and sold would be Q_c and the price would be P_c.
- Now suppose that there is a penalty on sellers.
- To determine the new supply curve, we add the cost of breaking the law to the minimum price that drug dealers are willing to accept.
- The market moves from point *E* to point *F*.
- Now suppose that there is a penalty on buyers (but no penalty on sellers).
- The market moves to point *G*.

- To determine the new demand curve, we subtract the cost of breaking the law from the value of the good to determine the maximum price buyers are willing to pay.
- If penalties are imposed on both sellers and buyers, supply and demand decrease and the supply curve and the demand curve shift.
- The market moves to point *H*.

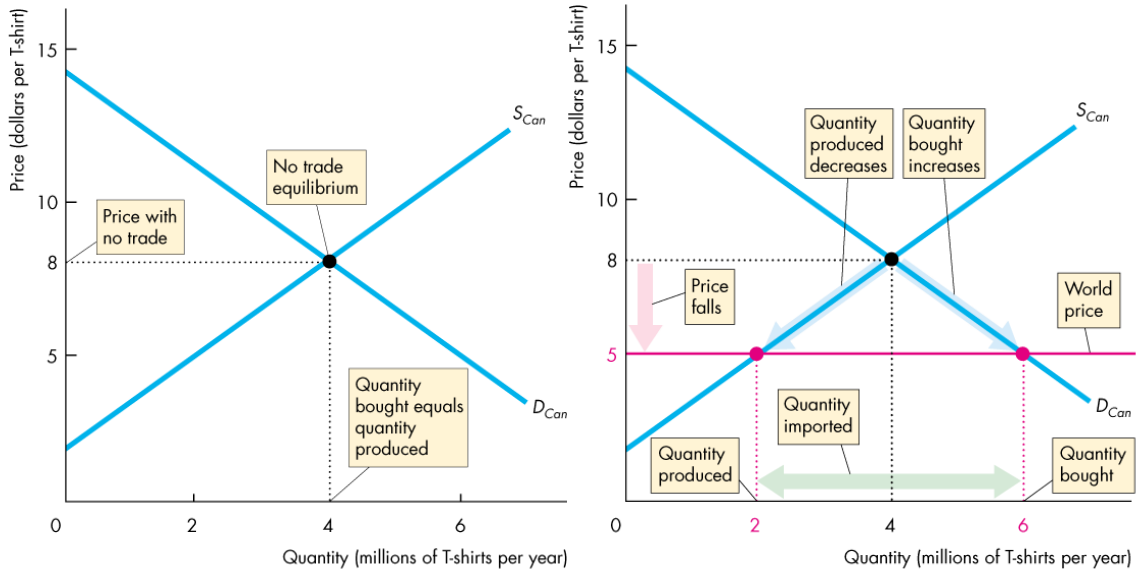
- The quantity of drugs bought could be decreased if drugs were legalized and taxed.
- A sufficiently high tax could be imposed to decrease the supply, raise the price, and achieve the same decrease in the quantity bought as with a prohibition on drugs.
- Is there a case for legalizing drugs?
  The government can generate a tax revenue that is not available if drugs are illegal.
- In favour of prohibition is the fact that prohibition sends a signal that might influence preferences, decreasing demand for illegal drugs.

Chapter 7

Global Markets in Action

How Global Markets Work

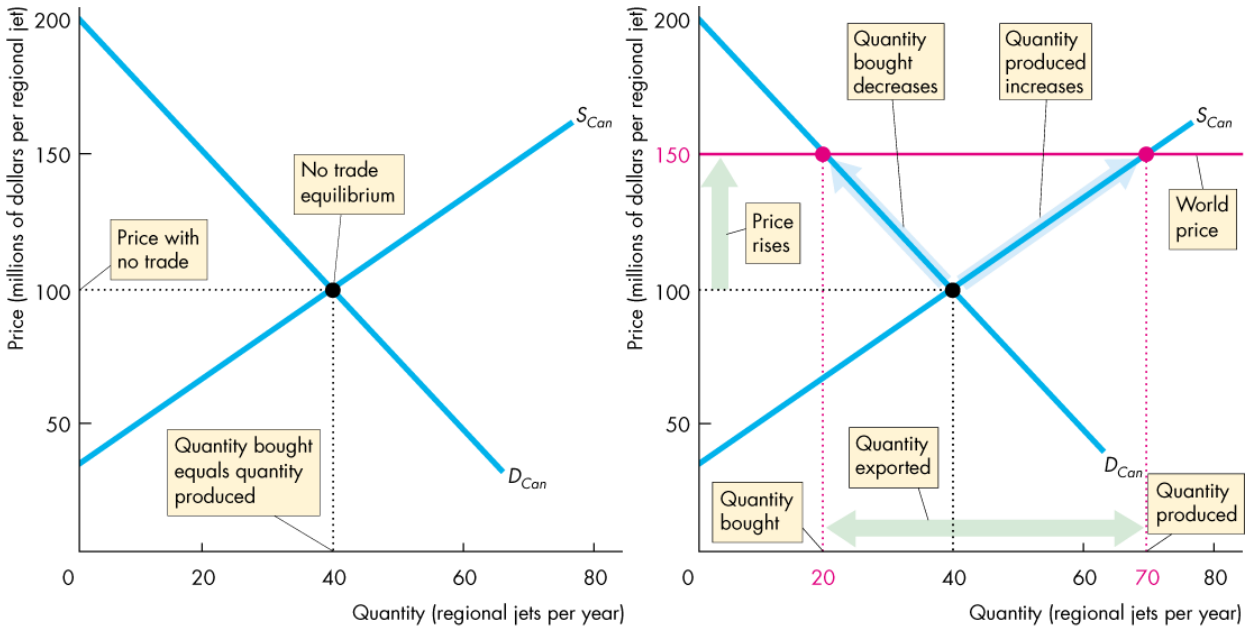
- The goods and services we buy from other countries are our **imports**, and the goods and services we sell to people in other countries are our **exports**.
- Comparative advantage is the fundamental force that drives international trade.
- Comparative advantage is a situation in which a person can perform an activity or produce a good or service at a lower opportunity cost than anyone else.
- National comparative advantage is a situation in which a nation can perform an activity or produce a good or service at a lower opportunity cost than any other nation.
- The graphs show the market for t-shirts.



(a) Equilibrium with no international trade **(b) Equilibrium in a market with imports**

- In the left graph, with no international trade, the price of a t-shirt is $8 and Canada produces and buys 4 million t-shirts a year.
- The right graph shows that the rest of the world has a comparative advantage in the production of t-shirts because the world price is less than Canada's price.
- With international trade, the price of a t-shirt in Canada falls to $5.
- Canadian producers produce 2 million t-shirts (at the intersection of the S_{CAN} curve and the world price line), and Canadian consumers purchase 6 million t-shirts (at the intersection of the D_{CAN} curve and the world price line).
- Canada imports 4 million t-shirts.

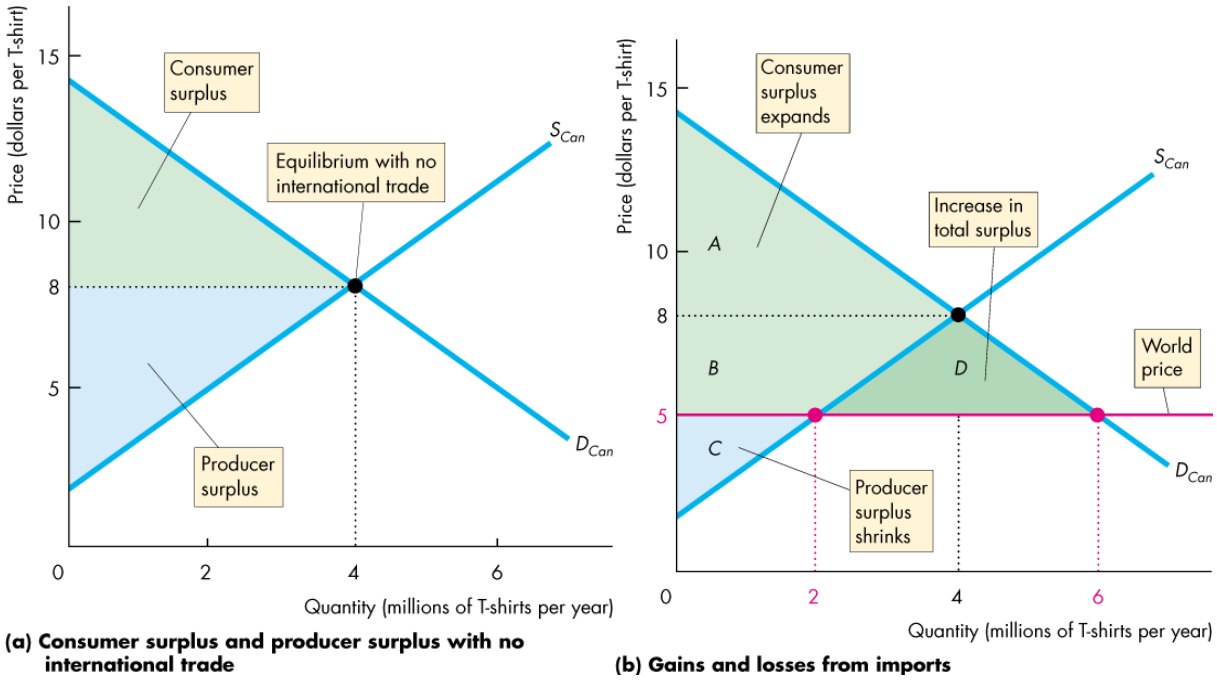
- The graphs show the market for regional jets.



(a) Equilibrium without international trade **(b) Equilibrium in a market with exports**

- In the left graph, with no international trade, the price of a regional jet is $100 million and Canada produces and buys 40 regional jets a year.
- The right graph shows that Canada has a comparative advantage in the production of regional jets because the world price is greater than Canada's price.
- With international trade, the price of a regional jet in Canada rises to $150 million.
- Canadian producers produce 70 regional jets (at the intersection of the S_{CAN} curve and the world price line), and Canadian consumers purchase 20 regional jets (at the intersection of the D_{CAN} curve and the world price line).
- Canada exports 50 regional jets.

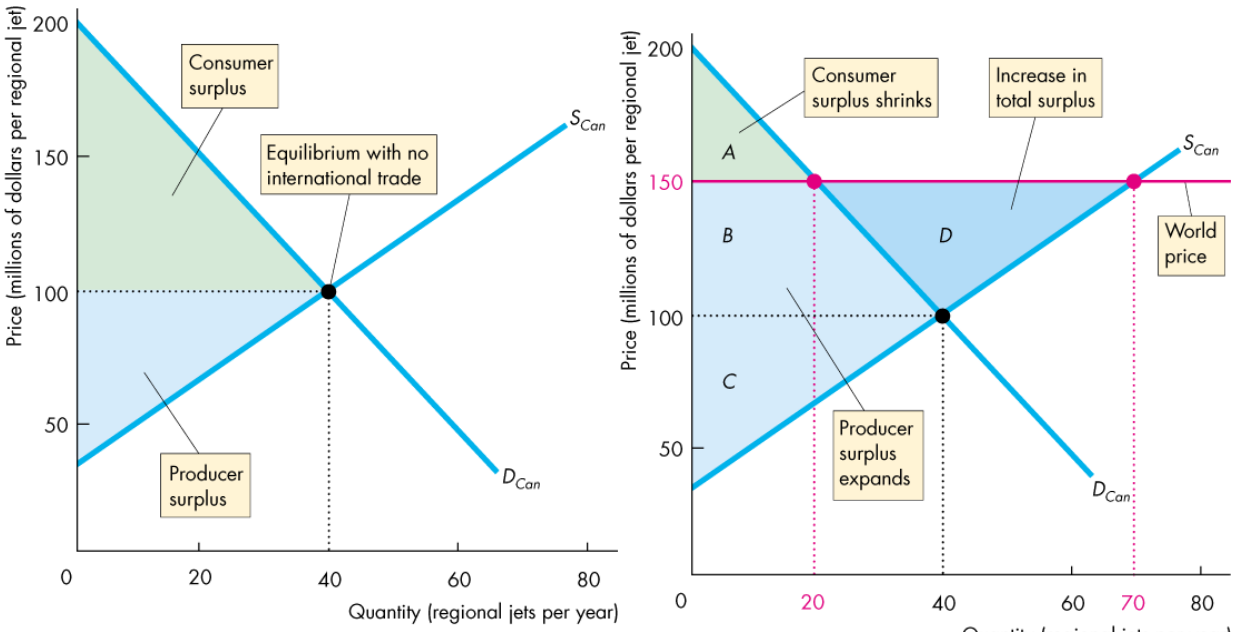
Winners, Losers, and the Net Gain from Trade



(a) Consumer surplus and producer surplus with no international trade

(b) Gains and losses from imports

- The graph on the left shows Canada's consumer surplus and producer surplus with no international trade in t-shirts.
- The right graph shows Canada's consumer surplus and producer surplus with international trade in t-shirts.
- Consumer surplus increases with international trade because the price of a t-shirt falls from $8 to $5 and because the quantity of t-shirts purchased in Canada increases from 4 million to 6 million.
- Producer surplus decreases with international trade because the price of a t-shirt falls from $8 to $5 and because the quantity of t-shirts produced in Canada decreases from 4 million to 2 million.
- Consumer surplus increases, and producer surplus decreases but the increase in consumer surplus is greater than the decrease in producer surplus. Total surplus increases by area *D*.



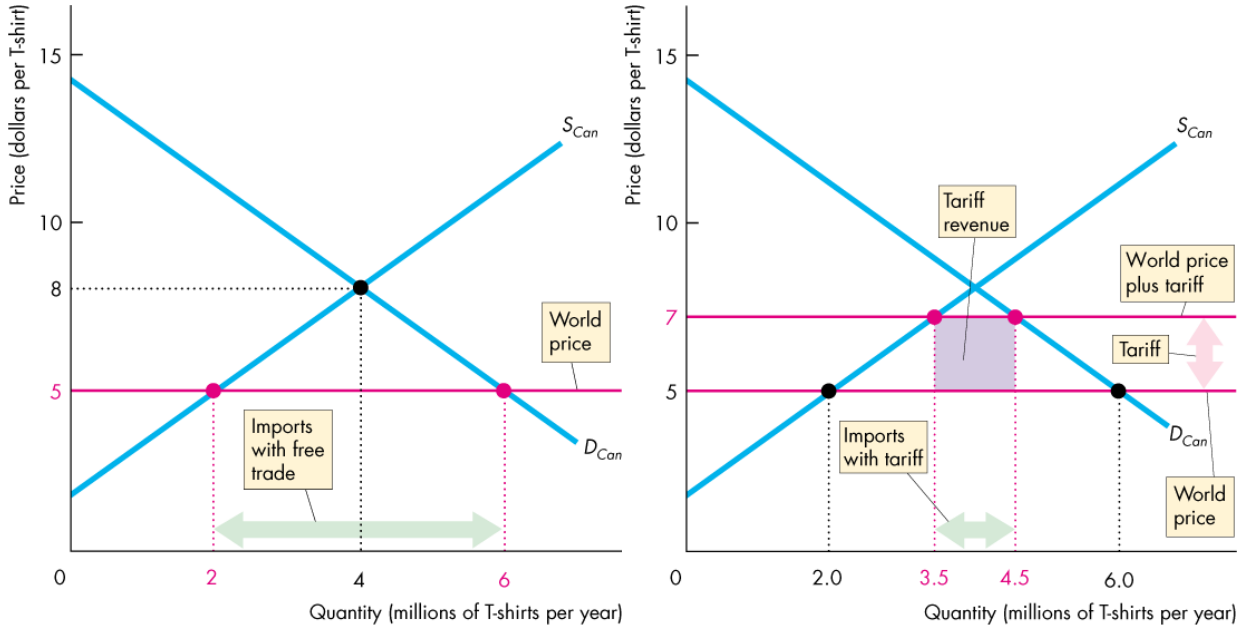
(a) Consumer surplus and producer surplus with no international trade

