Managerial Economics

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Agenda

- Course objectives
- Course content
- Reference material
- Evaluative components
- Introduction to managerial economics

Course Objectives

- To examine the nature and scope of managerial economics
- To understand the reasons for the existence of firm, its environment and market forces of demand and supply
- To examine various economic forecasting techniques used by managers
- To analyze production, cost and profit maximization
- Understanding different markets and the behavior of the firm
- Formulating appropriate strategies for revenue and profit maximization

Course Content

- Introduction to Economics,
- Theory of the firm and Demand Analysis – I
- Demand Analysis – II and Elasticities
- Economic Forecasting
- Production function
- Production Analysis
- Cost of Production
- Profit and Revenue Maximization

Course Content

- Perfect Competition and Monopoly
- Monopolistic Competition
- Oligopoly Model
- Games, Information and Strategy
- Pricing and Profit Analysis
- Factor Market Analysis
- Employment and Unemployment in India
- Understanding macroeconomic aggregates and variables, Market Failure

Reference Material

T.B.: Truett & Truett, Managerial Economics, John Wiley & Sons, 8th edition, Singapore, 2004

R.B.: Samuelson & Nordhus, Economics, McGraw-Hill, 19th edition, 2017

Evaluation Components

- Quiz-1: 10%
- Quiz-2: 10%
- Simulation exercise: 15%
- Case Studies and Presentations: 25%
- Major exam: 40% (Open Book)

Introduction

Fundamental Questions

– What is managerial Economics?
– Why managerial Economics?
– What kind of issues does it deal with?
– How can it help us make better decisions in business?

Fundamental economic problems

- Three questions that managers face
  - What to produce
  - How to produce
  - How to distribute
- Scarcity of resources
- How does economics answer these questions?
- Market mechanism
- Central themes of managerial economics

Managerial economics

Definition

Managerial Economics: *the application of economic theory and methods to business decision-making.*

Business: Any situation where there is a transaction between two or more parties.

Relationship with economic theory

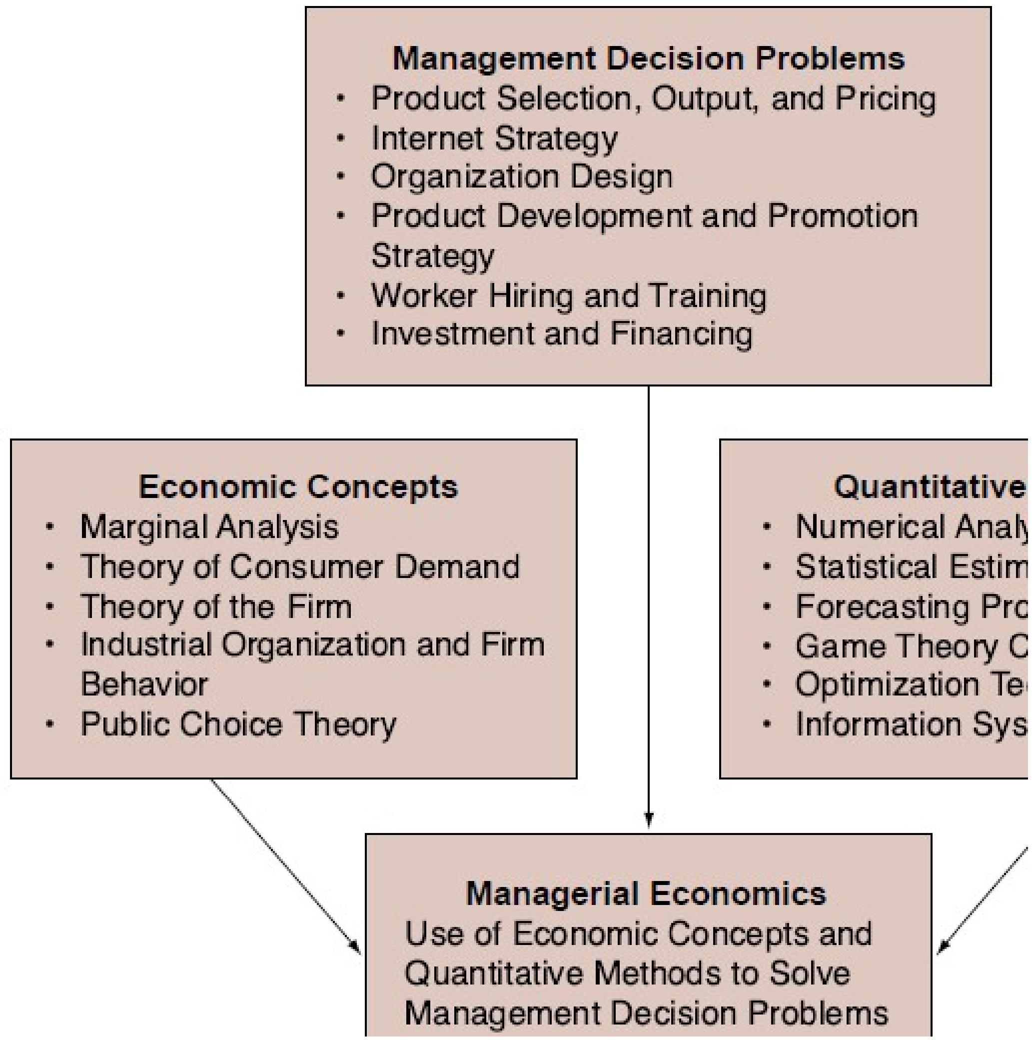
- Microeconomics
  - Theory of the firm
  - Theory of consumer behaviour (demand)
  - Production and cost theory (supply)
  - Price theory
  - Market structure and competition theory
- Macroeconomics
  - Aggregate variables such as GDP, GNP, Inflation, Unemployment etc.

Managerial Economics: How is it useful?

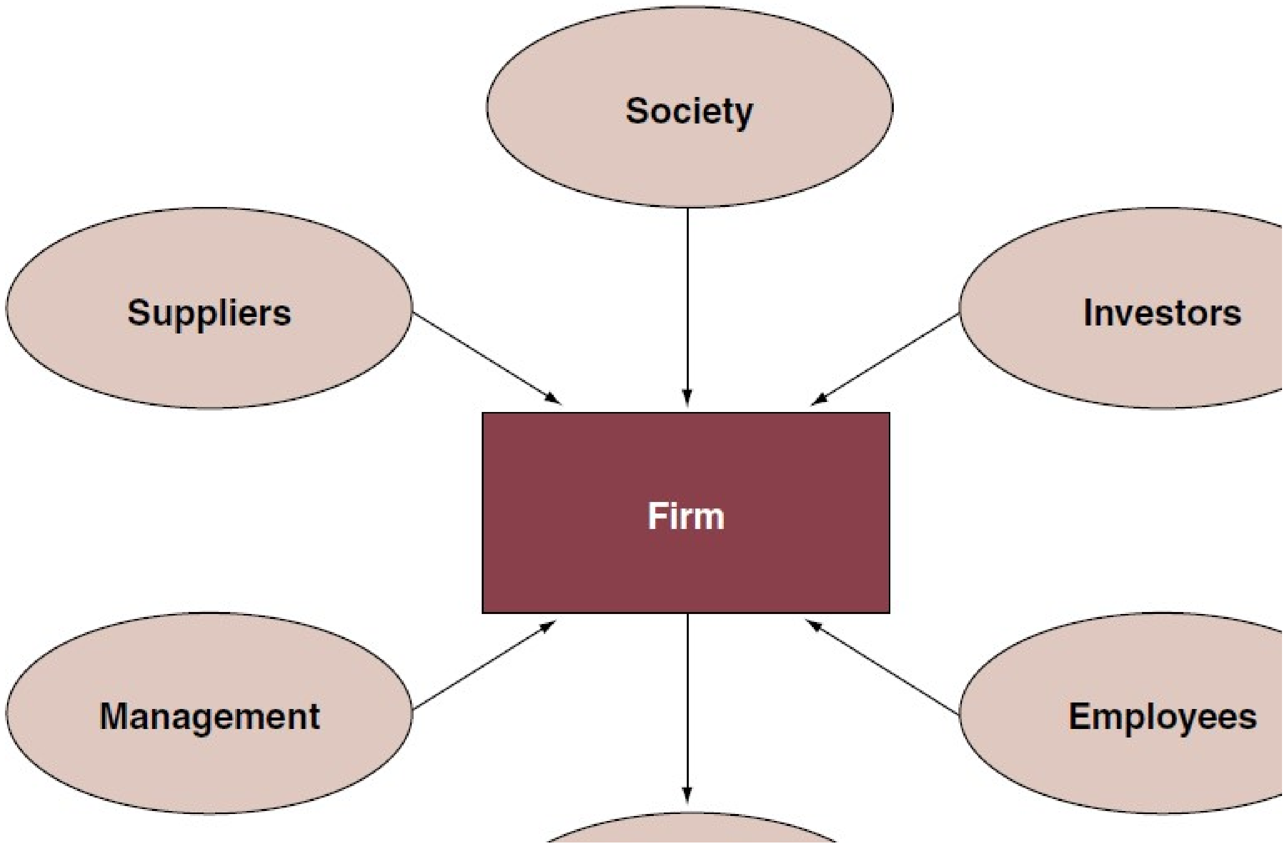
- It prescribes rules for improving managerial decisions
- It helps managers recognize how economic forces affect organizations
- It links economic concepts with quantitative methods to develop vital tools for managerial decision making

Managerial Economics:

A Tool for Improving Management Decision Making



The Corporation is a Legal Device



What is the best “choice”