(b) Gains and losses from exports

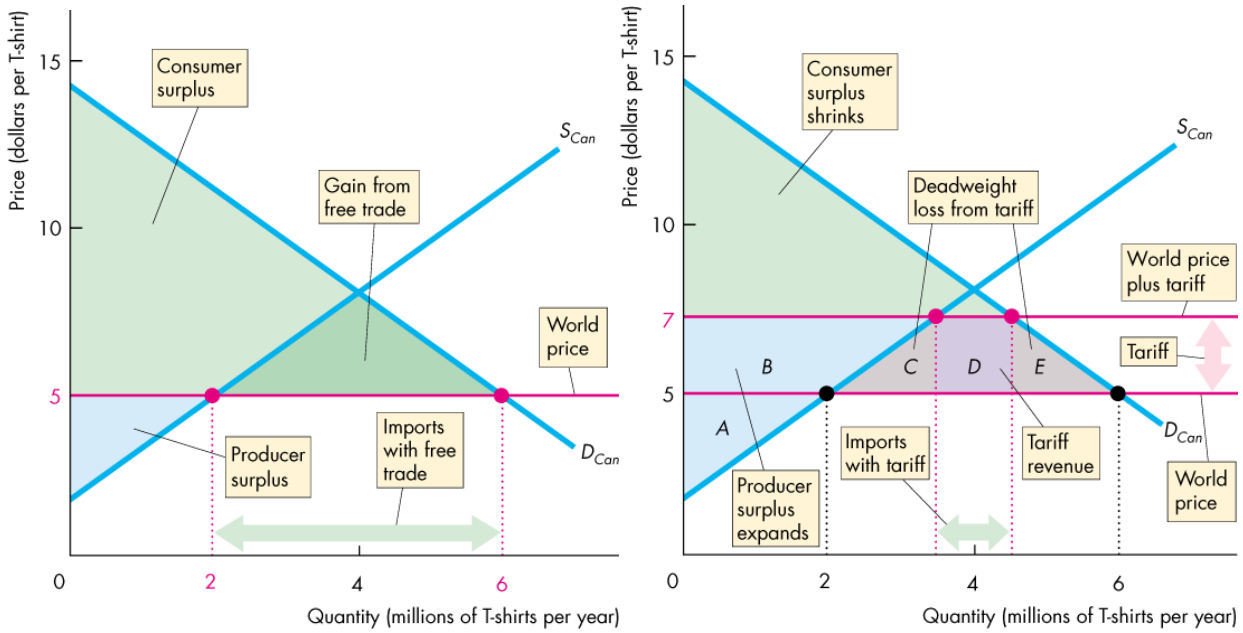
- The graph on the left shows Canada's consumer surplus and producer surplus with no international trade in regional jets.
- The right graph shows Canada's consumer surplus and producer surplus with international trade in regional jets.
- Consumer surplus decreases with international trade because the price of a regional jet rises from $100 million to $150 million and because the quantity of regional jets purchased in Canada decreases from 40 to 20.
- Producer surplus increases with international trade because the price of a regional jet rises from $100 million to $150 million and because the quantity of regional jets produced in Canada increases from 40 to 70.
- Consumer surplus decreases, and producer surplus increases but the increase in producer surplus is greater than the decrease in consumer surplus. Total surplus increases by area *D*.

International Trade Restrictions

- A **tariff** is a tax on a good that is imposed by the importing country when an imported good crosses its international boundary.



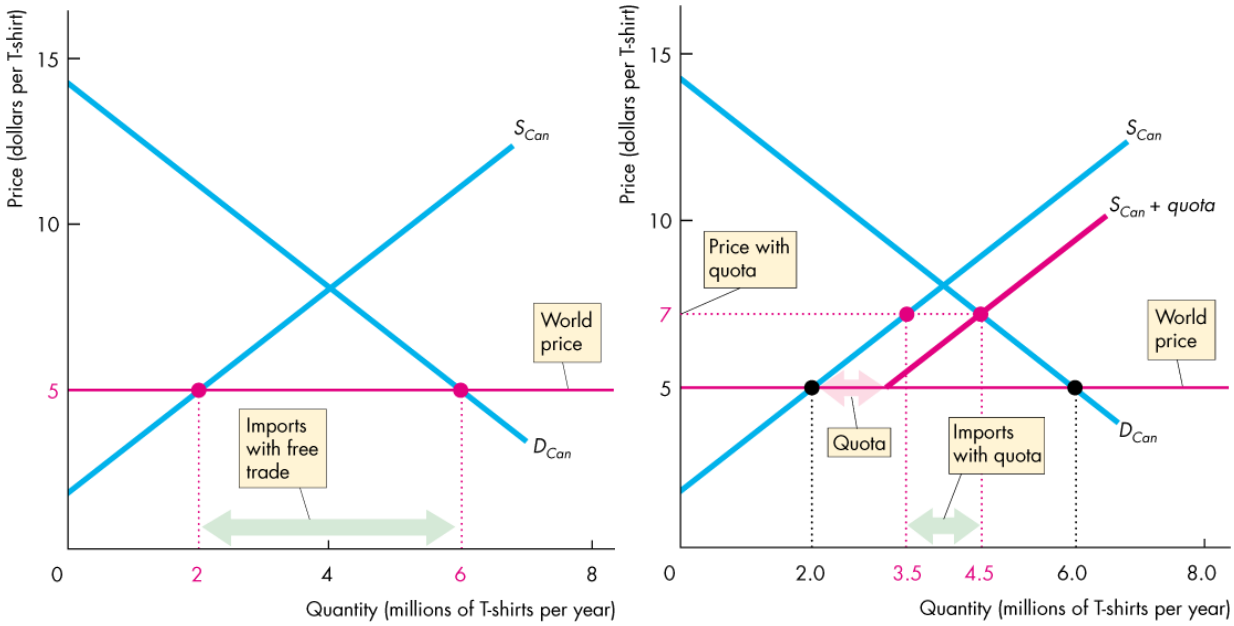
- The left graph shows the market for t-shirts in Canada with free trade.
- Canada imports 4 million t-shirts.
- The right graph shows the market for t-shirts in Canada when a tariff of $2 a t-shirt is imposed.
- The price of a t-shirt in Canada rises from the world price of $5 to a price of $7.
- Canadians now purchase 4.5 million t-shirts (at the intersection of the D_{CAN} curve and the world price plus tariff line).
- Canadian producers now produce 3.5 million t-shirts (at the intersection of the S_{CAN} curve and the world price plus tariff line).
- Canada imports 1 million t-shirts.
- The Canadian government collects a tariff of $2 on each t-shirt imported, so the government makes a tariff revenue of $2 million.



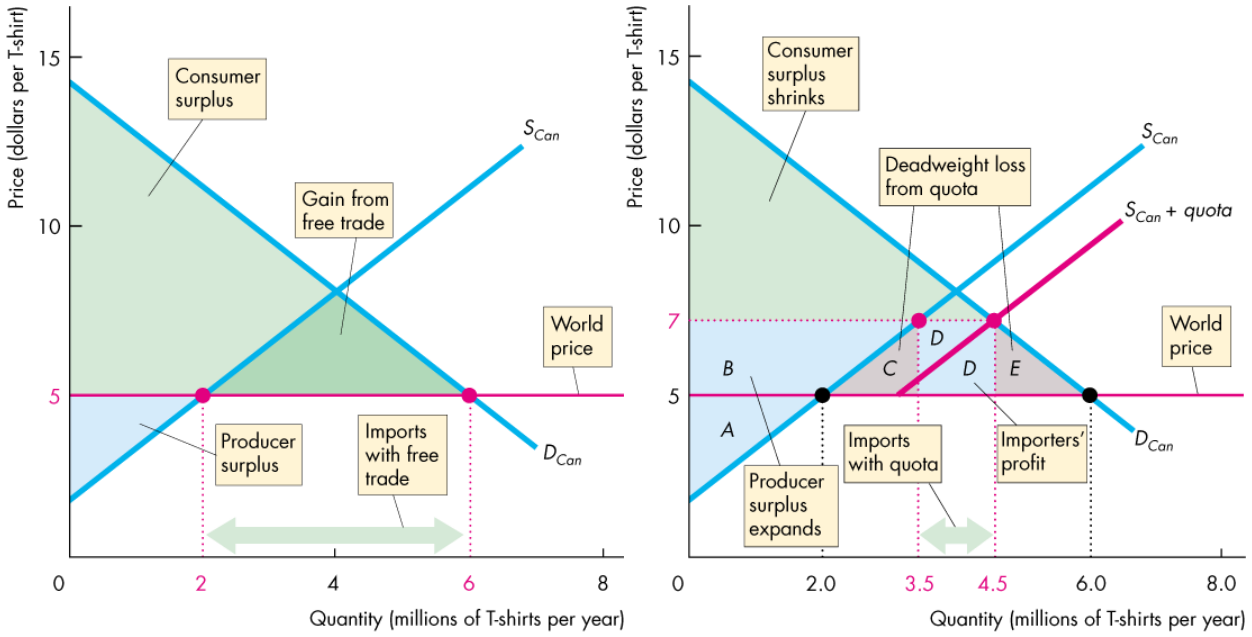
(a) Free trade **(b) Market with tariff**

- There are winners and losers from a tariff.
- The left graph shows the market for t-shirts in Canada with free trade.
- The right graph shows the market for t-shirts in Canada when a tariff is applied.
- Consumer surplus decreases because the price of a t-shirt rises and the quantity of t-shirts bought decreases.
- Producer surplus increases because the price of a t-shirt rises and the quantity of t-shirts produced in Canada increases.
- The government gains revenue equal to area *D* but creates a deadweight loss equal to the sum of areas *C* and *E*.

- An **import quota** is a restriction that limits the maximum quantity of a good that may be imported in a given period.



- The left graph show the market for t-shirts in Canada with free trade.
- Canada imports 4 million t-shirts.
- And the right graph shows the market for t-shirts in Canada with an import quota of 1 million t-shirts.
- The price of a t-shirt in Canada rises from the world price of $5 to a price of $7.
- Canadians now purchase 4.5 million t-shirts (at the intersection of the D_{CAN} curve and the S_{CAN}+quota curve).
- Canadian producers now produce 3.5 million t-shirts (the quantity supplied on the S_{CAN} curve at the price of $7 a t-shirt).
- Canada imports 1 million t-shirts.



- There are winners and losers from a quota.
- The left graph shows the market for t-shirts in Canada with free trade.
- The right graph shows the market for t-shirts in Canada when an import quota is applied.
- Consumer surplus decreases because the price of a t-shirt rises and the quantity of t-shirts bought decreases.
- Producer surplus increases because the price of a t-shirt rises and the quantity of t-shirts produced in Canada increases.
- The importers gain an equal to area *D* but a deadweight loss equal to the sum of areas *C* and *E* is created.

The Case Against Protection

- Two arguments for restricting international trade are:
  - The infant-industry argument
  - The dumping argument
- The **infant industry argument** for protection is that it is necessary to protect a new industry to enable it to grow into a mature industry that can compete in world markets.
- The argument has two fatal flaws:
  - The industry's owners profit from the industry's growth to maturity and have all the incentives needed to bring the industry to maturity.
  - Subsidy is more efficient than protection.
- **Dumping** occurs when a foreign firm sells its exports at a price below its cost of production.
- The argument has three fatal flaws:
  - Dumping is virtually impossible to detect.
  - There are no global monopolies.

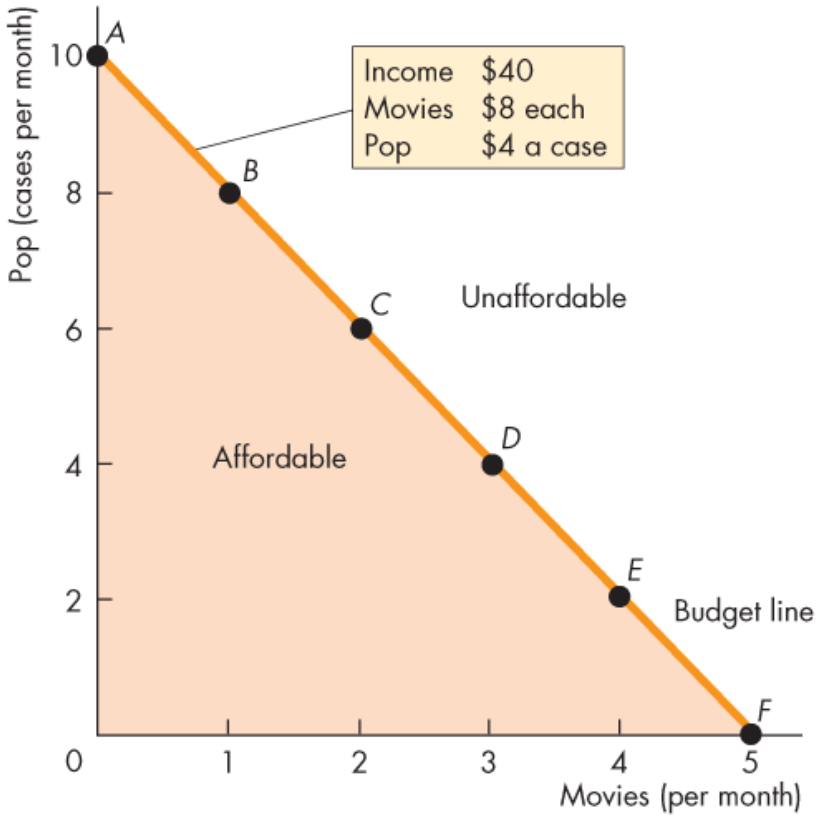
    - If there were, international anti-monopoly rules would be needed, not protection.
- Other arguments for protection are fatally flawed.
    - Allows us to compete with cheap foreign labour.
    - Penalizes lax environmental standards.
    - Saves jobs.
    - Prevents rich countries from exploiting developing countries.
- Trade is restricted because of tariff revenue and rent seeking.
- In developing countries, governments have a difficult time collecting taxes from their citizens because much economic activity takes place in an informal economy with few financial records.
- The one area in which economic transactions are well recorded and audited is in international trade.
- So this activity is an attractive base for tax collection in developing countries and is used much more extensively than in the developed countries.
- Rent seeking is the major reason why international trade is restricted.
- **Rent seeking** is lobbying for special treatment by the government to create economic profit or to divert consumer surplus or producer surplus away from others.

Chapter 9

Possibilities, Preferences, and Choices

Consumption Possibilities

- A household's **budget line** describes the limits to its consumption choices.
- Lisa has $40 a month to spend, the price of pop is $4 a case, and the price of a movie is $8.
- The figure shows Lisa's budget line.
- Its position depends on Lisa's income and on the prices she faces.



The Budget Equation

In General	In Lisa's Case
1. The variables:	
Income = Y	Y = \$40
Price of a movie = P_M	P_M = \$8
Price of pop = P_P	P_P = \$4
Quantity of movies = Q_M	
Quantity of pop = Q_P	

2. The budget:

$P_P Q_P + P_M Q_M = Y$

$\$4Q_P + \$8Q_M = \$40$

3. The budget line:

$P_P Q_P + P_M Q_M = Y$

Divide both sides of equation by P_P

$Q_P + (P_M / P_P) Q_M = Y / P_P$

Subtract $(P_M / P_P) Q_M$ from both sides of equation

$Q_P = Y / P_p - (P_M / P_P) Q_M$

4. The budget line with numbers:

$\$4Q_P + \$8Q_M = \$40$

Divide both sides of the equation by P_P**(\$4)**

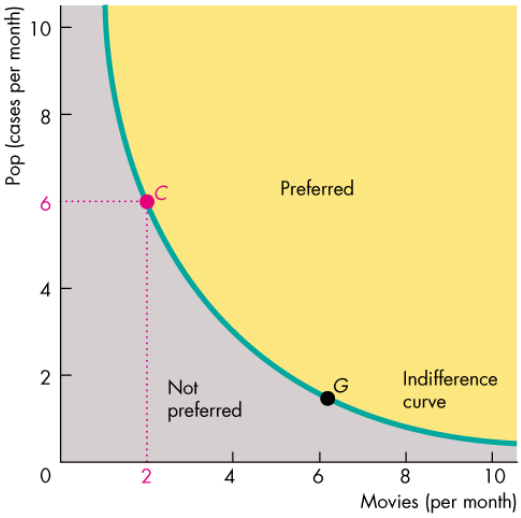
$Q_P + (\$8 / \$4) Q_M = \$40/\$4$

Subtract **(\$8/\$4)**Q_M from both sides of equation

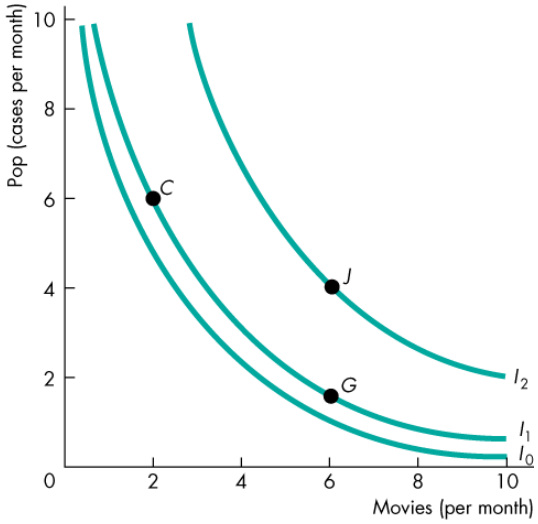
$Q_P = 10 - 2Q_M$

- When the price changes, so does the budget line.
- When the price of a movie decreases, the budget line rotates outward and when the price of a movie increases, the budget line rotates inward.
- A change in money income changes real income but does not change relative prices.
- When income decreases, the budget line shifts inward. When income increases, the budget line shifts outward.

Preferences and Indifference Curves



(a) An indifference curve



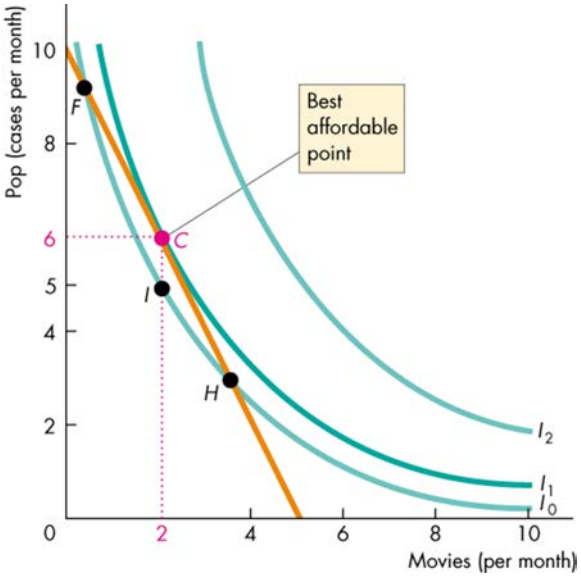
(b) Lisa's preference map

- An **indifference curve** is a line that shows combinations of goods among which a consumer is indifferent.
- The top figure shows one of Lisa's indifference curves.
- Lisa is just as happy to consume at point *C* as she is to consume at point *G*.
- Lisa also prefers all the combinations above the indifference curve to those on the indifference curve.
- And she prefers any combination on the indifference curve to any combination in the grey area below the indifference curve.
- The bottom figure shows Lisa's preference map.
- Indifference curves are like contours on a regular map.
- A point on I_2, such as point *J* is preferred to points on I_1 such as *C* and *G*.
- Points on I_1 are preferred to points on I_0.

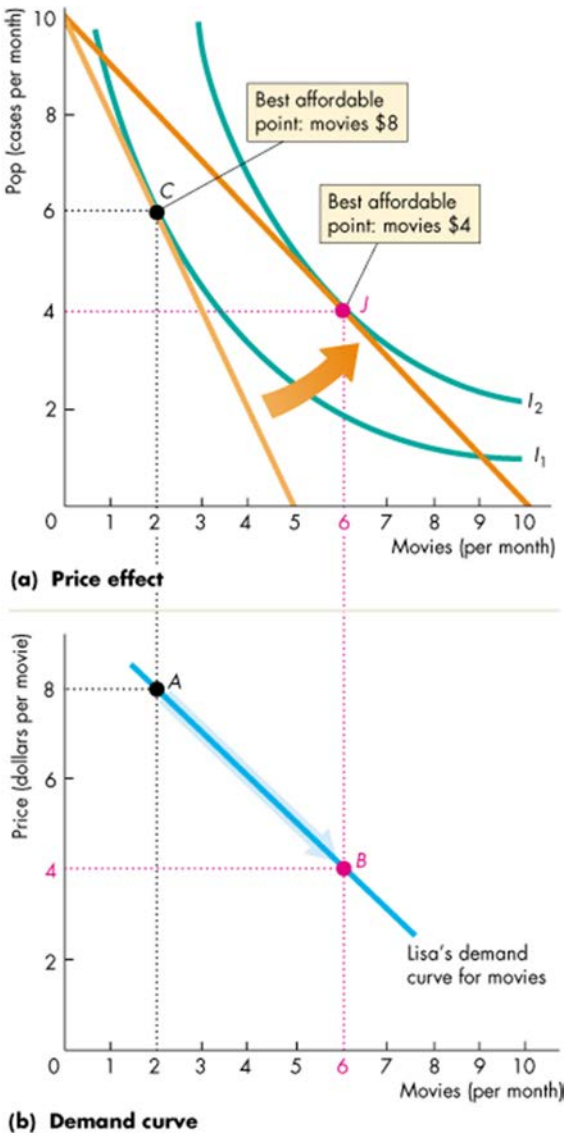
- The **marginal rate of substitution** (MRS) is the rate at which a person will give up good *y* (the good measured on the *y*-axis) to get an additional unit of good *x* (the good measured on the *x*-axis) and at the same time remain indifferent (remain on the same indifference curve).
- The *MRS* is the magnitude of the slope of an indifference curve.
- The *MRS* diminishes as we move along an indifference curve consuming more of the good measured on the *x*-axis and less of the good measured on the *y*-axis.
- A **diminishing marginal rate of substitution** is a general tendency for a person to be willing to give up less of good *y* to get one more unit of good *x*, and at the same time remain indifferent, as the quantity of *x* increases.
- Study p. 209 of your textbook to discover the shape of indifference curves for substitutes and complements.

Predicting Consumer Choices

- Lisa will consume at her best affordable point, which is 2 movies and 6 cases of pop at point *C* in the figure below.
- At point *C*, Lisa is on her budget line, is on her highest attainable indifference curve, and has a marginal rate of substitution between movies and pop equal to the relative price.

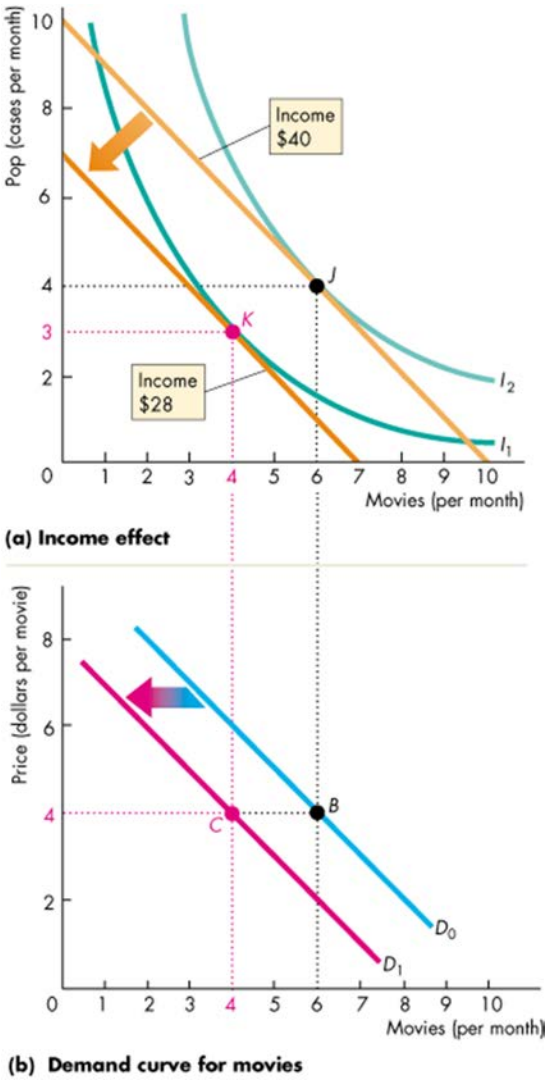


- The effect of a change in the price on the quantity of a good consumed is called the **price effect**.
- Lisa starts at point *C* in the figure below.
- Initially, the price of pop is $4 a case and the price of a movie is $8.
- So, when the price of a movie is $8, Lisa sees 2 movies a month, which is point *A* on the demand curve in the bottom figure.

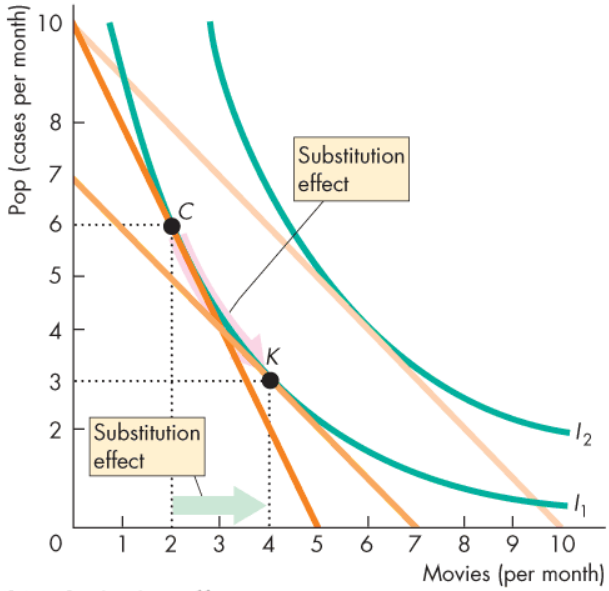


- With pop remaining at $4 a case, the price of a movie falls to $4.
- The budget line rotates outward.
- Lisa's best affordable point is now *J*.
- Lisa now consumes 6 movies and 4 cases of pop a month.
- So, when the price of a movie is $4, Lisa sees 6 movies a month, which is point *B* on the demand curve in the bottom figure.
- As the price decreases, Lisa moves down along her demand curve.
- The effect of a change in income on consumption is called the **income effect**.

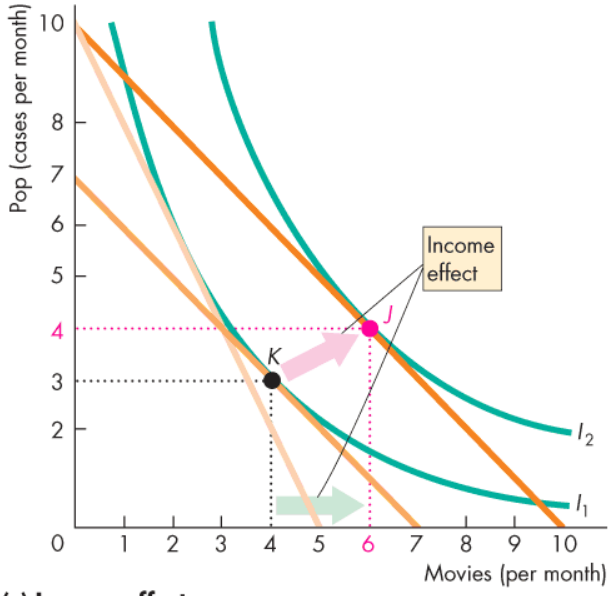
- Suppose Lisa's income decreases from $40 a month to $28 a month.
- When the price of a case of pop is $4, the price of a movie is $4, and Lisa's income is $40 a month, she consumes at point *J* in the top figure.
- Now, her income falls to $28 a month.
- Lisa's budget line shifts leftward and she now consumes at point *K*.
- Pop and movies are normal goods.
- When income falls, Lisa consumes less of both of these goods.
- With a fall in income, the demand curve for movies shifts leftward in the bottom figure.
- We can divide the price effect into two parts – substitution effect and income effect.
- The substitution effect is the effect of a change in price on the quantity bought when the consumer (hypothetically) remains indifferent between the original situation and the new one.



The figure below separates the price effect into the substitution effect and income effect.



(b) Substitution effect



(c) Income effect

- Lisa's initial consumption point is point *C*.
- If the price of a movie falls to $4 and she remains on the same indifference curve, she moves to point *K*.
- To calculate the substitution effect, we give Lisa a pay cut.
- To isolate the income effect, we increase Lisa's income (we give her back the pay cut) so that she can move from the original indifference curve to the new one.
- The income effect is the move from *K* to *J*.

Chapter 10

Organizing Production

The Firm and Its Economic Problem

- A **firm** is an institution that hires factors of production and organizes those factors to produce and sell goods and services.
- The firm's goal is to maximize profit.
- The opportunity cost of any action is the highest-valued alternative forgone.
- A firm's opportunity cost of production is the sum of the cost of using resources:
    - Bought in the market
    - Owned by the firm
    - Supplied by the firm's owner
- The firm's opportunity cost of using the capital it owns is called the **implicit rental rate** of capital.
- The implicit rental rate of capital is made up of economic depreciation and forgone interest.
- **Economic depreciation** is the change in the *market* value of capital over a given period.
- The return to entrepreneurship is profit, and the return that an entrepreneur can expect to receive on the average is called **normal profit**.
- A firm's economic profit is equal to its total revenue minus its opportunity cost.
- The firm's opportunity cost includes *normal profit*.
- Study Table 10.1 on p. 229 of your text, which summarizes economic accounting concepts.
- The features of the environment that limit the maximum profit a firm can make are technology constraints, information constraints, and market constraints.
- A **technology** is any method of producing a good or service.

Technological and Economic Efficiency

- **Technological efficiency** occurs when the firm produces a given output by using the least amount of inputs.
- **Economic efficiency** occurs when the firm produces a given output at the least cost.
- Study the examples on pp. 231-232 of your textbook.

Information and Organization

- Firms use a mixture of two systems to organize production:
    - Command systems
    - Incentive systems
- A **command system** is a method of organizing production that uses a managerial hierarchy.
- Commands pass downward through the managerial hierarchy, and information passes upward.

- An **incentive system** is a method of organizing production that uses a market-like mechanism inside the firm.
- Instead of issuing commands, senior managers create compensation schemes that will induce workers to perform in ways that maximize the firm's profit.
- The **principle-agent problem** is the problem of devising compensation rules that induce an *agent* to act in the best interest of a *principle*.
- Three ways of coping with the principle-agent problem are:
    - Ownership arrangements
    - Incentive pay
    - Long-term contracts
- Three main types of business organization are:
    - Sole proprietorship
    - Partnership
    - Corporation
- A sole proprietorship is a firm with a single owner who has unlimited liability.
- A partnership is a firm with two or more owners who have unlimited liability.
- A corporation is a firm owned by one or more limited liability stockholders.
- Study the pros and cons of different types of firms in Table 10.4 on p. 235 of your text.

Markets and the Competitive Environment

- Economists identify four market types:
    - Perfect competition
    - Monopolistic competition
    - Oligopoly
    - Monopoly
- **Perfect competition** arises when there are many firms, each selling an identical product, many buyers, and no restrictions on the entry of new firms into the industry.
- **Monopolistic competition** is a market structure in which a large number of firms compete by making similar but slightly different products.
- **Oligopoly** is a market structure in which a small number of firms compete.
- **Monopoly** arises when there is one firm, which produces a good or service that has no close substitutes in which the firm is protected by a barrier preventing the entry of new firms.

(We will be studying each of these market types in Chapters 12, 13, 14, and 15).

- Economists use two measures of concentration to study the extent to which a market is dominated by a small number of firms.
- These two measures of concentration are:
    - The four-firm concentration ratio
    - The Herfindahl-Hirschman Index

- The **four-firm concentration ratio** is the percentage of the value of sales accounted for by the four largest firms in an industry.
- The **Herfindahl-Hirschman Index** is the square of the percentage market share of each firm summed over the largest 50 firms (or summed over all the firms if there are fewer than 50) in a market.
- The limitations of concentration measures are their failure to take proper account of:
    - The geographical scope of the market
    - Barriers to entry and firm turnover
    - The correspondence between a market and an industry
- Study the examples of concentration ratio calculations in Table 10.5 on p. 238 of your textbook.

Produce or Outsource? Firms and Markets

- There are four key reasons why, in many instances, firms are more efficient than markets as coordinators of economic activity. Firms can achieve:
    - Lower transactions costs
    - Economies of scale
    - Economies of scope
    - Economies of team production
- **Transaction costs** are the costs that arise from finding someone with whom to do business, of reaching an agreement about the price and other aspects of the exchange, and of ensuring that the terms of the agreement are fulfilled.
- When the cost of producing a unit of a good falls as its output rate increases, **economies of scale** exist.
- A firm experiences **economies of scope** when it uses specialized resources to produce a range of goods and services.
- A production process in which the individuals in a group specialize in mutually supportive tasks is team production.