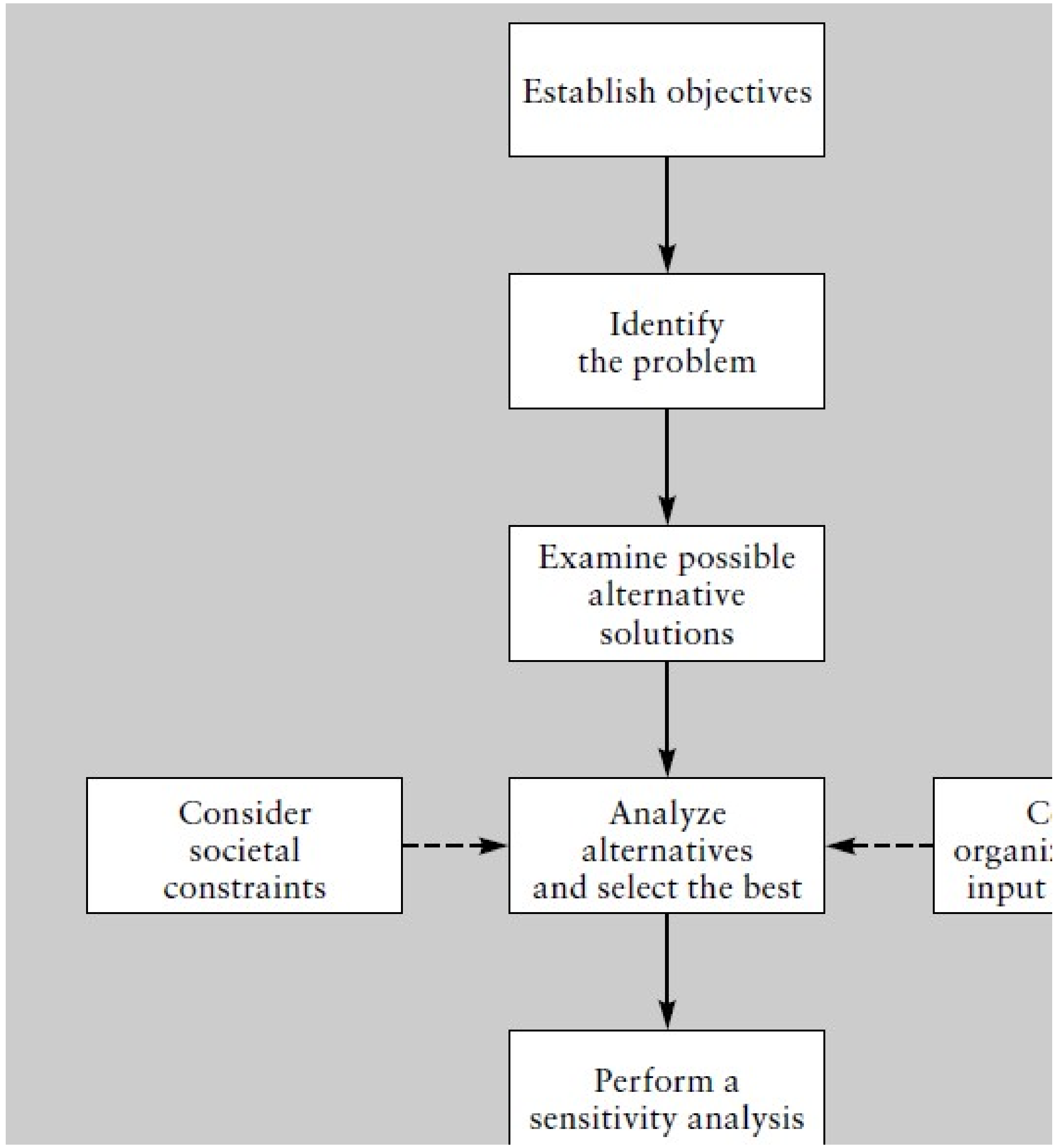
- Understand the economic environment in which it operates
  - The case of a grocery retailer
    - It describes the logic of this pricing practice with respect to the goal of profit maximization
  - Auto import quotas
    - It explains the predictable economic consequence of the action
- Consider alternatives

What is the best “choice”

- Make optimal choices to make maximize
  - Profit
  - Market share
  - Managerial interests
  - Government influence
  - National interests
  - Social and environmental benefits

Managerial Ethics

The Decision-Making Process



Case study 1: Import quotas on Japanese cars

- The United Auto Workers (UAW) and Ford Motor Company's petition in 2018 to the ITC
  - Relief from import competition
- 1.2 million passenger cars shipped to the United States during the first half of that year
  - 21% increase over the previous year
- American Motors
- Chrysler
- Ford Motor Company
- General motors
- The ITC rejected the appeal

Case study 1: Import quotas on Japanese cars (*cont..)*

- Reasons
  - The companies had failed to anticipate the changing demand
  - Price differences created by labour cost differences
- Two views
- Protection of Jobs-taxing imports
  - Justified because costs of unemployment were higher the increased costs to consumers of limiting imports
  - If companies were given temporary help, the industries could recover and become fully competitive
  - A New York Times poll showed 71% Americans felt-it is more important to protect jobs
- No protection
  - They blamed the managers of the companies for their bad decisions
  - For consumers, pay higher prices and taxes, and limited choice

Opportunity costs

- Scarcity and choice are central to the economics discipline
- In the face of scarcity, we make many decisions
- Follow one course of action and forgo some other course of action

Opportunity cost is the highest valued alternative forgone whenever a choice is made.

Definitions of Profit

- Business or Accounting Profit: Total revenue minus the explicit or accounting costs of production.
- Economic Profit: Total revenue minus the explicit and implicit costs of production.
- Opportunity Cost: Implicit value of a resource in its best alternative use.

Theories of Profit

- Risk-Bearing Theories of Profit
- Frictional Theory of Profit
- Monopoly Theory of Profit
- Innovation Theory of Profit
- Managerial Efficiency Theory of Profit

Absolute & Comparative Advantage

	Wood (Logs)	Food (Bushels)
Colleen	10	10
Bill	4	8

Absolute & Comparative Advantage

	Wood (Logs)	Food (Bushels)
Colleen	150	150
Bill	80	80

Absolute & Comparative Advantage

	Wood (Logs)	Food (Bushels)
Colleen	270	30
Bill	0	240

Absolute & Comparative Advantage

	Wood (Logs)	Food (Bushels)
Colleen	170	170
Bill	100	100

Social Function of Profit

- Profit is a signal that guides the allocation of society's resources.
- High profits in an industry are a signal that buyers want more of what the industry produces.
- Low (or negative) profits in an industry are a signal that buyers want less of what the industry produces.

Ten Economic Principles for managers

1. Making decisions
2. Decisions are always among alternatives
3. Decision alternatives always have costs and benefit
4. Increase the firm’s value
5. Firm’s value is measured by its expected profit
6. Firm’s sales revenue depends demand for its product
7. The firm must minimize cost for each level of output
8. The firm must develop a strategy consistent with its market
9. Growth depends on rational investment decisions
10. Firms deal rationally and ethically with laws and regulations

1. Making decisions

- The role of the managers is to make decisions
  - Business firms come in all sizes
  - No firm has unlimited resources
  - Short-run and long-run decisions
- *Managerial Economics*: How to make decisions that make sense for the operation of the firm

2. Decisions are among alternatives

- Choices are always among alternatives
- Example-buying a new computer
- A job can be done by many, but some may be better at it than others-cost differs

3. Decision alternatives have costs and benefits

- Studying OR watching TV
- What we consider when making our decision?
- Benefit: benefit gained from studying –own knowledge and capabilities
- Cost-cost of giving up watching television
- Choosing to study-additional benefit gained from study exceeds the additional cost to next best alternative
- Opportunity cost

4. Objective of management is to increase the firm's value

- Profit is the difference between TR and TC
- Different types of organizations/ firms
- Problem- Managers attempt to maximize own interest while shareholders increase own benefit
- Principle –agent problem

5. The firm's value is measured by its expected profit

- Example: two companies
- Profits earned in two different periods
- Two different production process
- Which one would be better company
- It can be evaluated based on the excepted profit
- Present value of the expected future profit stream

6. Firm's sales revenue depends on demand for its product

- Price sensitive goods
- Less price sensitive goods
- Demand varies
- New goods introduced in the market

7. Firm must minimize cost for each level of output

- TR-TC
- Two factors affect
- Technology of production
- Input prices
- Factors of production
- Different levels of technologies

8. Firm must develop a strategy consistent with it market

- If a company has any sellers- focus on sellers
- Selling identical products –little rivalry
- Differentiated products –strong competition
- Price changes
- Example-airline industry

Value of the Firm

The present value of all expected future profits

$$PV = \frac{\pi_1}{(1+r)^1} + \frac{\pi_2}{(1+r)^2} + \cdots + \frac{\pi_n}{(1+r)^n} = \sum_{t=1}^{n} \frac{\pi_t}{(1+r)^t}$$

$$Value\,of\;Firm = \sum_{t=1}^{n} \frac{\pi_t}{(1+r)^t} = \sum_{t=1}^{n} \frac{TR_t - TC_t}{(1+r)^t}$$

9. Firm's growth depends on rational investment

- Decision to invest in new plant or equipment or develop a new product
- The process of evaluating new investments of the firm-capital project analysis
- Capital project-calculating the expected stream of benefits it will produce for the firm

10. Successful firm deal rationally and ethically with laws and regulations

- Various business laws
- Case of Satyam

ECONOMICS IN PRACTICE

Frozen Foods and Opportunity Costs

The growth of the frozen dinner entrée market in the last 50 years is a good example of the role of opportunity costs in our lives.

ECONOMICS IN PRACTICE

To Understand Global Affairs

An understanding of economics is essential to an understanding of global affairs.

iPod and the World

An iPod Has Global Value. Ask the (Many) Countries That Make It.

The New York Times

Theories and Models

Expressing Models in Words, Graphs, and Equations

The most common method of expressing the quantitative relationship between two variables is graphing that relationship on a two-dimensional plane.

Sunk Cost

Theories and Models

Cautions and Pitfalls

The Post Hoc *Fallacy*

post hoc, ergo propter hoc Literally, "after this (in time), therefore because of this." A common error made in thinking about causation: If Event A happens before Event B, it is not necessarily true that A caused B.

The Fallacy of Composition

fallacy of composition The erroneous belief that what is true for a part is necessarily true for the whole.

Economic Policy

Criteria for judging economic outcomes:

1. Efficiency
2. Equity
3. Growth
4. Stability

Economic Policy

Criteria for judging economic outcomes:

1. Efficiency
2. Equity
3. Growth
4. Stability

8 major sectors

EX - IM → -ve

Consumption & Spending → 7%

23-26%

less of O/P → more of O/P

wastage of resources

So. Wet taste/preferences

GDP → Gross domestic pdt

Distribution

Subsidized

Subsidies

Economic Policy

Efficiency

efficiency In economics, allocative efficiency. An efficient economy is one that produces what people want at the least possible cost.

Equity

equity Fairness.

Economic Policy

Economic Policy

Growth

economic growth An increase in the total output of an economy.

Stability

stability A condition in which national output is growing steadily, with low inflation and full employment of resources.

HOW TO READ AND UNDERSTAND GRAPHS

•A **graph** is a two-dimensional representation of a set of numbers, or data.

TIME SERIES GRAPHS

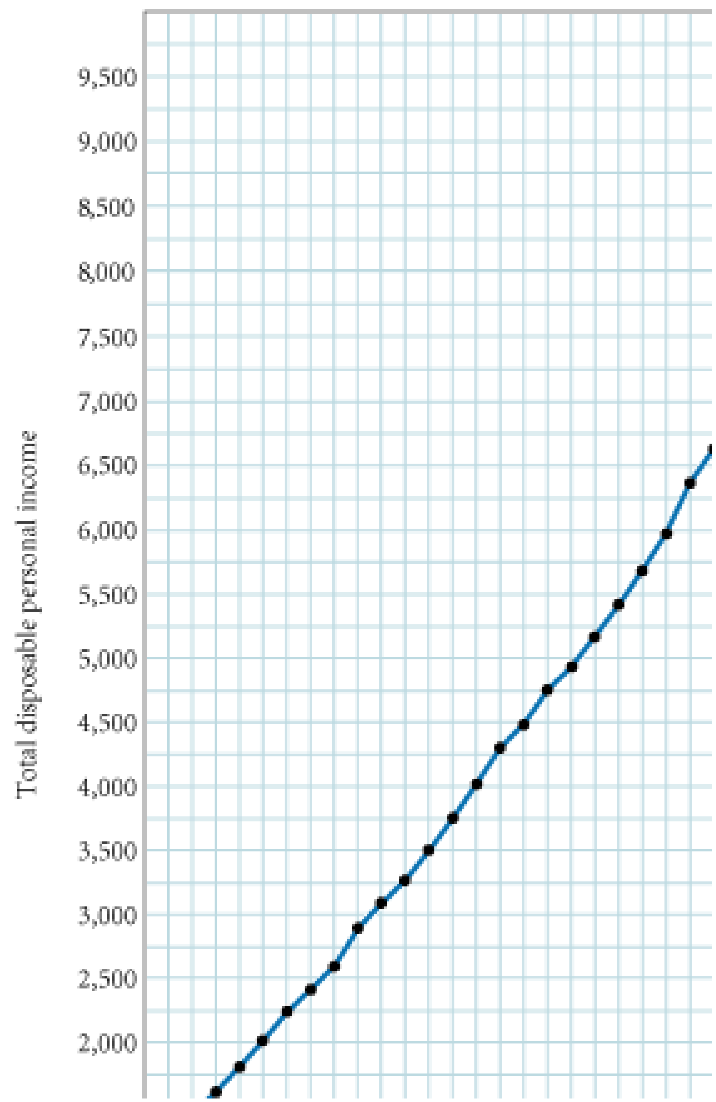
•A ***time series graph*** shows how a single variable changes over time.