Chapter 11

Output and Costs

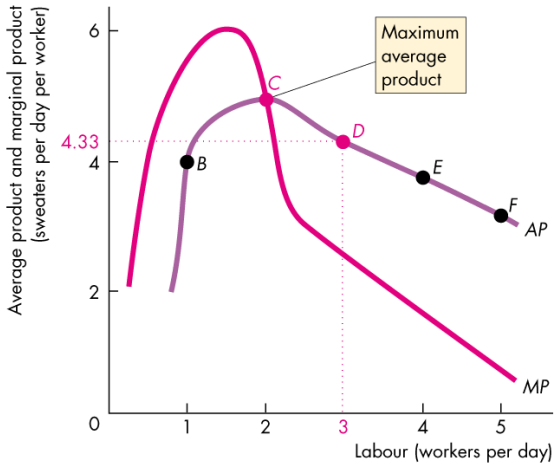
Decision Time Frames

- To study the relationship between a firm's output decision and its costs, we use two decision time frames:
    - The short run
    - The long run
- The **short run** is a time frame in which the quantity of at least one factor of production is fixed.
- The **long run** is a time frame in which the quantities of *all* factors of production can be varied.
- Long-run decisions are *not* easily reversed because once a plant decision is made the firm usually must live with it for some time.
- We call the past cost of buying a plant that has no resale value a **sunk cost**.

Short-Run Technology Constraint

- **Total product** is the total output produced.
- The total product curve separates what is attainable from what is unattainable.
- The **marginal product** of labour is the increase in total product that results from a one-unit increase in the quantity of labour employed with all other inputs remaining the same.
- Marginal product increases and then diminishes.
- **Diminishing marginal returns** occur when the marginal product of an additional worker is less than the marginal product of the previous worker.
- The **law of diminishing returns** states that:
    - As a firm uses more of a variable factor of production, with a given quantity of a fixed factor of production, the marginal product of the variable factor eventually diminishes.
- All production processes eventually reach a point of diminishing marginal returns.
- The **average product** of labour is equal to the total product divided by the quantity of labour employed.

- The figure below shows an average product curve and a marginal product curve.



- When marginal product exceeds average product, average product is increasing.
- When marginal product is less than average product, average product is decreasing.
- When marginal product equals average product, average product is at its maximum.

Short-Run Cost

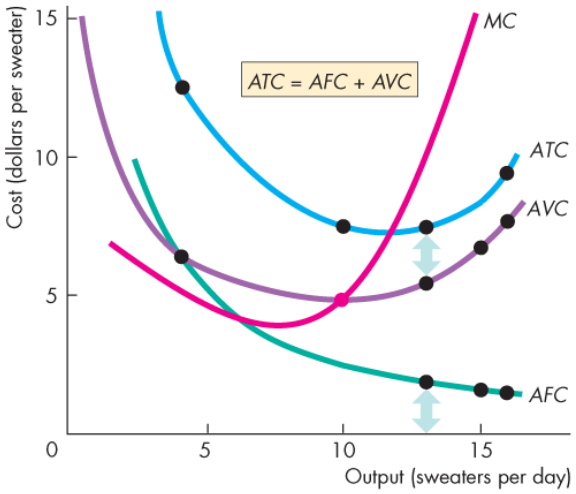
- A firm's **total cost** (*TC*) is the cost of all the factors of production it uses. Total cost is divided into two parts:
    - **Total fixed cost** (*TFC*) is the cost of the firm's fixed factors. Total fixed cost does not change as output changes.
    - **Total variable cost** (*TVC*) is the cost of the firm's variable factors. Total variable cost changes as output changes.

$$TC = TFC + TVC$$

- A firm's **marginal cost** is the increase in total cost that results from a one-unit increase in output. It is calculated as the increase in total cost divided by the increase in output.
- **Average fixed cost** (*AFC*) is total fixed cost per unit of output.
- **Average variable cost** (*AVC*) is total variable cost per unit of output.
- **Average total cost** (*ATC*) is total cost per unit of output.

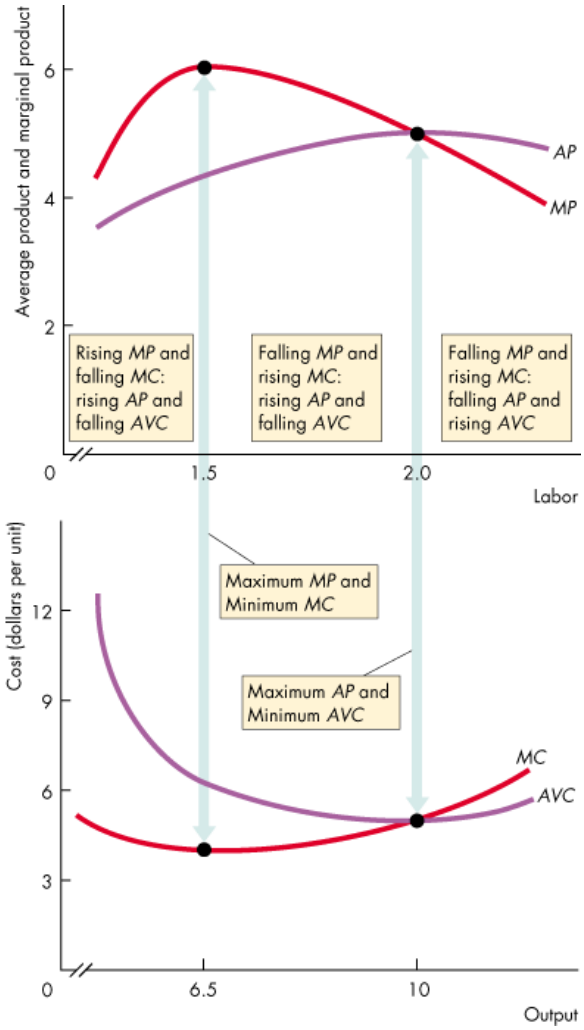
$$ATC = AFC + AVC$$

- Figure 11.4 in your textbook shows the total cost curves for Campus Sweaters.
- *TFC* is constant.
- *TC* is the sum of *TFC* and *TVC*.
- The figure below shows the average cost curves and the marginal cost curve.



- *ATC* is the sum of *AVC* and *AFC*.
- *MC* intersects *ATC* and *AVC* at their minimum points.
- When marginal cost is less than average cost, average cost is decreasing.
- When marginal cost exceeds average cost, average cost is increasing.
- When marginal cost equals average cost, average cost is at its minimum.

- The figure below studies the relationship between product curves and cost curves.
- When marginal product is increasing, marginal cost is decreasing.



- When marginal product is decreasing, marginal cost is increasing.
- When average product is increasing, average cost is decreasing.
- When average product is decreasing, average variable cost is increasing.
- When average product is at its maximum, average variable cost is at its minimum.

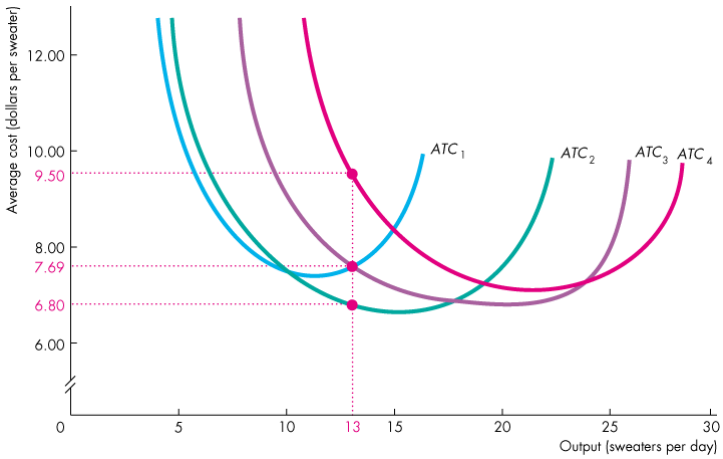
- When a technological change shifts the total product curve upward, it also shifts the marginal product curve and the average product curve upward.
- An increase in a fixed cost shifts the fixed cost curves upward, shifts the total cost curve upwards, but leaves the variable cost curves and the marginal cost curve unchanged.
- An increase in variable cost shifts the variable cost curves upward and shifts the marginal cost curve upward but leaves the fixed cost curves unchanged.
- Table 11.2 on p. 261 of your textbook gives an excellent summary of short-run cost.

Long-Run Cost

- In the short run, a firm can vary the quantity of labour but the quantity of capital is fixed.
- In the long run, a firm can vary both the quantity of labour and the quantity of capital.
- So in the long run, all costs are variable costs.
- The behaviour of long-run cost depends on the firm's *production function*, which is the relationship between the maximum output attainable and the quantities of both labour and capital.
- Table 11.3 below shows the production function for Campus Sweaters.

Labour (workers per day)	**Output (sweaters per day)**			
	Plant 1	Plant 2	Plant 3	Plant 4
1	4	10	13	15
2	10	15	18	20
3	13	18	22	24
4	15	20	24	26
5	16	21	25	27
Knitting Machines (number)	1	2	3	4

- The figure below shows the short-run average total cost curves for the four different quantities of capital.



- Each short-run *ATC* curve is U-shaped.
- For each short-run *ATC* curve, the larger the plant, the greater is the output at which average total cost is a minimum.

- The minimum average total cost for a larger plant occurs at a greater output than it does for a smaller plant because the larger plant has a higher total fixed cost and for any given output level, a higher average fixed cost.
- In the long-run, a firm chooses the plant size that minimizes the average total cost for the chosen amount of output.
- The **long-run average cost curve** (*LRAC*) is the relationship between the lowest attainable average total cost and output when both the plant size and labour are varied.
- **Economies of scale** are features of a firm's technology that lead to falling long-run average cost as output increases.
- When economies of scale are present, the *LRAC* curve slopes downward.
- **Diseconomies of scale** are features of a firm's technology that lead to rising long-run average cost as output increases.
- When diseconomies of scale are present, the *LRAC* curve slopes upward.
- **Constant returns to scale** are features of a firm's technology that lead to constant long-run average cost as output increases.
- When constant returns to scale are present, the *LRAC* curve is horizontal.
- A firm's **minimum efficient scale** is the smallest quantity of output at which long-run average cost reaches its lowest level.

Chapter 12
Perfect Competition

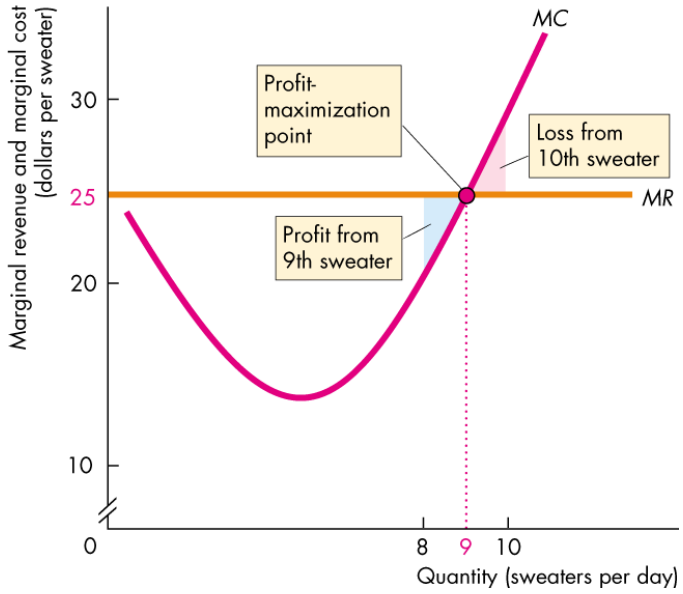
What if Perfect Competition?

- **Perfect competition** is an industry in which:
  - Many firms sell identical products to many buyers.
  - There are no restrictions on entry into the industry.
  - Established firms have no advantage over new ones.
  - Sellers and buyers are well informed about prices.
- In perfect competition, each firm is a price taker.
- A **price taker** is a firm that cannot influence the price of a good or service.
- Examples of firms in perfect competition:
  - Wheat farms
  - Fisheries
  - Wood pulping
  - Laundry services
  - Painting
- A firm's goal is to maximize economic profit, which is equal to total revenue minus total cost.
- **Total revenue** equals the price of output multiplied by the number of units of output sold.
- **Marginal revenue** is the change in total revenue that results from a one-unit increase in the quantity sold.

The Firm's Output Decision

- In the short run, a firm must decide:
  - Whether to produce or to shut down.
  - If the decision is to produce, what quantity to produce.
- In the long run, a firm must decide:
  - Whether to increase or decrease its plant size.
  - Whether to stay in an industry or leave it.
- A perfectly competitive firm maximizes economic profit by choosing its output level.
- Economic profit is maximized when the total revenue curve exceeds the total cost curve by the largest amount.
- Another way to find the profit-maximizing output is to use *marginal analysis* and compare marginal revenue with marginal cost.

- The figure shows a firm's profit-maximizing output using marginal analysis.

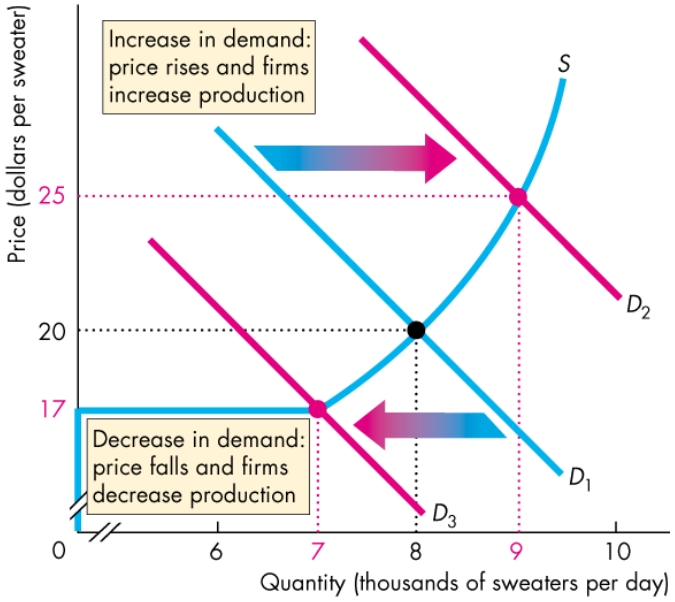


- If marginal revenue exceeds marginal cost, then the extra revenue from selling one more unit exceeds the extra cost incurred to produce it.
- The firm makes an economic profit on the marginal unit, so its economic profit increases if output increases.
- If marginal revenue is less than marginal cost, then the extra revenue from selling one more unit is less than the extra cost incurred to produce it.
- The firm incurs an economic loss on the marginal unit, so its economic profit decreases if output increases and its economic profit increases if output decreases.
- If the marginal revenue equals marginal cost, economic profit is maximized.
- In the short run, a firm in perfect competition can make a normal profit, an economic profit, or incur an economic loss.
- When price equals minimum average total cost, the firm breaks even and makes a normal profit.
- If the price exceeds the average total cost of producing the profit-maximizing output, the firm makes an economic profit.
- If the price is less than minimum average total cost, the firm incurs an economic loss.
- A perfectly competitive firm's short-run supply curve shows how the firm's profit-maximizing output varies as the market price varies, other things remaining the same.
- In the short run, a firm cannot avoid incurring its fixed cost, but it can avoid variable costs by temporarily laying off its workers and shutting down.
- The **shutdown point** is the output and price at which the firm just covers its total variable cost.
- If the price is above minimum average variable cost, a firm maximizes profit by producing the output at which marginal cost equals price.
- So the supply curve has two separate parts.

- At prices above minimum average variable cost, the supply curve is the same as the marginal cost curve.
- At prices below minimum average variable cost, the supply curve runs along the vertical axis, and the firm produces nothing.

Output, Price, and Profit in the Short Run

- The **short-run market supply curve** shows the quantity supplied by all the firms in the market at each price when each firm's plant and the number of firms remain the same.



(b) Change in equilibrium

- Suppose the market has 1,000 identical firms.
- The demand curve is D_1.
- The equilibrium price is $20.
- Each firm takes this price as given, produces its profit-maximizing output, which is 8 sweaters a day, and breaks even.
- Industry output is 8,000 sweaters a day.
- Now suppose demand increases to D_2.
- The equilibrium price rises to $25, the new profit-maximizing output for each firm is 9 sweaters a day, and each firm makes an economic profit.
- Industry output is 9,000 sweaters a
- Now suppose demand increases to D_3.
- The equilibrium price falls $17, the new profit-maximizing output for each firm is 7 sweaters a day, and each firm incurs an economic loss.
- Industry output is 7,000 sweaters a day.
- In the short run, a firm might make an economic profit, incur an economic loss, or break even.
- But in the long run, a firm cannot make an economic profit or incur an economic loss.