HOW TO READ AND UNDERSTAND GRAPHS

TIME SERIES GRAPHS

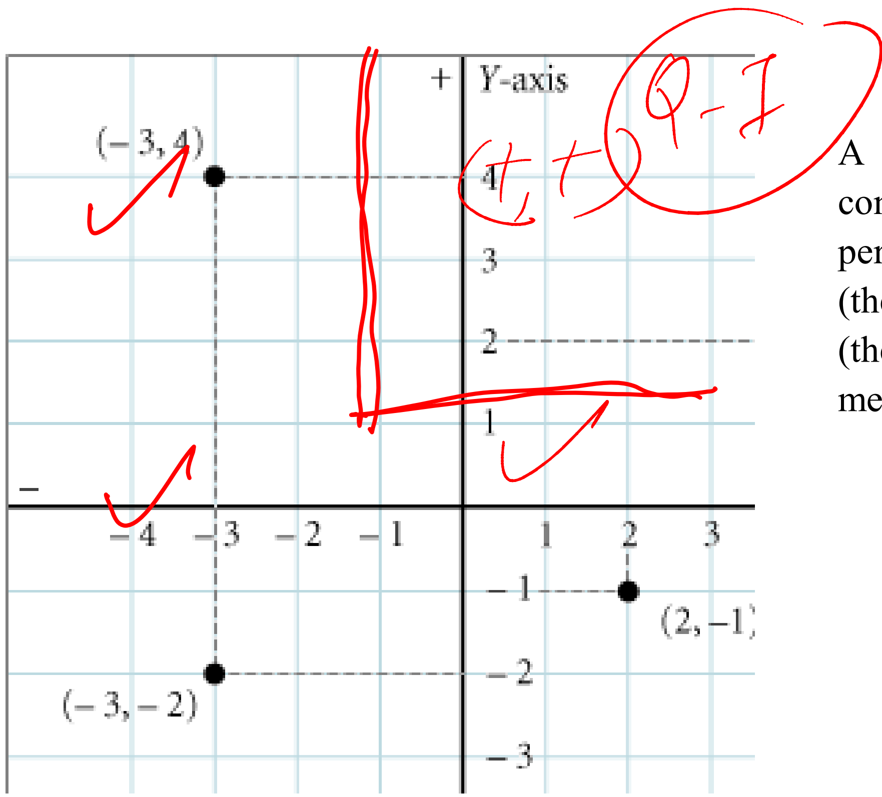
Total Disposable Personal Income in the United States, 1975–2006 (in billions of dollars)

Year	Total Disposable Personal Income	Year	Total Disposable Personal Income
1975	1,181.4	1991	4,474.8
1976	1,299.9	1992	4,754.6
1977	1,436.0	1993	4,935.3
1978	1,614.8	1994	5,165.4
1979	1,808.2	1995	5,422.6
1980	2,019.8	1996	5,677.7
1981	2,247.9	1997	5,968.2
1982	2,406.8	1998	6,355.6
1983	2,586.0	1999	6,627.4
1984	2,887.6	2000	7,120.2
1985	3,086.5	2001	7,393.2
1986	3,262.5	2002	7,827.7
1987	3,459.5	2003	8,159.9
1988	3,752.4	2004	8,646.9
1989	4,016.3	2005	8,945.6
1990	4,293.6	2006	9,501.5



Total Disposable Personal Income in the United States: 1975–2006 (in billions of dollars)

GRAPHING TWO VARIABLES ON A CARTESIAN COORDINATE SYSTEM

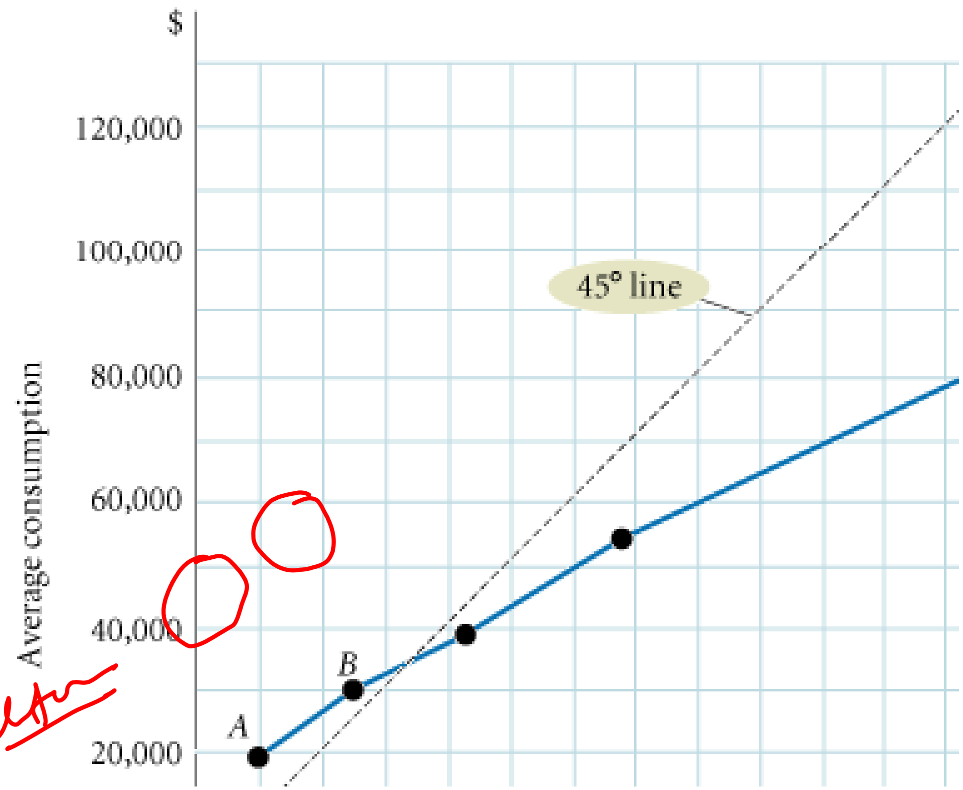


A Cartesian coordinate system is constructed by drawing two perpendicular lines: a vertical axis (the Y-axis) and a horizontal axis (the X-axis). Each axis is a measuring scale.

PLOTTING INCOME AND CONSUMPTION DATA FOR HOUSEHOLDS

Consumption Expenditures and Income, 2005

	Average Income Before Taxes	Average Consumption Expenditures
Bottom fifth	$ 9,676	$ 19,120
2nd fifth	25,546	28,921
3rd fifth	42,622	39,098
4th fifth	67,813	54,354
Top fifth	147,737	90,469



→ bank loan to

→ subsidies

Savings

wealth

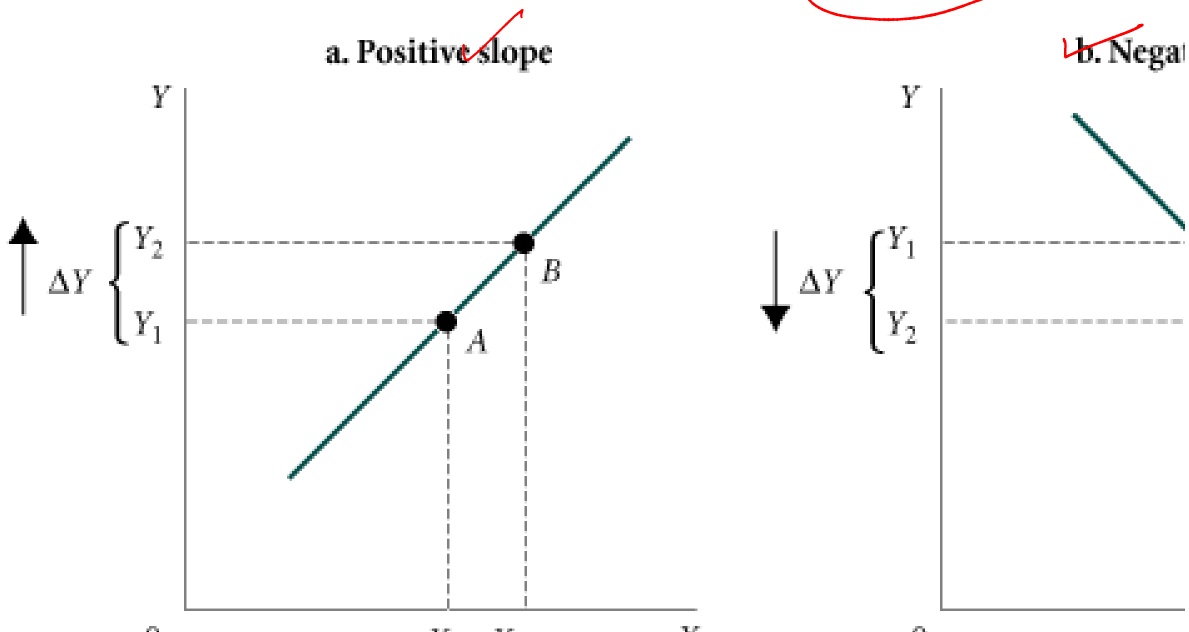
Income + P.S.