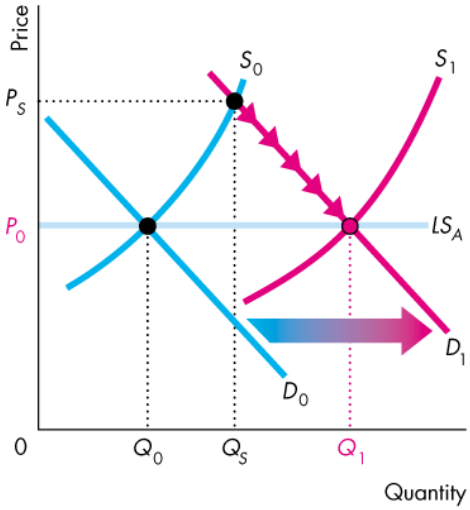
Output, Price, and Profit in the Long Run

- In the long run, a firm responds to economic profit by entering the industry and responds to economic loss by leaving the industry.
- Suppose existing firms are earning an economic profit.
- New firms enter the industry.
- An entry takes place, industry supply increases.
- As supply increases, the quantity increases and the price falls.

- Suppose existing firms are incurring an economic loss.
- Firms begin to exit the industry.
- As exit takes place, industry supply decreases.
- As supply decreases, the quantity decreases and the price rises.
- In the long run, firms break even.
- At this point, exit ceases and the industry is in long-run equilibrium.

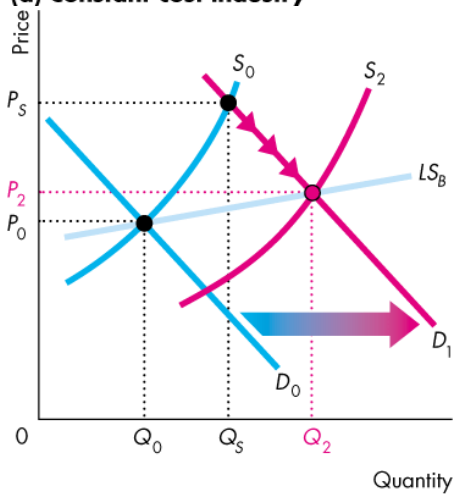
Changing Tastes and Advancing Technology

- When there is a permanent decrease in demand, the following events take place:
    - The industry demand curve shifts leftward.
    - The price falls.
    - Firms begin to incur economic losses.
    - Some firms exit the industry.
- As exit takes place the supply curve shifts leftward and the price begins to increase.
- Losses decline and the exit process slows down.
- After a large enough number of firms has exited, the remaining firms make zero economic profit.
- **External economies** are factors beyond the control of an individual firm that lower a firm's costs as *industry* output expands.
- **External diseconomies** are factors beyond the control of a firm that increase a firm's costs as *industry* output expands.
- In the absence of external economies and diseconomies, when industry output increases, price remains constant.
- A **long-run market supply curve** shows how the quantity supplied in a market varies as the market price varies after all the possible adjustments have been made, including changes in plant size and the number of firms in the market.



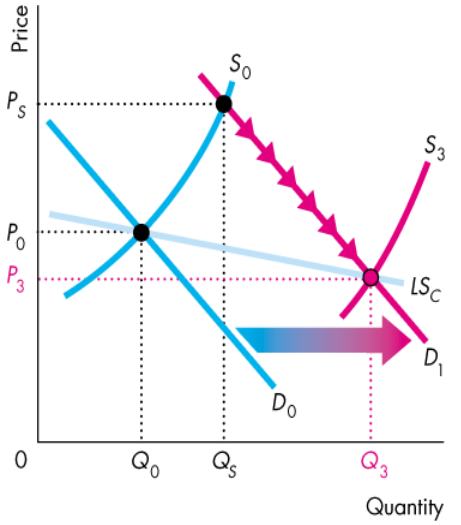
(a) Constant-cost industry

- The top figure shows a constant-cost industry, where price remains constant when industry output increases.



(b) Increasing-cost industry

- The middle figure shows an increasing-cost industry, where in the face of external diseconomies, when industry output increases, price rises.

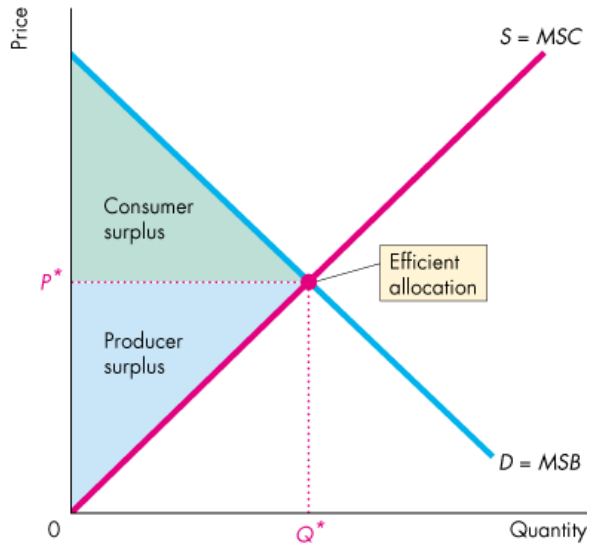


(c) Decreasing-cost industry

- The bottom figure shows a decreasing-cost industry, where in the presence of external economies, when industry output increases, price falls.

Competition and Efficiency

- A competitive industry can achieve an efficient use of resources.
- In competitive equilibrium, the quantity demanded equals the quantity supplied.
- So price equals the consumers' marginal benefit and the producers' marginal cost and the gains from trade are maximized.
- In the figure below, the gains from trade are measured by the consumer surplus (the green triangle) and the producer surplus (the blue triangle).



(b) A market

- The competitive equilibrium is efficient.
- An efficient use of resources requires that consumers be on their demand curves, firms be on their supply curves, and the market be in equilibrium.

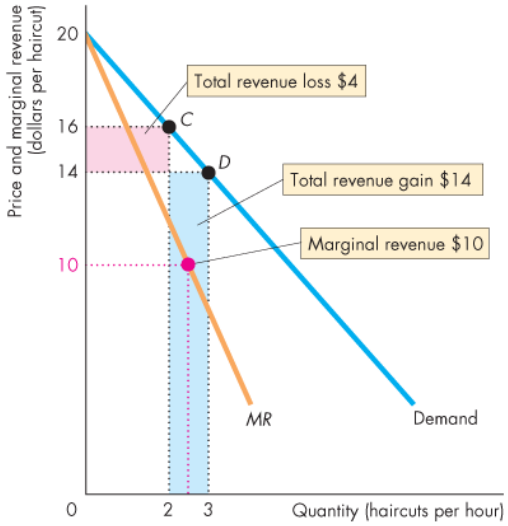
Chapter 13
Monopoly

Monopoly and How It Arises

- A **monopoly** is a market with a single firm that produces a good or service for which no close substitute exists and that is protected by a barrier that prevents other firms from selling that good or service.
- Legal, natural, or ownership constraints that protect a firm from potential competitors are called **barriers to entry**.
- A **legal monopoly** is a market in which competition and entry are restricted by the granting of a public franchise, government licence, patent, or copyright.
- Natural barriers to entry create **natural monopoly**, which is a market in which economies of scale enable one firm to supply the entire market at the lowest possible cost.
- All monopolies face a tradeoff between price and quantity sold – to sell a larger quantity, the monopoly must charge a lower price.
- A **single-price monopoly** is a firm that must sell each unit of its output for the same price to all its customers.
- **Price discrimination** is the practice of selling different units of a good or service for different prices.

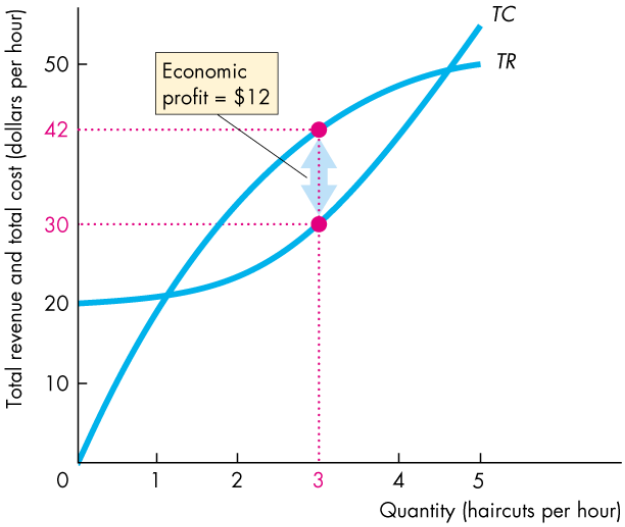
A Single-Price Monopoly's Output and Price Decision

- A monopolist faces the market demand curve.
- A monopolist's demand curve is downward sloping.
- The table shows the market demand schedule for Bobbie's Barbershop, the sole supplier of haircuts.



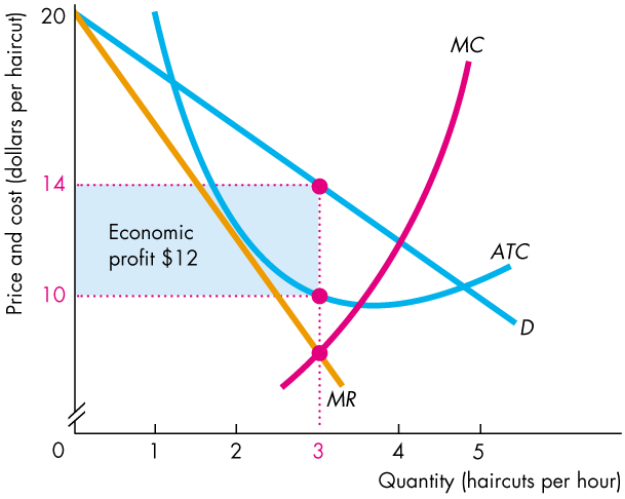
	Price (*P*) (dollars per haircut)	Quantity demanded (*Q*) (haircuts per hour)	Total revenue (*TR* = *P* × *Q*) (dollars)	Marginal revenue (*MR* = Δ*TR*/Δ*Q*) (dollars per haircut)
A	20	0	0	18
B	18	1	18	14
C	**16**	**2**	**32**	**10**
D	**14**	**3**	**42**	6
E	12	4	48	2
F	10	5	50	

- Total revenue is the price multiplied by the quantity sold and marginal revenue is the change in total revenue resulting from a one-unit increase in the quantity sold.
- A single-price monopoly always charges a price at which demand is elastic. Why? Because if demand is inelastic, the monopoly can produce less, raise its price, and earn greater profit.



(a) Total revenue and total cost curves

- The top figure shows that economic profit is maximized by producing 3 haircuts an hour.
- The profit-maximizing output also can be found as the quantity at which marginal cost equals marginal revenue.

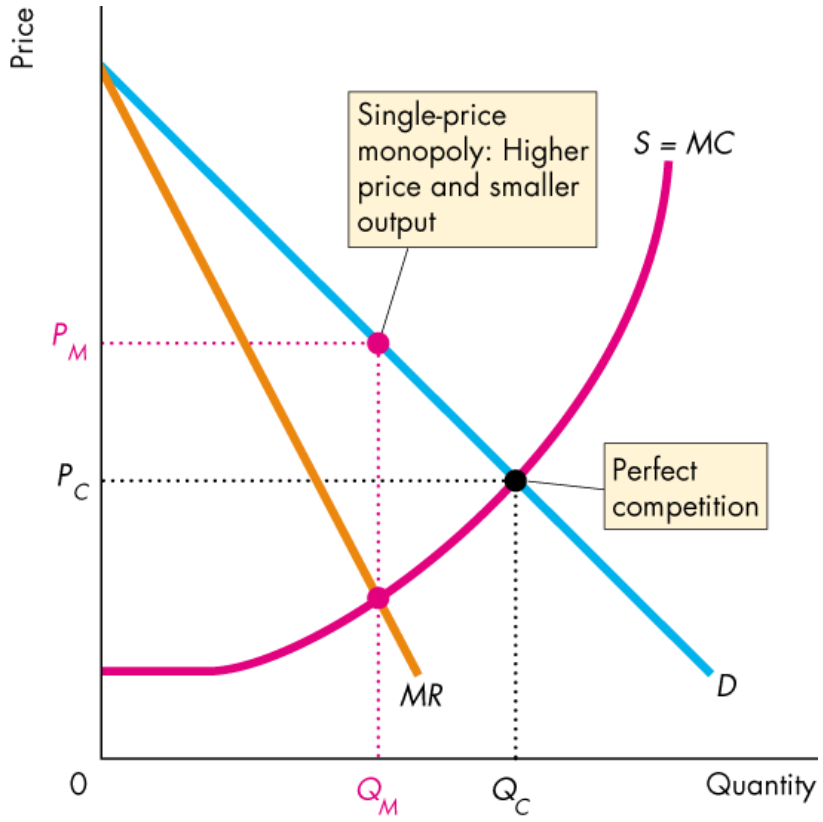


(b) Demand and marginal revenue and cost curves

- The bottom figure shows that marginal cost equals marginal revenue at 3 haircuts an hour.
- Economic profit is $12 an hour.
- This figure also shows how a monopoly sets its price.
- Find the profit-maximizing output at the intersection of the marginal cost and marginal revenue curves and the price comes from the demand curve.
- Here, the price is $14 a haircut.

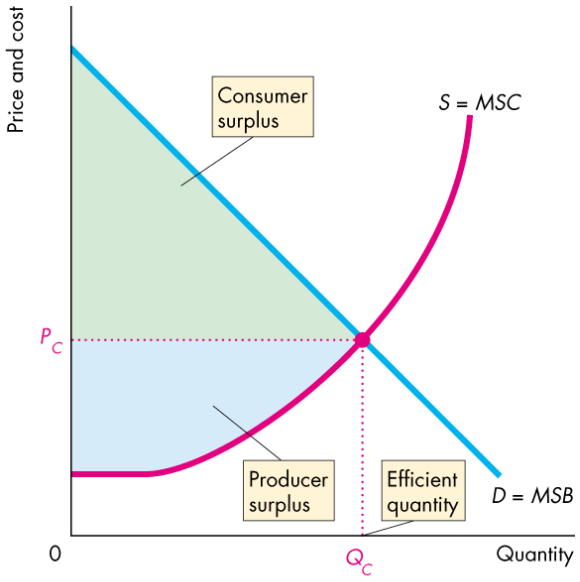
Single-Price Monopoly and Competition Compared

- Does a monopoly produce the same quantity and charge the same price as firms in perfect competition?
- Let's look at an example.
- The firms in a perfect competitive industry are bought up by a single firm – a monopoly.
- What happens to price and quantity?
- Begin with a perfectly competitive industry.

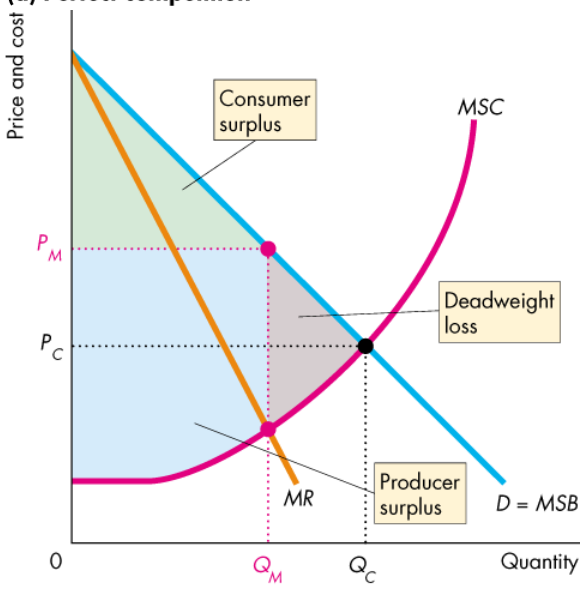


- The demand curve is *D* and the supply curve is *S* = *MC*.
- The industry produces the quantity Q_C and sells it for price P_C.
- Now the industry becomes a monopoly.
- The supply curve of the competitive industry becomes the marginal cost curve of the monopoly.
- The demand curve of the competitive industry becomes the monopoly's demand curve.
- The monopoly also faces the marginal revenue curve *MR*.
- The monopoly maximizes profit by producing the quantity Q_M, which it sells for the price of P_M.
- Compared to the perfectly competitive firms, a single-price monopoly restricts output and charges a higher price.

- The top figure shows the consumer surplus and producer surplus that is received in a perfectly competitive industry.



(a) Perfect competition



(b) Monopoly

- At the competitive equilibrium, marginal social benefit equals marginal social cost and the sum of consumer surplus and producer surplus is maximized.
- Resource use is efficient.
- Now let's see what happens to these surpluses when a monopoly takes over the industry in the bottom figure.
- The monopoly restricts output to Q_M and sells that output for P_M.
- Consumer surplus decreases to the smaller green triangle.
- Consumers lose partly by having to pay more for the good and partly by getting less of it.
- Part of the original producer surplus is also lost.
- The total loss resulting from the smaller monopoly output is the grey area, part of which is the loss of consumer surplus and part of which is the loss of producer surplus.
- The loss is deadweight loss.
- The monopoly takes the darker blue rectangle.
- Monopoly creates a deadweight loss and is inefficient.