→ Expenditure

HOW TO READ AND UNDERSTAND GRAPHS

SLOPE

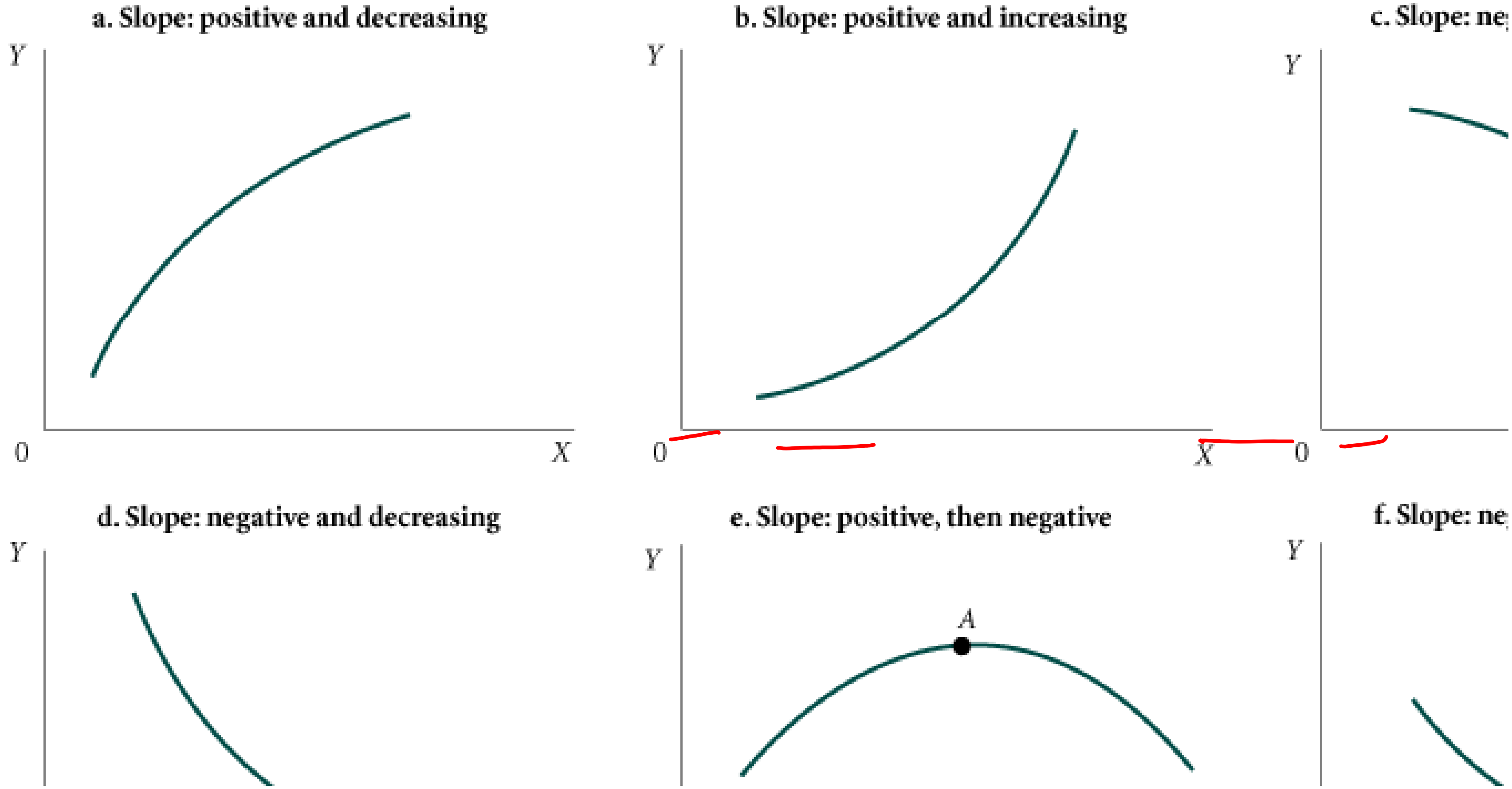
$$\frac{\Delta Y}{\Delta X} = \frac{Y_2 - Y_1}{X_2 - X_1} = \frac{\text{Rise}}{\text{Run}} = \frac{\uparrow}{\rightarrow}$$



A positive slope indicates that increases in *X* are associated with increases in *Y* and that decreases in *X* are associated with decreases in *Y*.

A negative slope indicates the opposite—when *X* increases, Y decreases and when *X* decreases, *Y* increases.

HOW TO READ AND UNDERSTAND GRAPHS

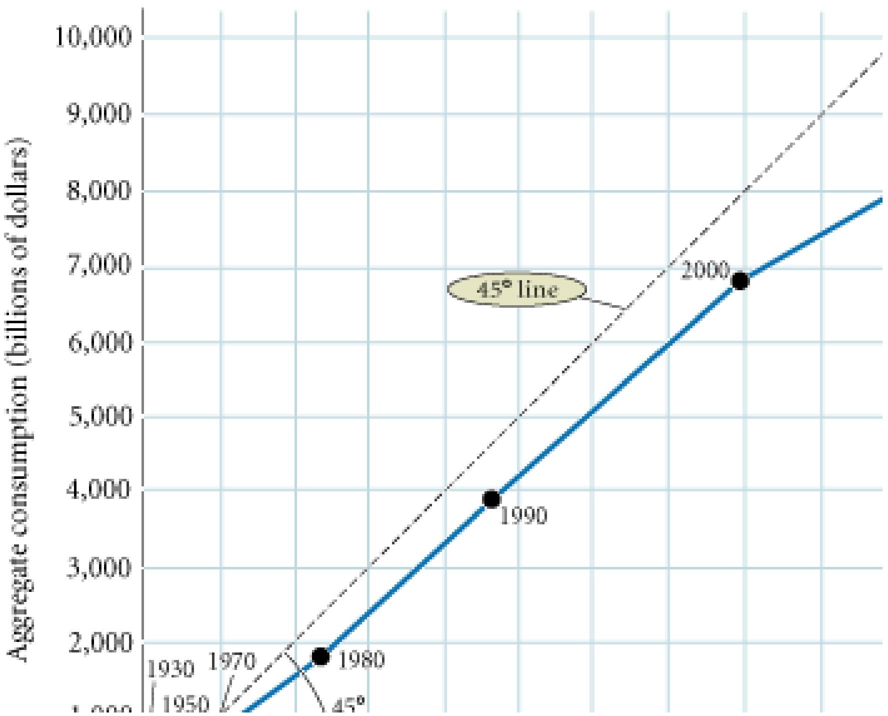


SOME PRECAUTIONS

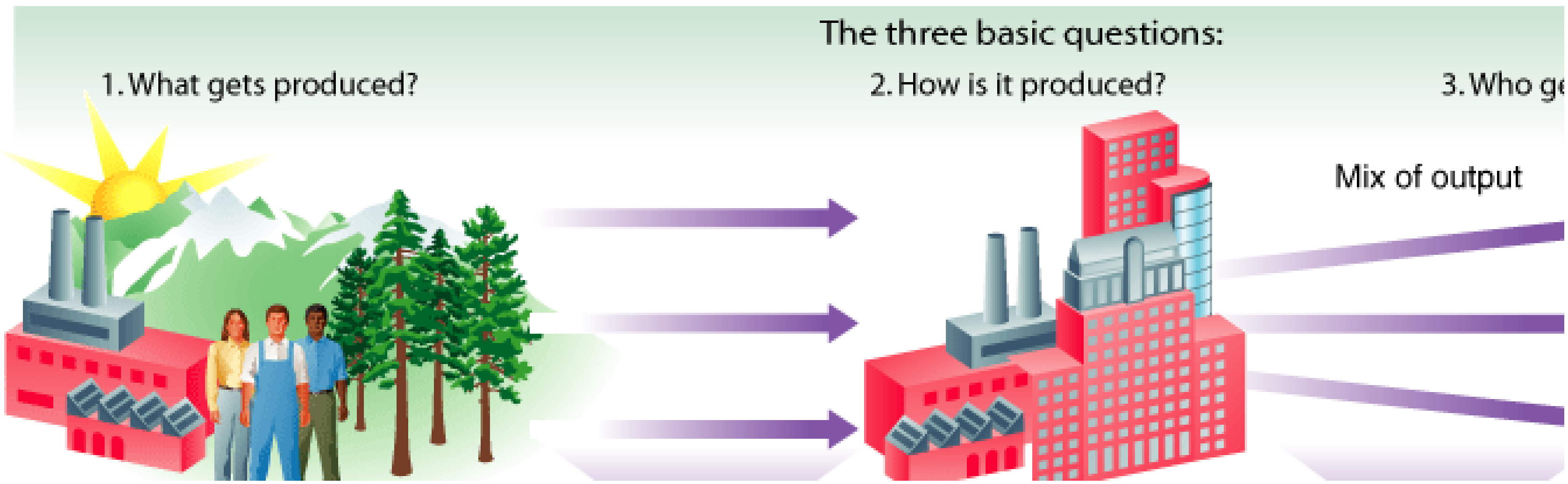
Aggregate National Income and Consumption for the United States, 1930–2006 (in billions of dollars)

	Aggregate National Income	Aggregate Consumption
1930	$ 75.6	$ 70.2
1940	81.1	71.2
1950	241.0	192.7
1960	427.5	332.3
1970	837.5	648.9
1980	2,243.0	1,762.9
1990	4,642.1	3,831.5
2000	7,984.4	6,683.7
2004	10,306.8	8,195.9
2005	10,887.6	8,707.8
2006	11,655.6	9,224.5

loan →



The Economic Problem: Scarcity And Choice



Scarcity, Choice, And Opportunity Cost

Weighing Present and Expected Future Costs and Benefits

- We trade off present and future benefits in small ways all the time.

Capital Goods and Consumer Goods

consumer goods Goods produced for present consumption.

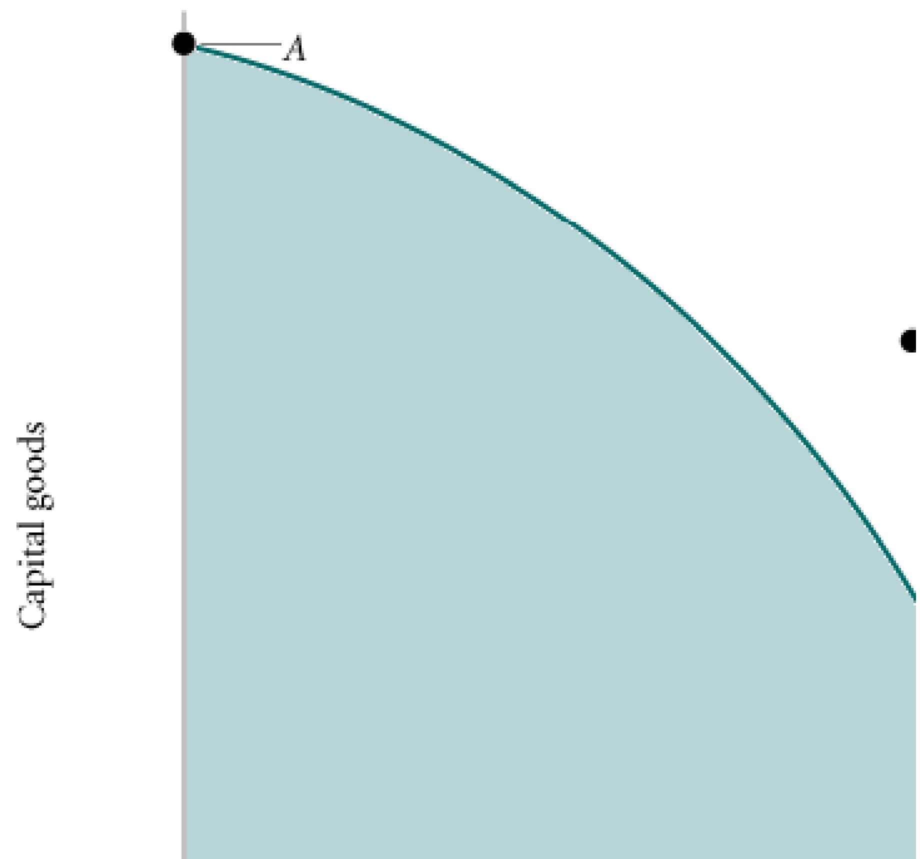
investment The process of using resources to produce new capital.

Scarcity, Choice, And Opportunity Cost

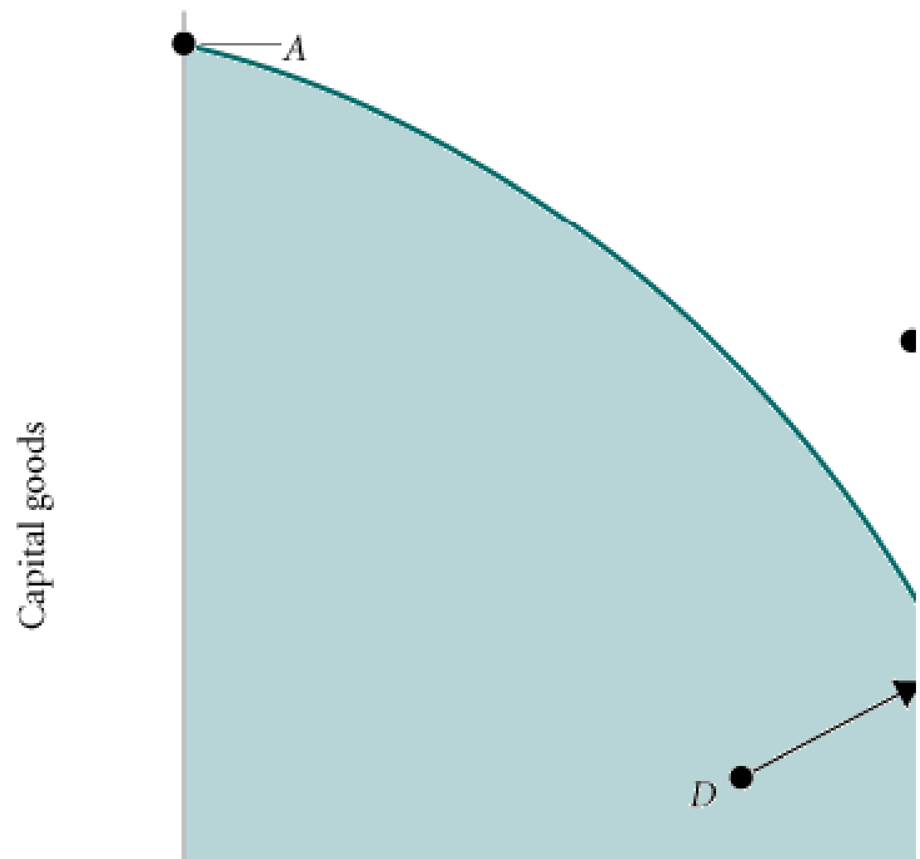
The Production Possibility Frontier

production possibility frontier (ppf) A graph that shows all the combinations of goods and services that can be produced if all of society’s resources are used efficiently.

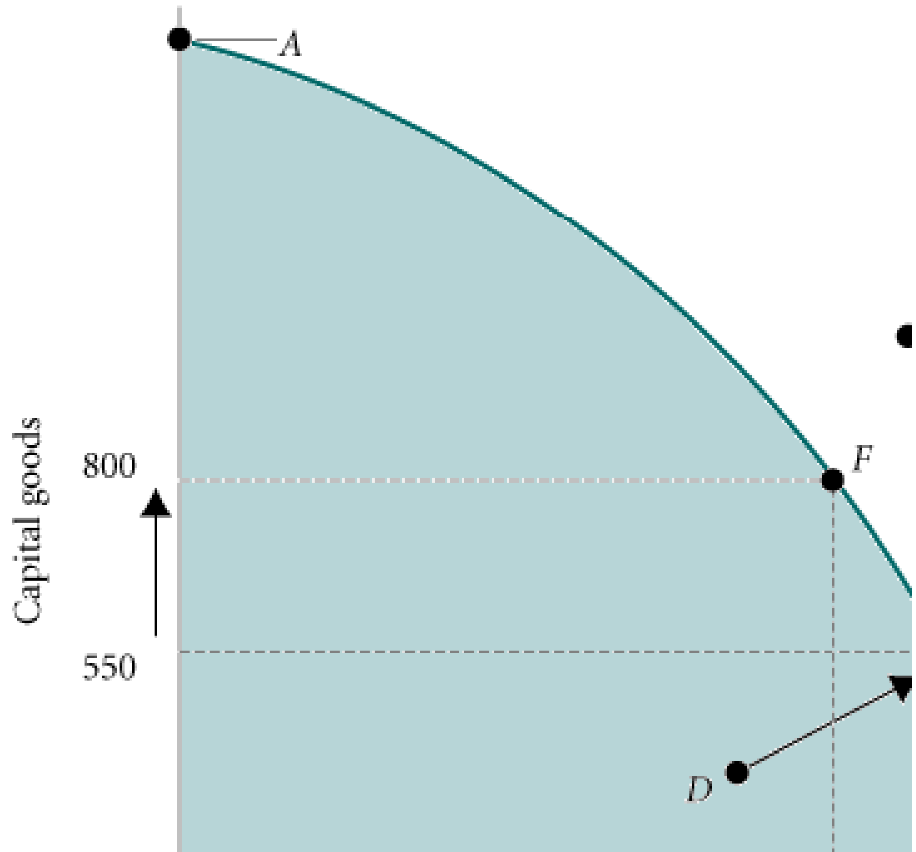
The Production Possibility Frontier



The Production Possibility Frontier



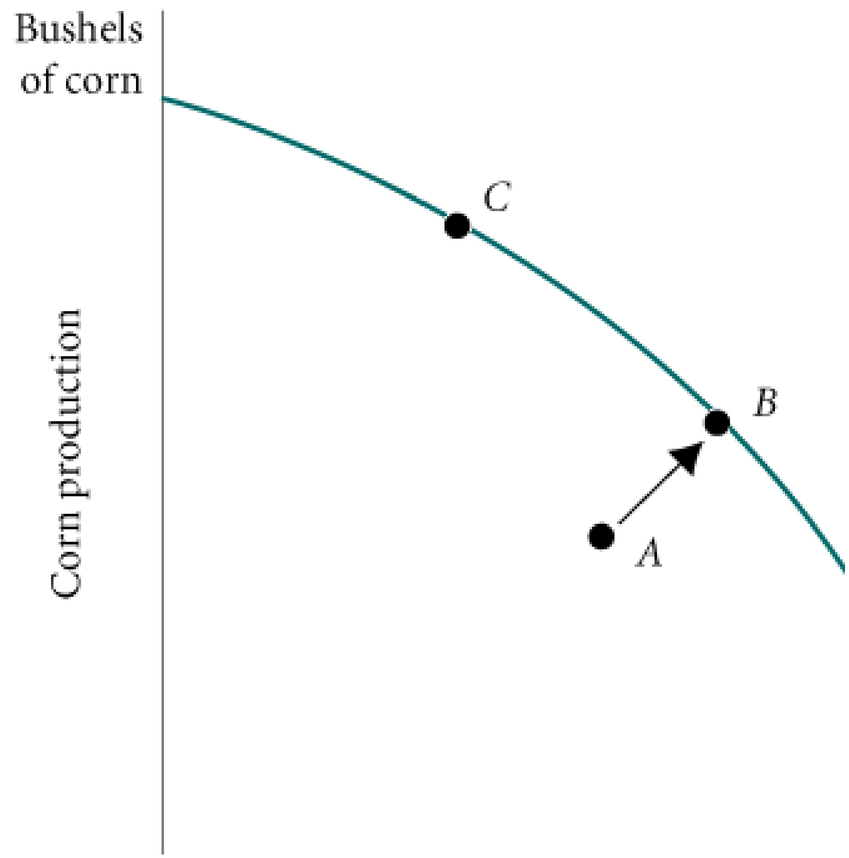
The Production Possibility Frontier & O.C.



Scarcity, Choice, And Opportunity Cost

The Production Possibility Frontier & Wrong policy decisions

Inefficiency



Scarcity, Choice, And Opportunity Cost

The Production Possibility Frontier

The Efficient Mix of Output

To be efficient, an economy must produce what people want.

Negative Slope and Opportunity Cost

marginal rate of transformation (MRT) The slope of the production possibility frontier (ppf).

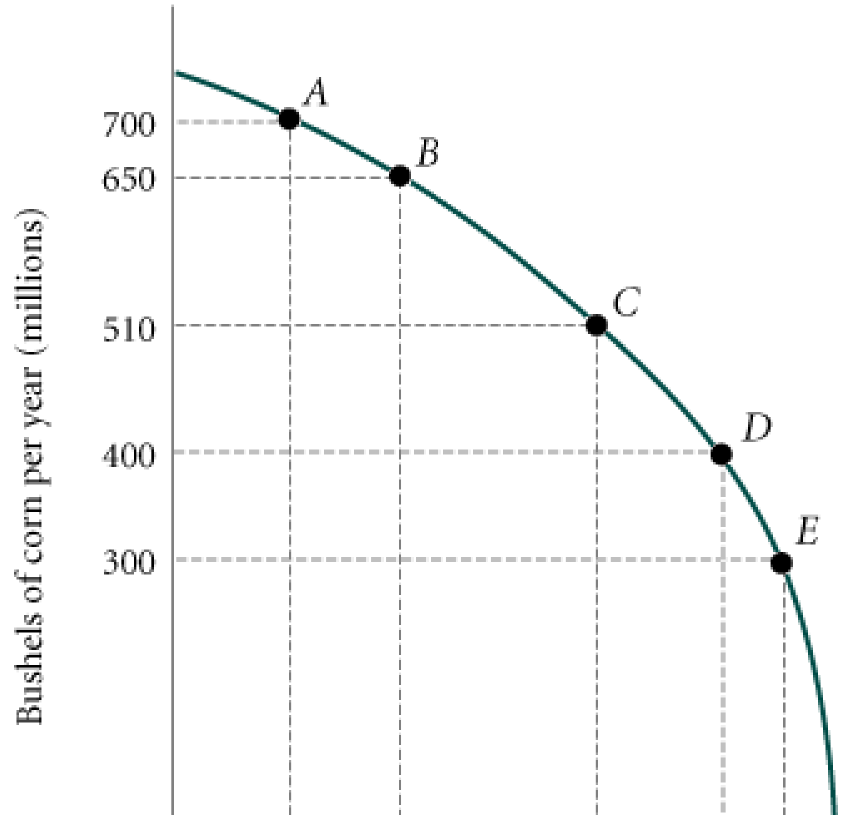
Scarcity, Choice, And Opportunity Cost

The Production Possibility Frontier

The Law of Increasing Opportunity Cost

Production Possibility Schedule for Total Corn and Wheat Production in Ohio and Kansas

Point on ppf	Total Corn Production (Millions of Bushels Per Year)	Total Wheat Production (Millions of Bushels Per Year)
A	700	100
B	650	200
C	510	380
D	400	500
E	300	550



Scarcity, Choice, And Opportunity Cost

The Production Possibility Frontier

Economic Growth

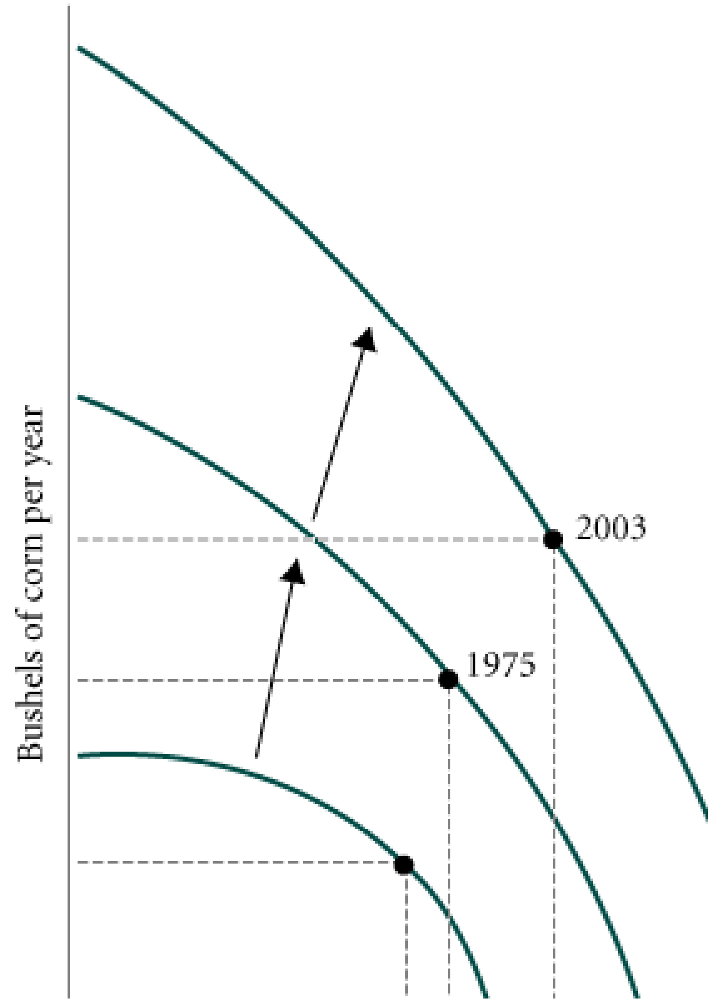
economic growth An increase in the total output of an economy. It occurs when a society acquires new resources or when it learns to produce more using existing resources.