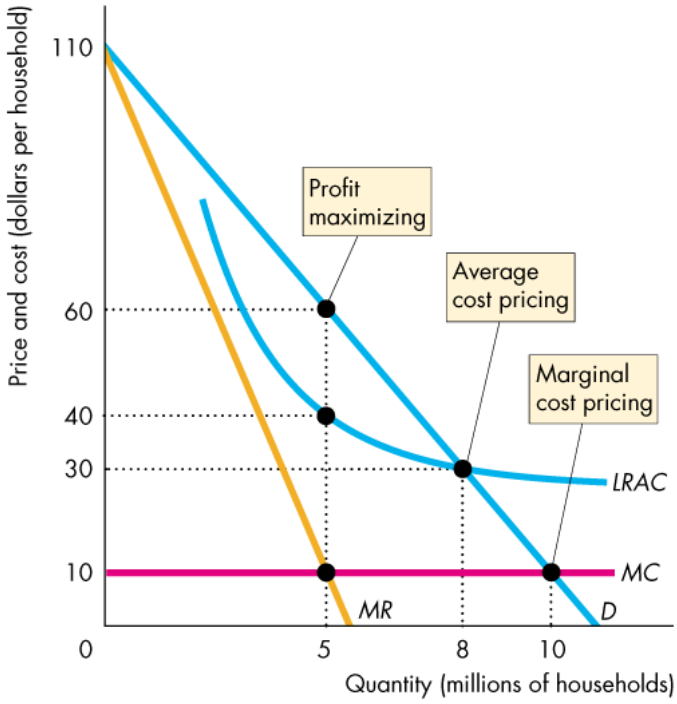
- But the social cost of monopoly exceeds the deadweight loss because of rent seeking.
- Any surplus—consumer surplus, producer surplus, or economic profit—is called **economic rent**.
- **Rent seeking** is the pursuit of wealth by capturing economic rent.
- Rent seekers pursue their goals by buying a monopoly or creating a monopoly.

Price Discrimination

- Price discrimination is charging different prices for a single good or service because of differences in buyers' willingness to pay and not because of differences in production costs.
- Examples of price discrimination:
    - Children and students pay a lower price than other people to see a movie.
    - Magazine subscribers pay a lower price than buyers at a newsstand.
    - Vacation travelers pay lower airfares than business travelers.
- Not all price differences are examples of price discrimination.
- If differences in cost lead to differences in price, there is no price discrimination.
- An example of a price difference that is not price discrimination is an electric power company that charges customers a higher price between 7:00 am and 9:00 am than between midnight and 7:00 am. The reason: peak-time power costs more to generate.
- Price discrimination is profitable.
- For a single price monopoly, total revenue equals price multiplied by the quantity sold.
- For example, Bobbie sells 3 haircuts an hour for $14 each and her total revenue is $42 an hour.
- But suppose Bobbie can sell 2 haircuts an hour for $16 and 1 an hour for $14.
- Her total revenue now increases to $46 an hour.
- Now suppose she can sell 1 haircut an hour for $18, one for $16, and one for $14.
- Her total revenue increases again to $48 an hour.
- The greater the degree of price discrimination, the greater is the total revenue.
- Price discrimination captures consumer surplus and converts it into economic profit.
- This idea is the essence of successful marketing.
- The greater the degree of price discrimination, the smaller is consumer surplus.
- **Perfect price discrimination** extracts the entire consumer surplus.
- With perfect price discrimination, the market demand curve becomes the marginal revenue curve.

Monopoly Regulation

- When demand and cost conditions create a natural monopoly, a government agency can step in to regulate the prices of the monopoly.
- The figure below shows a natural monopoly.



- With no regulation, a natural monopoly cable TV firm serves 5 million households and the price is $60 a household.
- A **marginal cost pricing rule** sets price equal to marginal cost.
- With a marginal cost pricing rule, the figure shows that the monopoly serves 10 million households and the price is $10 a household.
- The marginal cost pricing rule is efficient, but it leaves the natural monopoly incurring an economic loss.
- The monopoly may cover its costs by using price discrimination or by charging a two-part tariff.
- Another regulation is an average cost pricing rule.
- An **average cost pricing rule** sets price equal to average total cost.
- With an average cost pricing rule, the figure shows that the monopoly serves 8 million households and the price is $30 a household.
- The monopoly earns normal profit.
- The outcome is inefficient but less so than the unregulated profit-maximizing outcome.
- Implementing average cost pricing is difficult because it is not possible to be sure what a firm's costs are.
- To overcome this difficulty, regulators use **rate of return regulation** and **price cap regulation**.
- Study Figure 13.12 on p. 315 of your textbook to see the implementation of price cap regulation.

Chapter 14

Monopolistic Competition

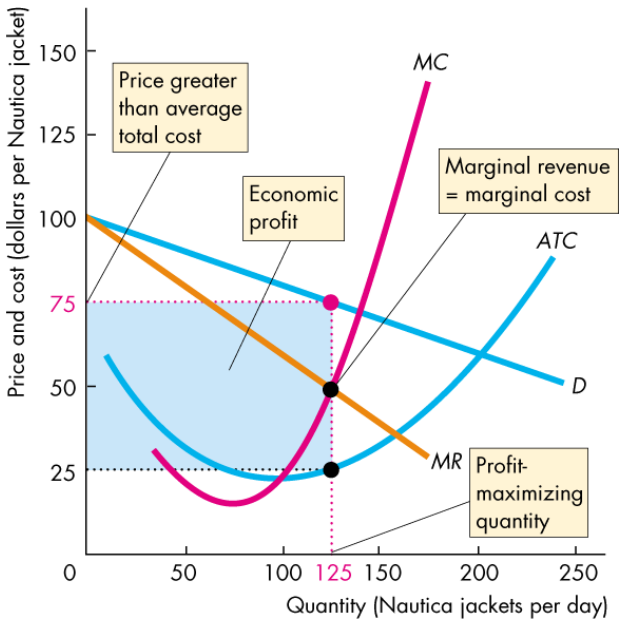
What is Monopolistic Competition?

- **Monopolistic competition** is a market structure in which:
  - A large number of firms compete.
  - Each firm produces a differentiated product.
  - Firms compete on product quality, price, and marketing.
  - Firms are free to enter and exit.
- A firm practices **product differentiation** if it makes a product that is slightly different from the products of competing firms.

Price and Output in Monopolistic Competition

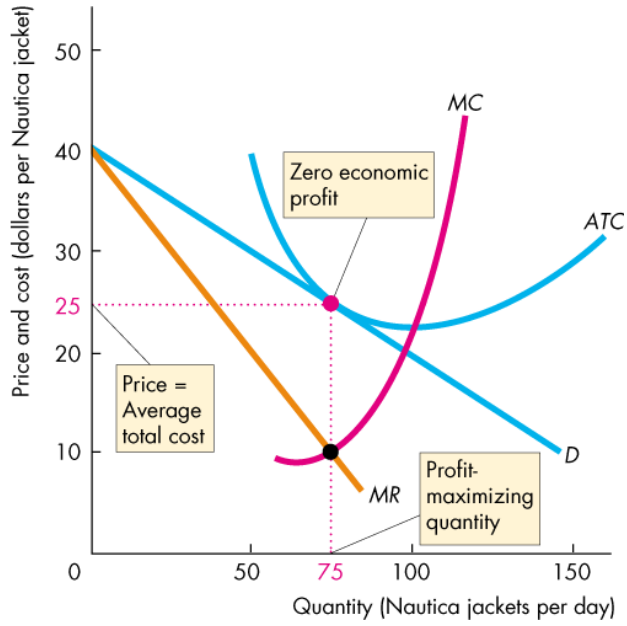
- A firm in monopolistic competition maximizes profit by producing the quantity at which marginal revenue equals marginal cost and charging the highest price the market will bear, just like a monopoly.
- In the figure, the demand curve is *D*.

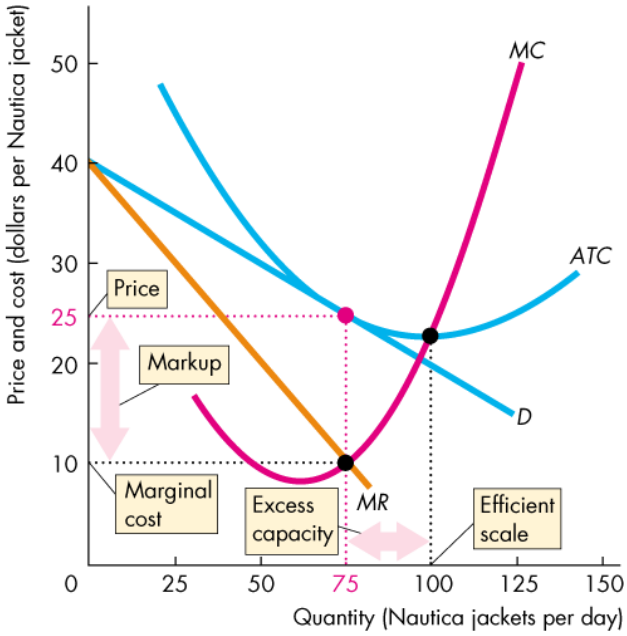
- The firm's marginal revenue curve is *MR*.
- It is derived in exactly the same way as that of a monopolist.
- The firm's average total cost curve is *ATC* and its marginal cost curve is *MC*.
- The firm maximizes profit by producing 125 jackets and selling them at a price of $75.
- This outcome looks like a monopoly.
- But unlike monopoly, in monopolistic competition, there are no barriers to entry.



- And just like the case of perfect competition, entry is triggered by the presence of economic profit.
- And exit is triggered by economic loss.
- Because in the situation shown here, the firm earns an economic profit, entry occurs.
- Entry decreases the demand facing this firm.

- The firm's demand curve and marginal revenue curve shift leftward.
- As demand decreases, the firm decreases production and lowers its prices.
- Entry continues until economic profit is eliminated.
- In monopolistic competition, marginal benefit exceeds marginal cost and production is less than its efficient level.
- In the long run, the monopolistically competitive industry produces an output at which price equals average total cost but exceeds marginal cost.
- This means that firms in monopolistic competition always have excess capacity in long-run equilibrium.
- The figure shows a firm's excess capacity.

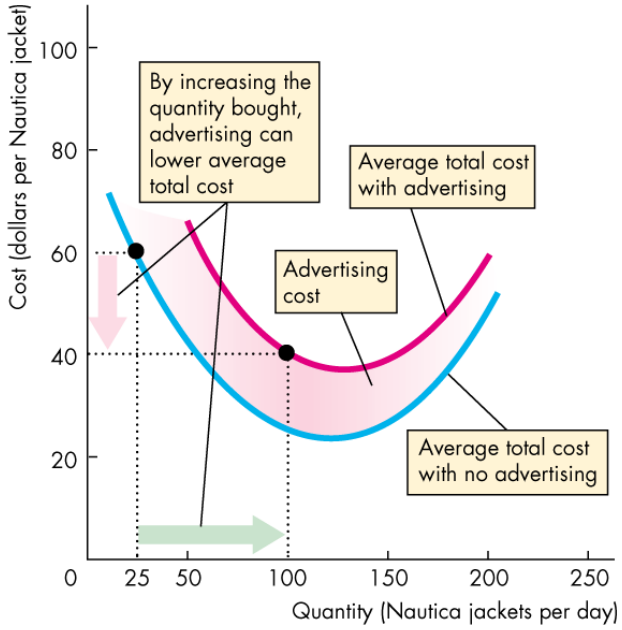




(a) Monopolistic competition

Product Development and Marketing

- Monopolistic competition induces product innovation, which consumers also value.
- These gains of monopolistic competition must be set against the deadweight loss it generates.
- Another aspect of monopolistic competition is large selling costs.
- Selling costs that inform and create information that has value are not a waste.
- If the marginal value of information equals the marginal cost, the efficient quantity of resources is used in selling.
- But selling costs that simply seek to persuade people to switch from one brand to another are a social waste.
- These costs are another source of inefficiency of monopolistic competition (measured against the perfect competition benchmark).
- The figure below shows selling costs and total cost of a monopolistically competitive firm.



- Selling costs are fixed costs, which increase average total cost.
- Selling costs increase average total cost by a greater amount at small outputs than at large outputs.
- In the figure, if advertising can increase sales from 25 jackets a day to 100 jackets a day, then average total cost falls from $60 a jacket to $40 a jacket.

Chapter 15
Oligopoly

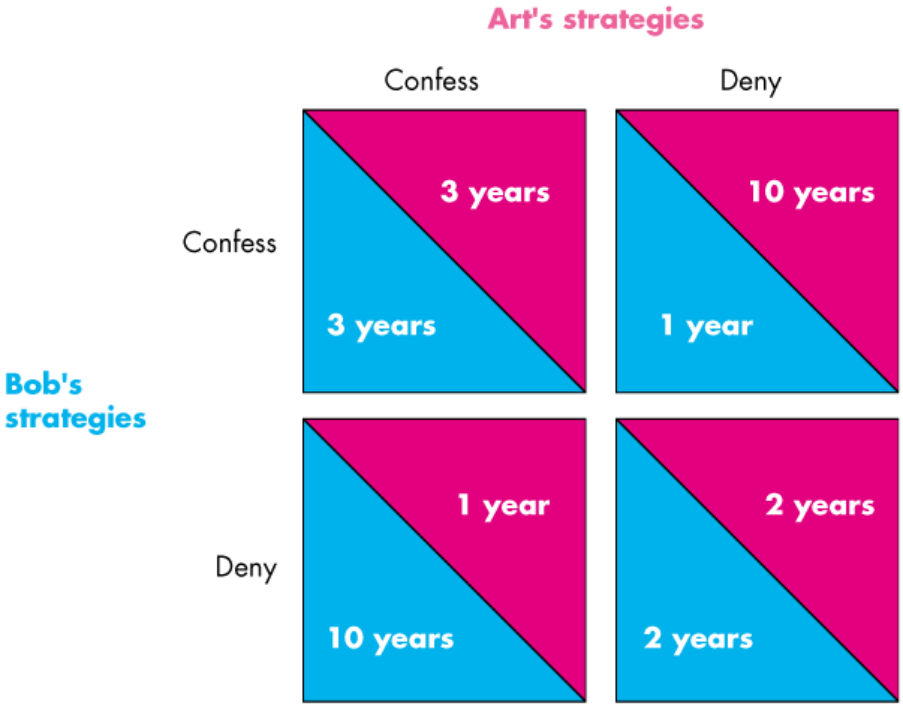
What is Oligopoly?

- **Oligopoly** is a market structure in which natural or legal barriers prevent the entry of new firms, and a small number of firms compete.
- Examples: beer, breakfast cereals, automobiles, long-distance telephone calls, airplanes, database software.
- The oligopoly problem is that the demand curve facing one oligopolist depends on actions of each other oligopolist.
- The oligopolist reasons as follows:
    - The quantity that I produce will influence the market price.
    - So I must restrict my output – just like a monopolist does – to make maximum profit.
    - But if I restrict my output, I will make an economic profit.
    - Other firms could increase their profits by producing more. And I have an incentive to produce more as well.
    - But if we all increase output, we'll all spoil the market for each other.
    - Price will fall and so will profits.
- So oligopolists must solve the following problem:
    - Each firm must try to find a way to balance off the desire for monopoly profit against the incentive to spoil the market for itself and the other firms.