Scarcity, Choice, And Opportunity Cost

The Production Possibility Frontier

Economic Growth

Economic Growth Shifts the
PPF Up and to the Right

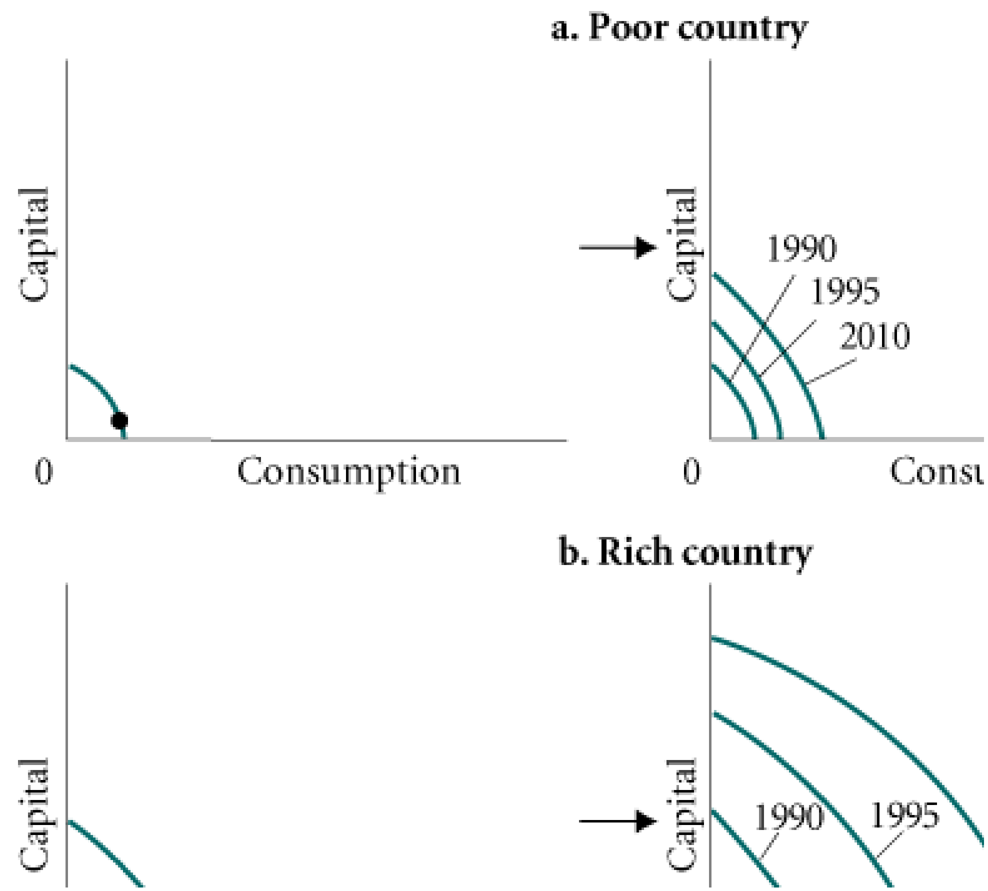


Scarcity, Choice, And Opportunity Cost

The Production Possibility Frontier

Sources of Growth and the Dilemma of Poor Countries

Capital Goods and Growth in Poor and Rich Countries



Scarcity, Choice, And Opportunity Cost

The Economic Problem

Recall the three basic questions facing all economic systems:

(1) What gets produced?

(2) How is it produced?

(3) Who gets it?

Given scarce resources, how do large, complex societies go about answering the three basic economic questions?

Economic Systems

Command Economies

command economy An economy in which a central government either directly or indirectly sets output targets, incomes, and prices.

Economic Systems

Laissez-faire Economies: The Free Market

laissez-faire economy Literally from the French: "allow [them] to do." An economy in which individual people and firms pursue their own self-interest without any central direction or regulation.

market The institution through which buyers and sellers interact and engage in exchange.

Some markets are simple and others are complex, but they all involve buyers and sellers engaging in exchange. The behavior of buyers and sellers in a laissez-faire economy determines what gets produced, how it is produced, and who gets it.

Economic Systems

Laissez-faire Economies: The Free Market

Consumer Sovereignty

consumer sovereignty The idea that consumers ultimately dictate what will be produced (or not produced) by choosing what to purchase (and what not to purchase).

Economic Systems

Laissez-faire Economies: The Free Market

Individual Production Decisions: Free Enterprise

free enterprise The freedom of individuals to start and operate private businesses in search of profits.

Competition and efficiency

Economic Systems

Laissez-faire Economies: The Free Market

Distribution of Output

The amount that any one household gets depends on its income and wealth.

Income is the amount that a household earns each year. It comes in a number of forms: wages, salaries, interest, and the like.

Wealth is the amount that households have accumulated out of past income through saving or inheritance.

Economic Systems

Laissez-faire Economies: The Free Market

Price Theory

In a free market system, the basic economic questions are answered without the help of a central government plan or directives. This is what the "free" in free market means—the system is left to operate on its own with no outside interference. Individuals pursuing their own self-interest will go into business and produce the products and services that people want. Other individuals will decide whether to acquire skills; whether to work; and whether to buy, sell, invest, or save the income that they earn. The basic coordinating mechanism is price.

Economic Systems

Mixed Systems, Markets, And Governments

The differences between command economies and laissez-faire economies in their pure forms are enormous. In fact, these pure forms do not exist in the world; all real systems are in some sense "mixed."

Firms and Households: The Basic Decision-Making Units

firm An organization that transforms resources (inputs) into products (outputs). Firms are the primary producing units in a market economy.

entrepreneur A person who organizes, manages, and assumes the risks of a firm, taking a new idea or a new product and turning it into a successful business.

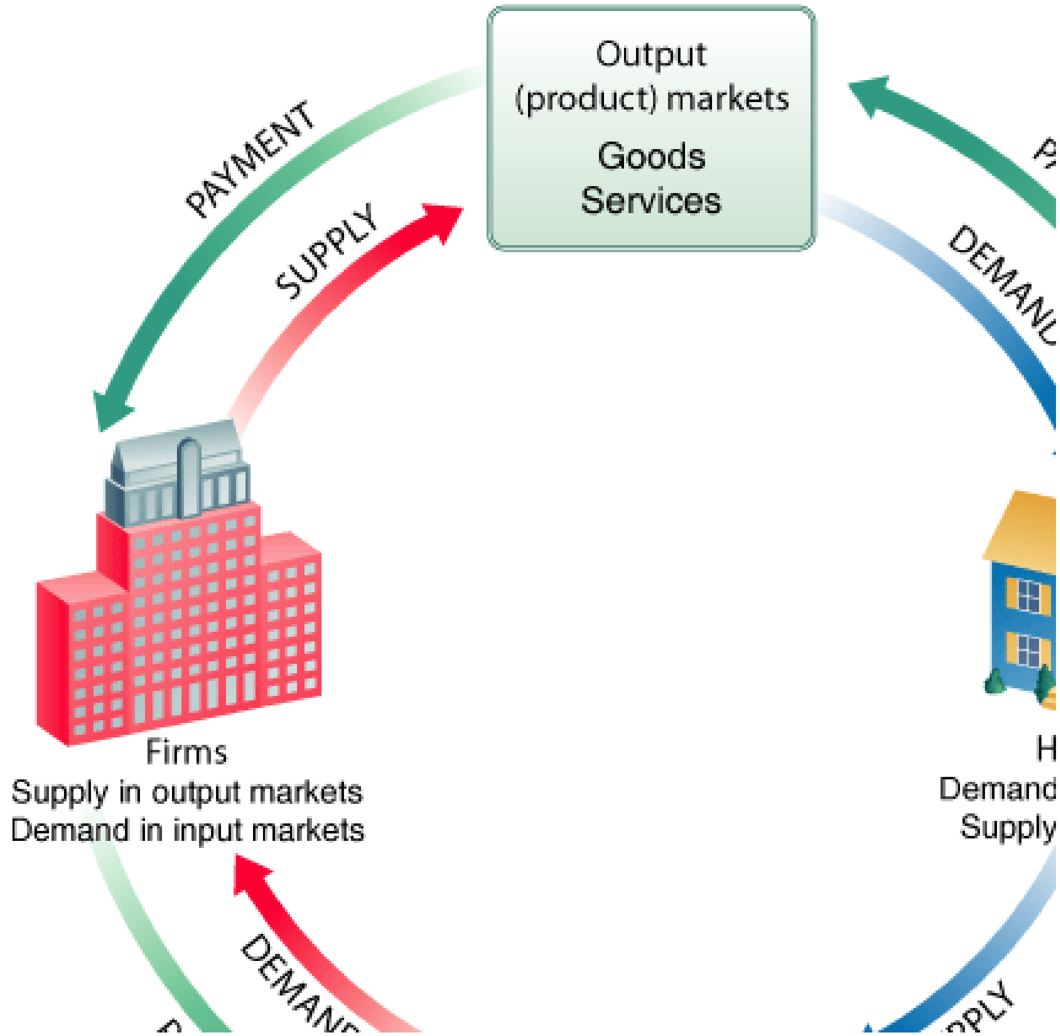
households The consuming units in an economy.

Input Markets and Output Markets: The Circular Flow

product or output markets The markets in which goods and services are exchanged.

input or factor markets The markets in which the resources used to produce products are exchanged.

Input Markets and Output Markets: The Circular Flow



Input Markets and Output Markets: The Circular Flow

labor market The input/factor market in which households supply work for wages to firms that demand labor.

capital market The input/factor market in which households supply their savings, for interest or for claims to future profits, to firms that demand funds to buy capital goods.

Input Markets and Output Markets: The Circular Flow

land market The input/factor market in which households supply land or other real property in exchange for rent.

factors of production The inputs into the production process. Land, labor, and capital are the three key factors of production.

Input and output markets are connected through the behavior of both firms and households. Firms determine the quantities and character of outputs produced and the types and quantities of inputs demanded. Households determine the types and quantities of products demanded and the quantities and types of inputs supplied.

Demand in Product/Output Markets

A household's decision about what quantity of a particular output, or product, to demand depends on a number of factors, including:

- The *price of the product* in question.
- The *income available* to the household.
- The household's *amount of accumulated wealth.*
- The *prices of other products* available to the household.
- The household's *tastes and preferences.*
- The household's *expectations* about future income, wealth, and prices.

Demand in Product/Output Markets

quantity demanded The amount (number of units) of a product that a household would buy in a given period if it could buy all it wanted at the current market price.

Demand in Product/Output Markets

Changes in Quantity Demanded versus Changes in Demand

The most important relationship in individual markets is that between market price and quantity demanded.

Changes in the price of a product affect the *quantity demanded* per period. Changes in any other factor, such as income or preferences, affect *demand*. Thus, we say that an increase in the price of Coca-Cola is likely to cause a decrease in the *quantity of Coca-Cola demanded*. However, we say that an increase in income is likely to cause an increase in the *demand* for most goods.

Demand in Product/Output Markets

Price and Quantity Demanded: The Law of Demand

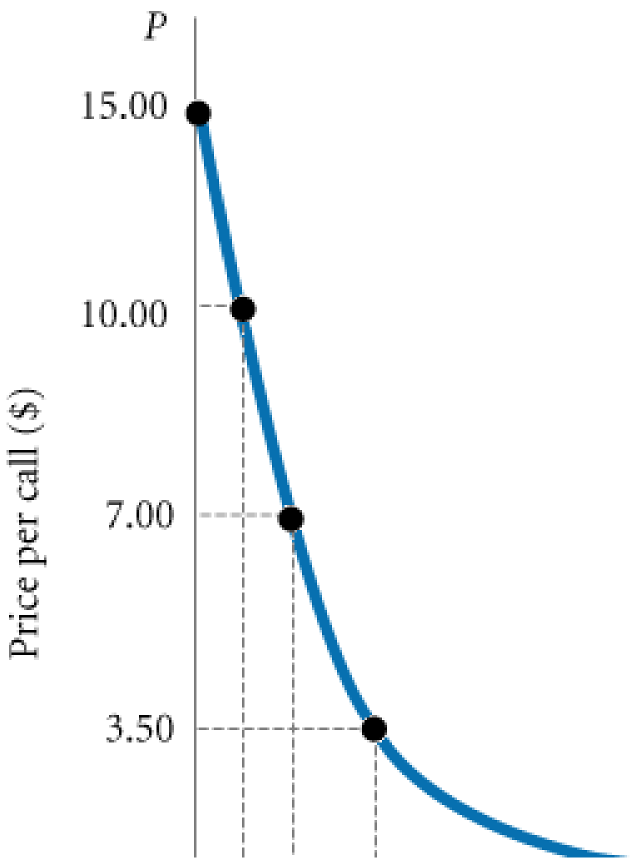
demand schedule A table showing how much of a given product a household would be willing to buy at different prices.

demand curve A graph illustrating how much of a given product a household would be willing to buy at different prices.

Demand in Product/Output Markets

Price and Quantity Demanded: The Law of Demand

ABC Demand Schedule for Telephone Calls	
Price (Per Call)	**Quantity Demanded (Calls Per Month)**
$ 0	30
.50	25
3.50	7
7.00	3
10.00	1
15.00	0



Demand in Product/Output Markets

Price and Quantity Demanded: The Law of Demand

Demand Curves Slope Downward

law of demand The negative relationship between price and quantity demanded: As price rises, quantity demanded decreases; as price falls, quantity demanded increases.

It is reasonable to expect quantity demanded to fall when price rises, *ceteris paribus*, and to expect quantity demanded to rise when price falls, *ceteris paribus*. Demand curves have a negative slope.

Demand in Product/Output Markets

Price and Quantity Demanded: The Law of Demand

Other Properties of Demand Curves

Two additional things are notable about Anna’s demand curve.

As long as households have limited incomes and wealth, all demand curves will intersect the price axis. For any commodity, there is always a price above which a household will not or cannot pay. Even if the good or service is very important, all households are ultimately constrained, or limited, by income and wealth.

That demand curves intersect the quantity axis is a matter of common sense. Demand in a given period of time is limited, if only by time, even at a zero price.

Demand in Product/Output Markets

Price and Quantity Demanded: The Law of Demand

Other Properties of Demand Curves

To summarize what we know about the shape of demand curves:

1. They have a negative slope. An increase in price is likely to lead to a decrease in quantity demanded, and a decrease in price is likely to lead to an increase in quantity demanded.
2. They intersect the quantity (*X*-) axis, a result of time limitations and diminishing marginal utility.
3. They intersect the price (*Y*-) axis, a result of limited incomes and wealth.

Demand in Product/Output Markets

Other Determinants of Household Demand

Income And Wealth

income The sum of all a household's wages, salaries, profits, interest payments, rents, and other forms of earnings in a given period of time. It is a flow measure.

wealth *or* net worth The total value of what a household owns minus what it owes. It is a stock measure.

Demand in Product/Output Markets

Other Determinants of Household Demand

Income And Wealth

normal goods Goods for which demand goes up when income is higher and for which demand goes down when income is lower.

inferior goods Goods for which demand tends to fall when income rises.

Demand in Product/Output Markets

Other Determinants of Household Demand

Prices of Other Goods and Services

substitutes Goods that can serve as replacements for one another; when the price of one increases, demand for the other increases.

perfect substitutes Identical products.

complements, complementary goods Goods that “go together”; a decrease in the price of one results in an increase in demand for the other and vice versa.

Demand in Product/Output Markets

Other Determinants of Household Demand

Tastes and Preferences

Income, wealth, and prices of goods available are the three factors that determine the combinations of goods and services that a household is *able* to buy.

Changes in preferences can and do manifest themselves in market behavior.

Within the constraints of prices and incomes, preference shapes the demand curve, but it is difficult to generalize about tastes and preferences. First, they are volatile. Second, tastes are idiosyncratic.

Demand in Product/Output Markets

Other Determinants of Household Demand

Expectations

What you decide to buy today certainly depends on today's prices and your current income and wealth.

There are many examples of the ways expectations affect demand.

Increasingly, economic theory has come to recognize the importance of expectations.

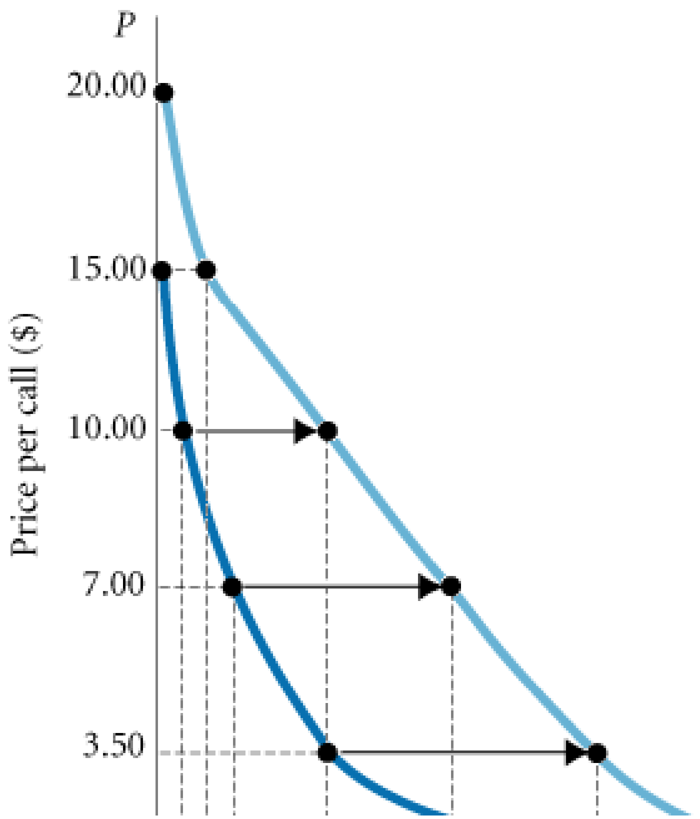
It is important to understand that demand depends on more than just *current* incomes, prices, and tastes.

Demand in Product/Output Markets

Shift of Demand versus Movement Along a Demand Curve

Shift of Demand Schedule Due to increase in Income

	Schedule D_0	Schedule D_1
Price (Per Call)	**Quantity Demanded (Calls Per Month at an Income of $300 Per Month)**	**Quantity Demanded (Calls Per Month at an Income of $600 Per Month)**
$ 0.00	30	35
0.50	25	33
3.50	7	18
7.00	3	12
10.00	1	7
15.00	0	2
20.00	0	0



Demand in Product/Output Markets

Shift of Demand versus Movement Along a Demand Curve

shift of a demand curve The change that takes place in a demand curve corresponding to a new relationship between quantity demanded of a good and price of that good. The shift is brought about by a change in the original conditions.

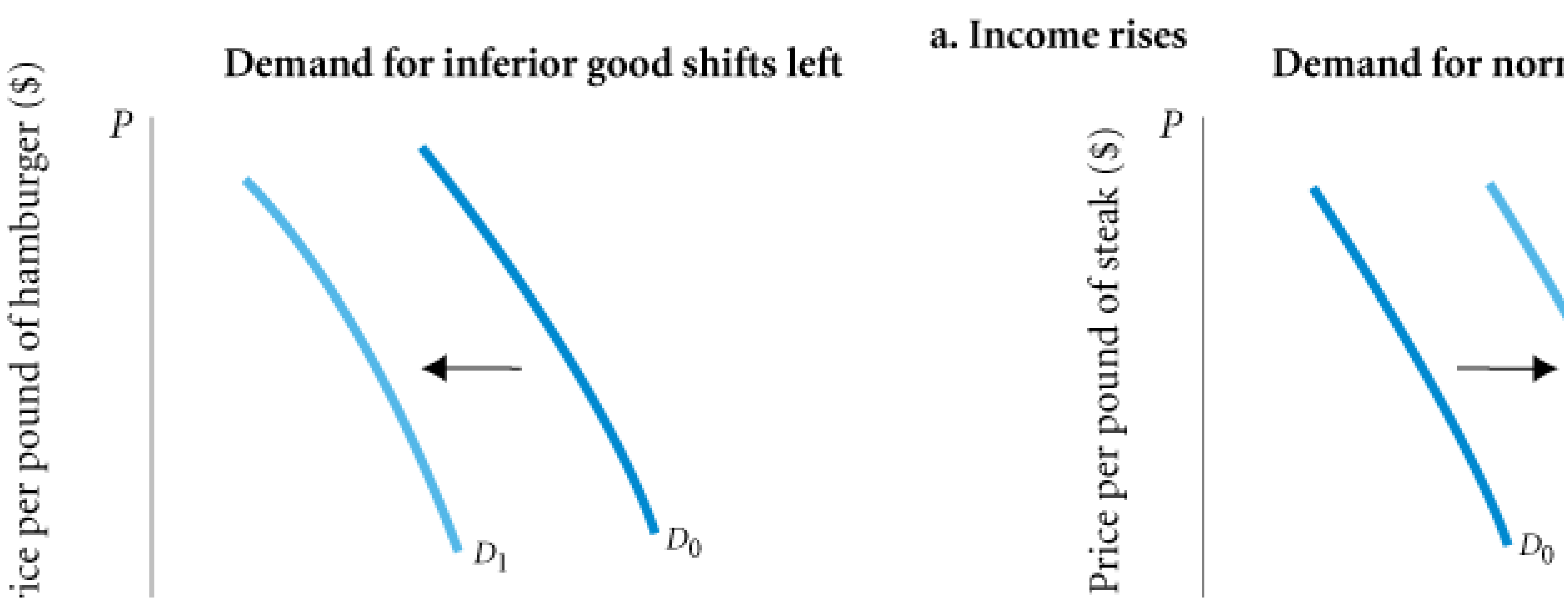
movement along a demand curve The change in quantity demanded brought about by a change in price.