Oligopoly Games

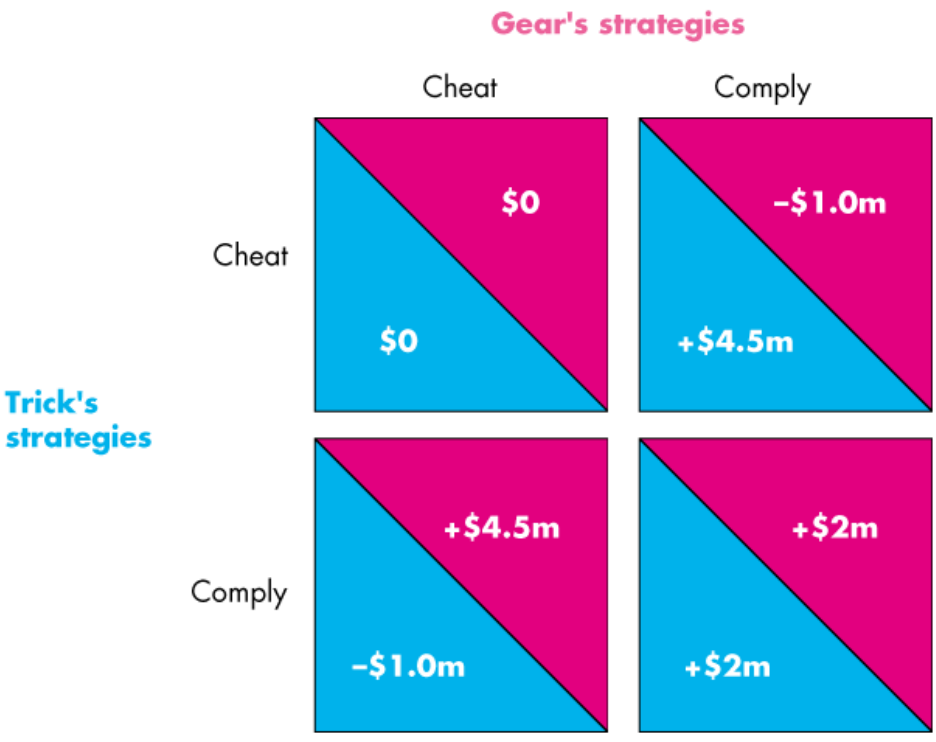
- **Game theory** is a tool for studying *strategic behaviour* – behaviour that takes into account the expected behaviour of others and the recognition of mutual interdependence.
- All games have four features:
    - Rules
    - Strategies
    - Payoffs
    - Outcomes
- The Story of the Prisoners' Dilemma:
    - Art and Bob are caught stealing a car for which the prison term is 2 years.
    - The Crown attorney suspects they have robbed a bank.
    - With no evidence, the prosecutor accuses them of a bank robbery for which the prison term is 10 years.
- The prosecutor isolates Art and Bob and offers each a deal:
    - Confess to the greater crime and your accomplice will get a 10 year prison term and you will get 1 year.
    - If you both confess, you will both serve a reduced sentence of 3 years.

- In game theory, **strategies** are all the possible actions of each player.
- Art and Bob have two possible actions:
    - Confess to the bank robbery.
    - Deny having committed the bank robbery.
- Because there are two players, each with two strategies, there are four possible outcomes:
    - Neither confesses.
    - Both confess.
    - Art confesses and Bob does not.
    - Bob confesses and Art does not.
- A **payoff matrix** is a table that shows the payoffs for every possible action by each player for every possible action by each other player.
- The table shows the payoff matrix for Art and Bob.



- The decision: take best possible action given the action of the other player.
- This is what is known as **Nash equilibrium**.
- Whatever the other player is doing, the best action is to confess.
- This is true for both players.
- This outcome is worse for both players than if they both deny.
- We can use game theory to study the behaviour of firms in oligopoly.
- We're going to study a special case of oligopoly called duopoly.
- **Duopoly** is a market structure in which there are only two producers who compete.
- Trick and Gear are two firms that between themselves can produce enough to supply the entire market.

- Trick and Gear form a natural duopoly.
- A **collusive agreement** is an agreement between two (or more) producers to restrict output, raise the price, and increase profits.
- A **cartel** is a group of firms that has entered into a collusive agreement to restrict output and increase prices and profits.
- Strategies for a firm in a cartel:
    - Comply with agreement
    - Cheat on agreement
- The duopoly game will have one of four possible outcomes:
    - Both firms comply.
    - Trick complies and Gear cheats.
    - Gear complies and Trick cheats.
    - Both firms cheat.
- Read pp. 347-349 in your textbook to find out how the payoffs for the four possible outcomes are determined.
- The four possible outcomes are:
    - Both comply and make an economic profit of $2 million a week each.
    - One cheats and makes an economic profit of $4.5 million a week while the other complies and incurs an economic loss of $1 million a week.
    - Both cheat and make zero economic profit.



- The Nash equilibrium is to cheat on the cartel agreement.

Repeated Games and Sequential Games

- If two firms play a game repeatedly, one firm has the opportunity to penalize the other for previous "bad" behaviour.
- There is more than one possible equilibrium for this type of game.
- A **cooperative equilibrium** is an equilibrium in which the players make and share the monopoly profit.
- A cooperative equilibrium might occur if cheating is punished.
- Punishment strategies are:
    - Trigger strategy
    - Tit-for-tat strategy
- A *tit-for-tat strategy* is one in which a player cooperates in the current period if the other player cooperated in the previous period but cheats in the current period if the other player cheated in the previous period.
- A *trigger strategy* is one in which a player cooperates if the other player cooperates but cheats forever thereafter if the other player cheats once.
- Study pp. 354-355 to analyze a sequential entry game in a contestable market.
- A **contestable market** is a market in which firms can enter and leave so easily that firms in the market face competition from *potential* entrants.

Anti-Combine Law

- Canada's anti-combine law dates from 1889.
- Canada's anti-combine law today is defined in the competition Act of 1986.
- The Competition Act distinguishes between practices that are criminal and noncriminal.
- Conspiracy to fix prices, bid-rigging, other anti-competitive price-fixing actions, and false advertising are criminal offences.
- Mergers, abuse of a dominant market position, refusal to deal, and other actions designed to limit competition such as exclusive dealing are noncriminal offences.

Chapter 16

Externalities

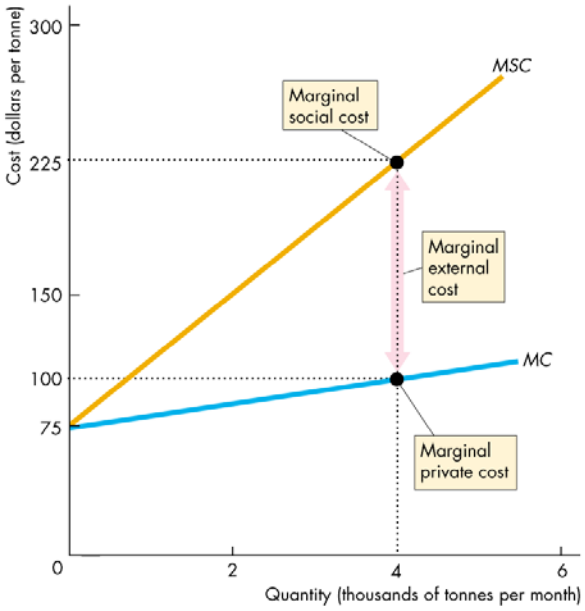
Externalities in Our Lives

- A cost or a benefit that arises from production and falls on someone other than the producer or a cost or benefit that arises from consumption and falls on someone other than the consumer is called an **externality**.
- An externality can arise from either production or consumption and it can be either a **negative externality**, which imposes an external cost, or a **positive externality**, which provides an external benefit.

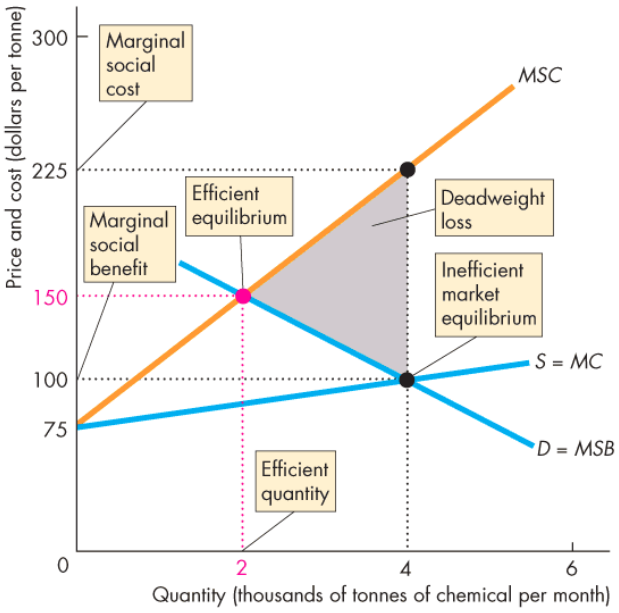
Negative Externality: Pollution

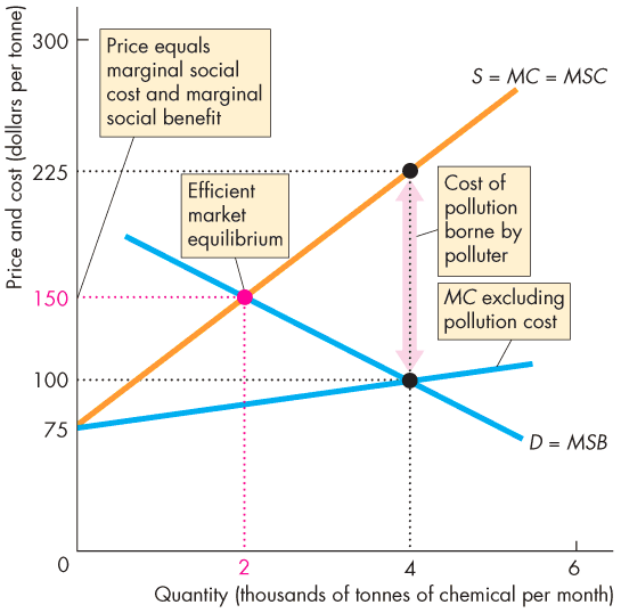
- A *private cost* of production is a cost that is borne by the producer of a good or service.
- *Marginal cost* is the cost of producing an *additional unit* of a good or service.
- **Marginal private cost** is the cost of producing an additional unit of a good or service that is borne by the producer of that good or service.
- An *external cost* is a cost of producing a good or service that is not borne by the producer but borne by other people.
- A **marginal external cost** is the cost of producing an additional unit of a good or service that falls on people other than the producer.
- **Marginal social cost** is the marginal cost incurred by the entire society – by the producer and by everyone else on whom the cost falls – and is the sum of marginal private cost and marginal external cost.

- The figure shows an example of the relationship between output and cost in a chemical industry that pollutes a waterway.
- Homeowners live along the waterway.
- When the quantity of chemicals produced increases, the amount of pollution increases and the external cost of pollution increases.
- When an industry is unregulated, the amount of pollution it creates depends on the market equilibrium price and the quantity of the good produced.



- In the figure, the demand curve *D* also measures the marginal social benefit, *MSB*, to the buyers of the chemical.
- The supply curve *S* also measures the marginal private cost, *MC*, of the producers.
- Market equilibrium at a price of $100 a tonne and 4,000 tonnes a month is inefficient because marginal social cost exceeds marginal benefit.
- **Property rights** are legally established titles to the ownership, use, and disposal of factors of production and goods and services that are enforceable in the courts.
- The bottom figure shows that with property rights, the marginal cost curve that excludes pollution cost shows only part of the producers' marginal cost.
- The marginal private cost curve includes the cost of pollution, so the supply curve is *S* = *MC* = *MSC*.
- Market equilibrium is at a price of $150 a tonne and a quantity of 2,000 tonnes a month and is efficient because marginal social cost equals marginal benefit.
- The **Coase theorem** is the proposition that if property rights exist, if only a small number of parties is involved, and if transactions costs are low, then private transactions are efficient.

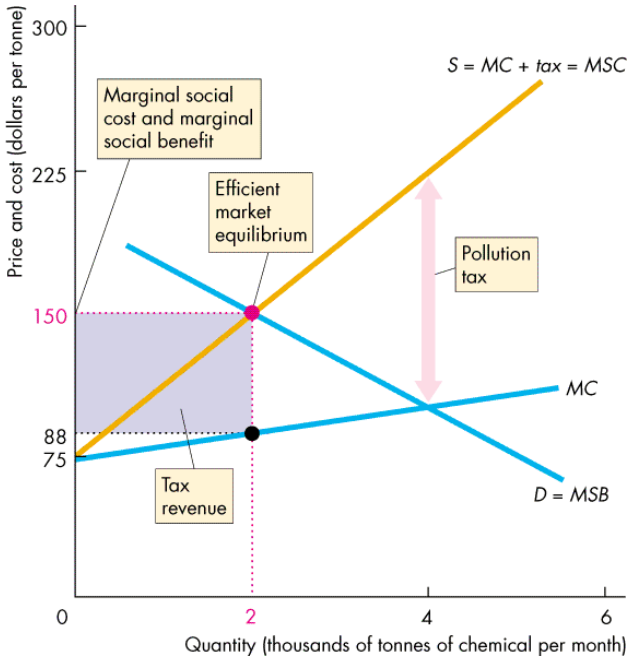




- In the figure above, the factories own the river and the homes along the waterway.
- According to the Coase theorem, it does not matter if the factories own the river and the homes or the residents own the river and the homes.
- In both cases, the factories bear the cost of their pollution and dump the efficient amount of waste into the river.
- The Coase solution works only when transactions costs are low.
- **Transactions costs** are the opportunity costs of conducting a transaction.
- The three main methods that governments use to cope with externalities are taxes, emission charges, and cap-and-trade.

- Taxes that are used as an incentive for producers to cut back on activity that creates an external cost are **Pigovian taxes**.
- The figure shows that by setting the tax rate equal to the marginal external cost, firms can be made to behave in the same way as they would if they bore the cost of the externality directly.

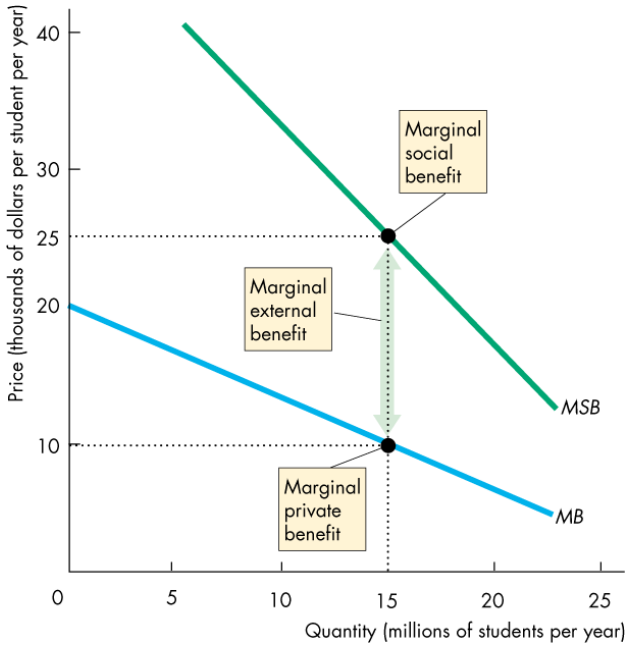
- When the pollution tax is imposed, the supply curve becomes the marginal private cost curve plus the tax, *S* = *MC* + *tax* = *MSC*.
- Market equilibrium is at a price of $150 a tonne and a quantity of 2,000 tonnes a month and is efficient because marginal social cost equals marginal benefit.
- Study pp. 378-379 for a description of emission charges and cap-and-trade.



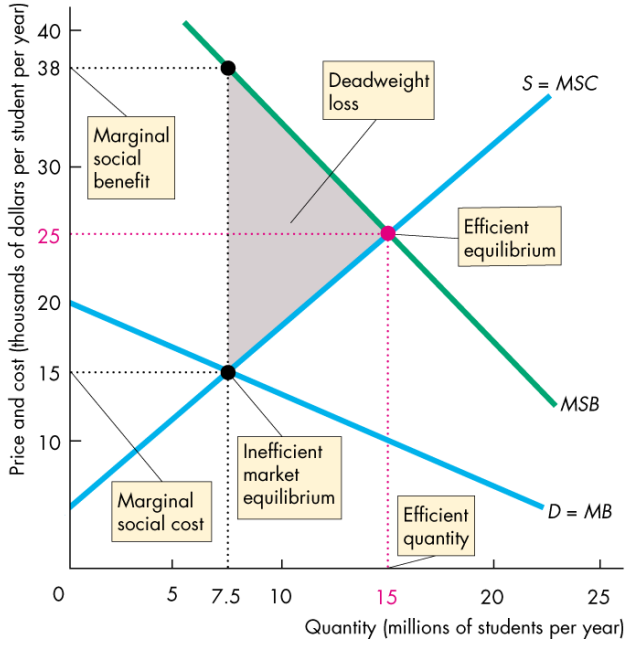
Positive Externality: Knowledge

- Knowledge – both what is known and how many people know it – brings external benefits.
- The stock of knowledge is expanded by research.
- The number of people who know what is known is expanded by education.
- To get the efficient quantities of research and education, we must bring marginal social benefit to equality with marginal social cost.
- A *private benefit* is a benefit that the consumer of a good or service receives.
- *Marginal benefit* is the benefit from an *additional unit* of a good service.
- **Marginal private benefit** is the benefit from an additional unit of a good or service that the consumer of that good or service receives.
- A **marginal external benefit** is the benefit from an additional unit of a good or service that people other than the consumer enjoy.
- **Marginal social benefit** is the marginal benefit enjoyed by society – by the consumer of the good or service (marginal private benefit) plus the marginal benefit enjoyed by others (marginal social benefit).

- The figure below shows an example of the relationship between marginal private benefit, marginal external benefit, and marginal social benefit.

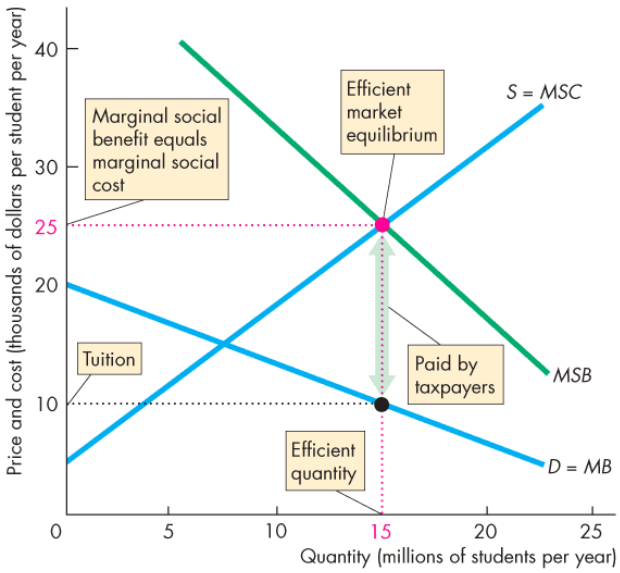


- The figure below shows that underproduction would result if the government left education to the private market.



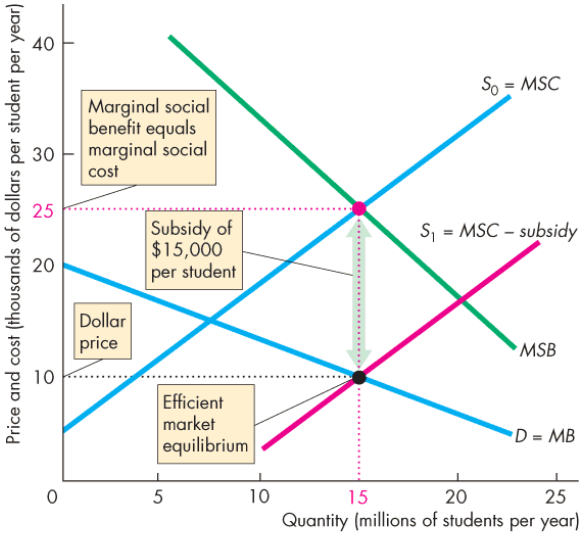
- The supply curve is the marginal cost of the private schools, *S* = *MSC*.
- The demand curve is the marginal private benefit curve, *D* = *MB*.
- Market equilibrium occurs at a tuition of $15,000 per student per year and 7.5 million students per year.

- The efficient number is 15 million, where marginal social benefit equals marginal social cost.
- Four devices that governments can use to achieve a more efficient allocation of resources in the presence of external benefits are public provision, private subsidies, vouchers, and patents and copyrights.
- Under **public provision**, a public authority that receives its revenue from the government produces the good or services.
- The figure below shows that marginal social benefit equals marginal social cost with 15 million students.
- When tuition is set at $10,000 and the taxpayers cover the other $15,000 marginal cost per student, the outcome is efficient.



(a) Public production

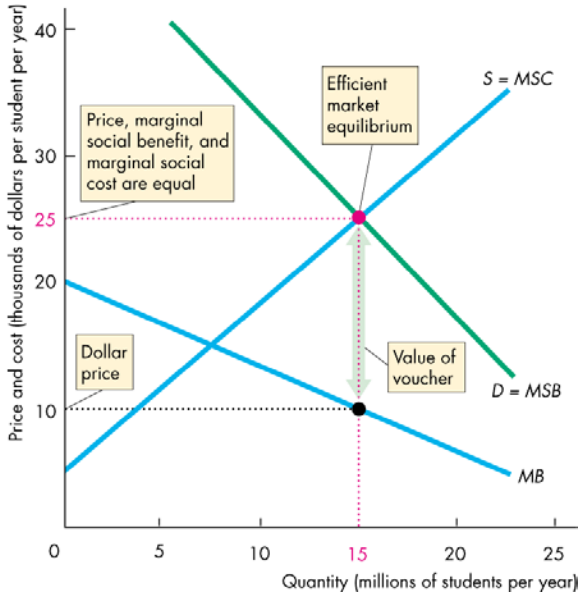
- A **subsidy** is a payment that the government makes to private producers.



(b) Private subsidy

- The figure shows that with a subsidy of $15,000 per student, the supply curve is *S* = *MSC* – *subsidy*.
- The equilibrium price is $10,000, and the market equilibrium is efficient with 15 million students enrolled.

- The figure shows that with a subsidy of $15,000 per student, the supply curve is *S* = *MSC* – *subsidy*.
- The equilibrium price is $10,000, and the market equilibrium is efficient with 15 million students enrolled.
- A **voucher** is a payment that the government makes to private producers.
- By making the subsidy depend on the level of output, the government can induce private decision makers to consider external benefits when they make their choices.
- In the figure below, with vouchers, buyers are willing to pay *MB* plus the value of the voucher.



- The demand curve becomes the marginal social benefit curve, *D* = *MSB*.
- Market equilibrium is efficient with 15 million students enrolled because price, marginal social benefit, and marginal cost are equal.
- Because knowledge is productive and generates external benefits, it is necessary to use public policies to ensure that those who develop new ideas have incentives to encourage an efficient level of effort.
- The main way of providing the right incentives uses the central idea of the Coase theorem and assigns property rights – called **intellectual property rights** – to creators.
- The legal device for establishing intellectual property rights is the patent or copyright.
- A **patent** or **copyright** is a government-sanctioned exclusive right granted to the inventor of a good, service, or productive process to produce, use, and sell the invention for a given number of years.

Chapter 18

Markets for Factors of Production

The Anatomy of Factor Markets

- The four factors of production are labour, capital, land (natural resources) and entrepreneurship.

The Demand for a Factor of Production

- The demand for a factor of production is a **derived demand**.
- Firms hire the quantities of factors of production that maximize their profit.
- To achieve this objective, they hire an additional unit of a factor of production if the additional revenue brought in exceeds the additional cost.
- The revenue brought in by one additional unit of a factor of production is the **value of marginal product** of that factor.
- The cost of hiring an additional unit of a factor of production is the factor price.
- The price of a unit of labour is the wage rate.
- To calculate the value of marginal product of a factor (say labour), we need to know the change in total product that results from a one-unit increase in the quantity of labour employed, (the marginal product), and the extra revenue that this output produces, (the price).

TABLE 18.1 Value of Marginal Product at Angelo's Bakery

	Quantity of labour (*L*) (workers)	Total product (*TP*) (loaves per hour)	Marginal product ($MP = \Delta TP/\Delta L$) (loaves per worker)	Value of marginal product ($VMP = MP \times P$) (dollars per worker)
A	0	0		
			7	14
B	1	7		
			6	**12**
C	**2**	13		
			5	10
D	3	18		
			4	8
E	4	22		
			3	6
F	5	25		

- The table above calculates value of marginal product at Angelo's Bakery.
- The bakery market is perfectly competitive and the market price of a loaf is $2.
- The value of marginal product is equal to marginal revenue multiplied by price.

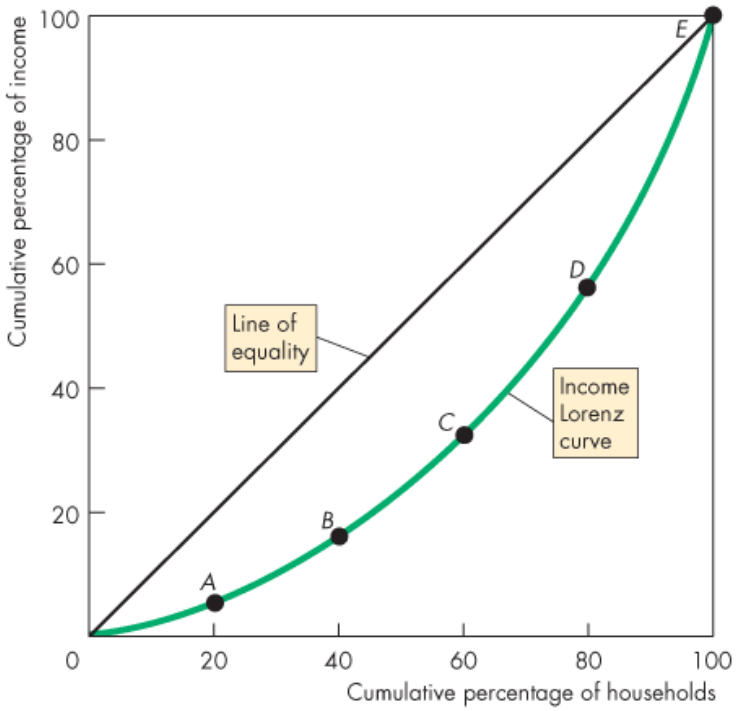
- The firm's demand for labour curve is its value of marginal product curve.
- By changing the label of the *y*-axis, to the wage rate, the value of marginal product curve becomes the demand curve.
- A firm hires the profit-maximizing quantity of labour.
- If the wage rate is less than value of marginal product, the firm can increase its profit by employing one more worker.
- If the wage rate is greater than the value of marginal product, the firm can increase its profit by employing one fewer worker.
- But if the wage rate equals value of marginal product, then the firm cannot increase its profit by changing the number of workers it employs.

Chapter 19

Economic Inequality

Measuring Economic Inequality

- **Market income** equals the wages, interest, rent, and profit earned in factor markets before paying income taxes.
- **Total income** equals market income plus cash payments to households by governments.
- **After-tax income** equals total income minus tax payments by households to governments.
- The income **Lorenz curve** graphs the cumulative percentage of income against the cumulative percentage of households.

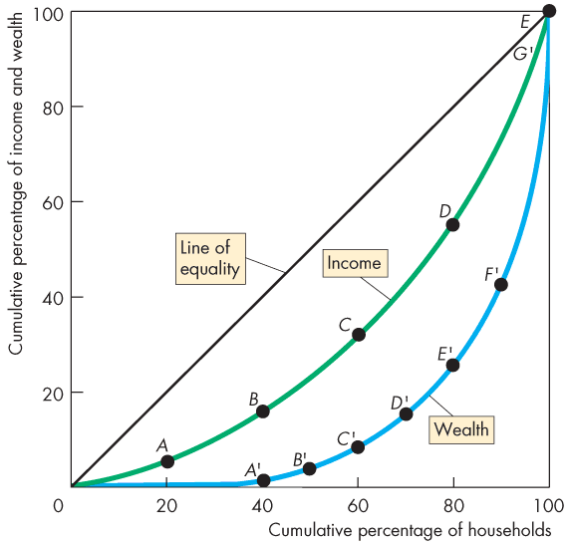


		Households		Income	
		Percentage	Cumulative percentage	Percentage	Cumulative percentage
A	Lowest 20	20	20	4.9	4.9
B	Second 20	20	40	10.6	15.5
C	Third 20	20	60	16.3	31.8
D	Fourth 20	20	80	24.0	55.8
E	Highest 20	20	100	44.2	100.0

- The table shows the shows the percentage of income in each quintile group and the cumulative percentage of households and income.

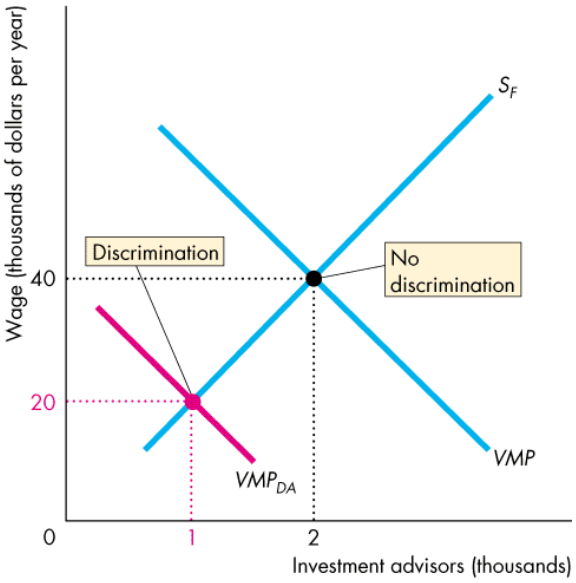
- The Lorenz curve graphs the cumulative income shares against the cumulative household percentages.
- In this graph, the line of equality is the straight line running from zero to 100 percent.
- Point *A* tells us that the 20 percent of the population with the lowest incomes earn 4.9 percent of total income.
- Point *B* tells us that the 40 percent of the population with the lowest incomes earn 15.5 percent of the total income.
- Point *C* tells us that the 60 percent of the population with the lowest incomes earn 31.8 percent of total income.
- Point *D* tells us that the 80 percent of the population with the lowest incomes earns 55.8 percent of total income.
- And by comparing point *D* and point *E*, we can see that the richest 20 percent of the population earn 44.2 percent of total income.

- The figure on the right includes the Lorenz curve for wealth with the Lorenz curve for income.
- Wealth is much more unequally distributed than income.
- If wealth and income are measured in a consistent way, they both have the same distribution.



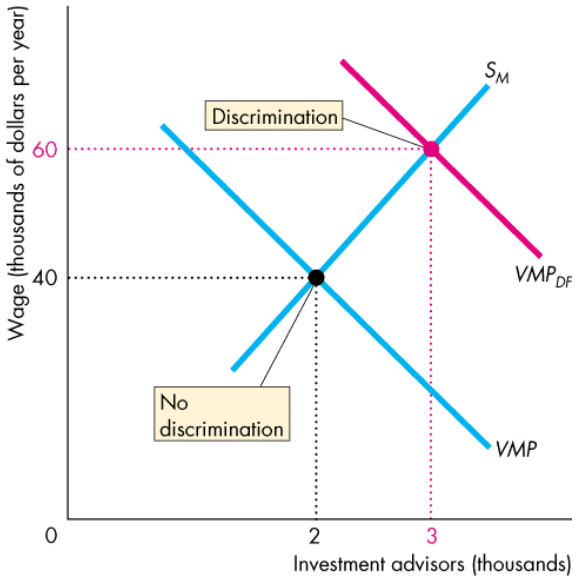
- **Poverty** is a state in which a family's income is too low to be able to buy the quantities of food, shelter, and clothing that are deemed necessary.
- In Canada, poverty is measured in terms of a low-income cutoff.
- The **low-income cutoff** is the income level, determined separately for different types of families, that is selected such that families with incomes below that limit normally spend 63.6 percent or more of their income on food, shelter, and clothing.
- Source of income, household type, age of householder, number of children, education, and labour force status are the most important factors influencing incidence of low income.

The Sources of Economic Inequality



(a) Females

- The top figure shows how discrimination can change the wage rate.
- With no discrimination, the wage rate is $40,000 a year and 2,000 women are hired and 2,000 men are hired.
- In the top figure, if women are discriminated against, the value of marginal product curve is VMP_{DA}, the wage rate falls to $20,000 a year, and 1,000 women are hired.



(b) Males

- In the bottom figure, the value of marginal product curve for men is VMP_{DF}, the wage rate rises to $60,000, and 3,000 men are hired.

- Economists disagree about whether prejudice actually causes wage differentials.
- The price difference can act as an incentive to encourage people who are prejudiced to buy from the people against whom they are prejudiced.
- The force could be strong enough to eliminate the effects of discrimination altogether.

Income Redistribution

- Government redistributes income in three ways:
    - Income taxes
    - Income maintenance programs
    - Subsidized services
- Income taxes may be progressive, regressive, or proportional.
- A **progressive income tax** is one that taxes income at an average rate that increases with the level of income.
- The **average tax rate** is the percentage of income paid in taxes.
- A **regressive income tax** is one that taxes income at an average rate that decreases with the level of income.
- A **proportional income tax** is one that taxes income at a constant rate, regardless of the level of income.
- There are three main types of income maintenance programs:
    - Social security programs
    - Employment insurance program
    - Welfare programs
- The two major subsidized services are:
    - Education
    - Health care
- The redistribution of income creates the **big tradeoff**, which is a tradeoff between equity and efficiency.
- A dollar collected from a rich person does not translate into a dollar received by a poor person because some of the dollar collected is used up in the process of redistribution.
- A bigger cost arises from the inefficiency of taxes and benefits.
- Taxing people's income from their work and saving lowers the after-tax income they receive.
- This lower after-tax income makes them work and save less, which in turn results in smaller output and less consumption not only for the rich who pay the taxes but also for the poor who receive the benefits.