Change in price of a good or service leads to
→ Change in *quantity demanded* (movement along the demand curve).

Change in income, preferences, or prices of other goods or services leads to
→ Change in *demand* (shift of the demand curve).

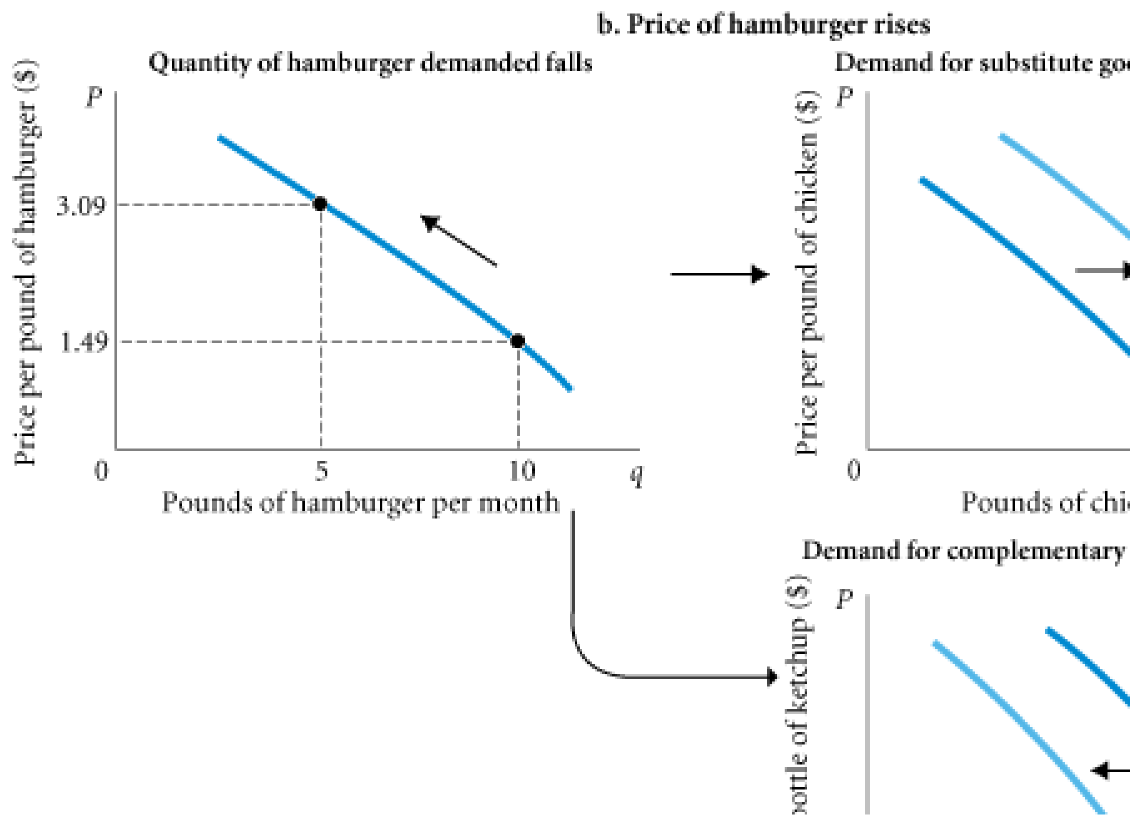
Demand in Product/Output Markets

Shift of Demand versus Movement Along a Demand Curve



Demand in Product/Output Markets

Shift of Demand versus Movement Along a Demand Curve



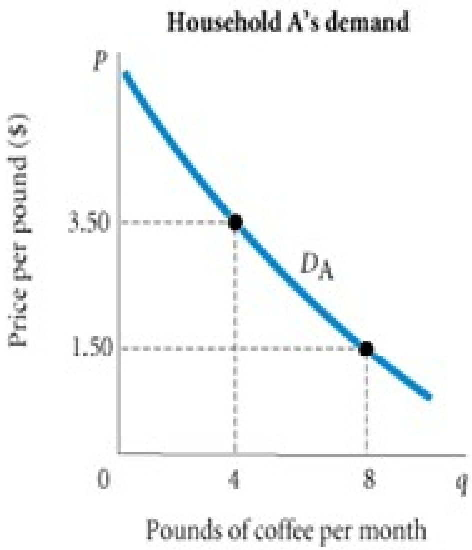
Demand in Product/Output Markets

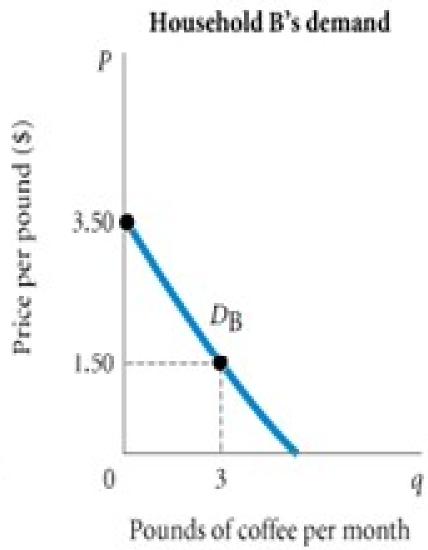
From Household Demand To Market Demand

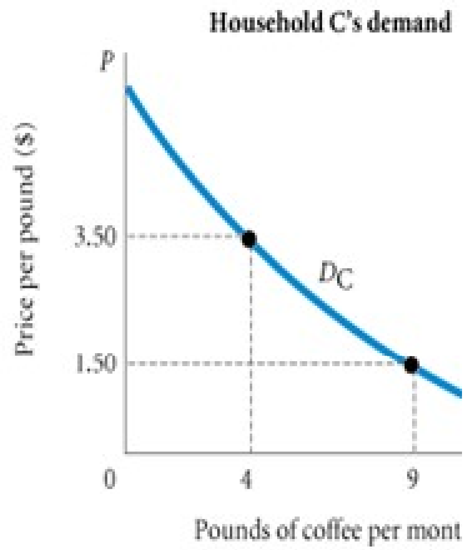
market demand The sum of all the quantities of a good or service demanded per period by all the households buying in the market for that good or service.

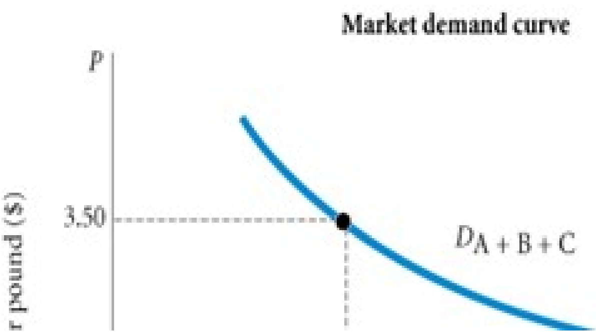
Demand in Product/Output Markets

From Household Demand To Market Demand









Price	Quantity (*q*) demanded by A		B		C	Total quantit demanded ir the market ((
$3.50	4	+	0	+	4	= 8
1.50	8	+	3	+	9	= 20

Supply in Product/Output Markets

Successful firms make profits because they are able to sell their products for more than it costs to produce them.

profit The difference between revenues and costs.

Supply in Product/Output Markets

Price and Quantity Supplied: The Law of Supply

quantity supplied The amount of a particular product that a firm would be willing and able to offer for sale at a particular price during a given time period.

supply schedule A table showing how much of a product firms will sell at different prices.

Supply in Product/Output Markets

Price and Quantity Supplied: The Law of Supply

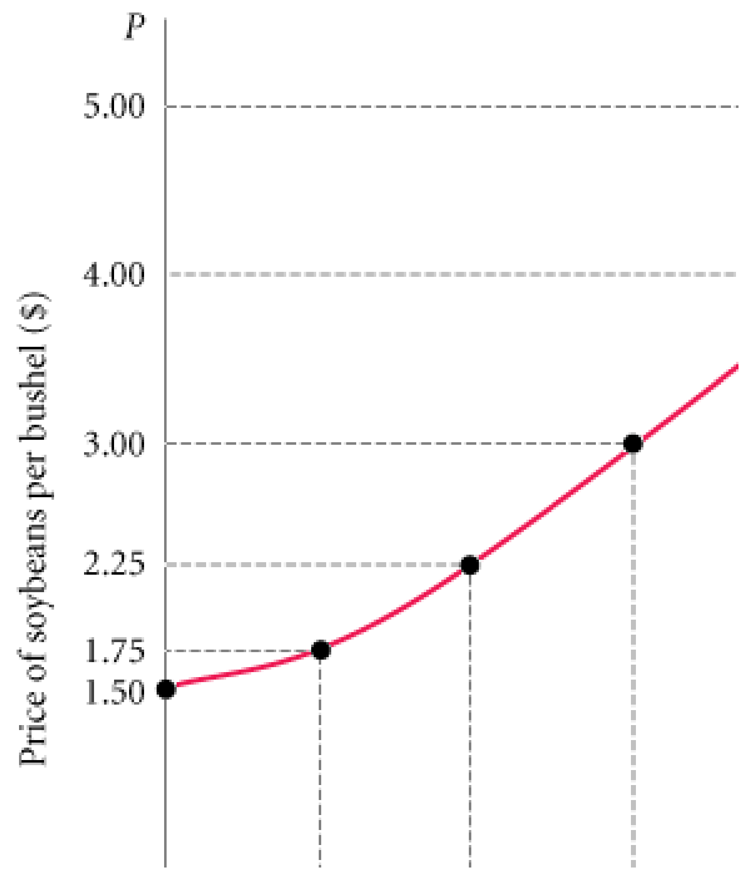
law of supply The positive relationship between price and quantity of a good supplied: An increase in market price will lead to an increase in quantity supplied, and a decrease in market price will lead to a decrease in quantity supplied.

supply curve A graph illustrating how much of a product a firm will sell at different prices.

Supply in Product/Output Markets

Price and Quantity Supplied: The Law of Supply

Clarence Brown's Supply Schedule for Soybeans	
Price (Per Bushel)	Quantity Supplied (Bushels Per Year)
$1.50	0
1.75	10,000
2.25	20,000
3.00	30,000
4.00	45,000
5.00	45,000



Supply in Product/Output Markets

Other Determinants Of Supply

The Cost Of Production

In order for a firm to make a profit, its revenue must exceed its costs.

Cost of production depends on a number of factors, including the available technologies and the prices and quantities of the inputs needed by the firm (labor, land, capital, energy, and so on).

Supply in Product/Output Markets

Other Determinants Of Supply

The Prices of Related Products

Assuming that its objective is to maximize profits, a firm's decision about what quantity of output, or product, to supply depends on:

1. The price of the good or service.
2. The cost of producing the product, which in turn depends on:
   - The price of required inputs (labor, capital, and land).
   - The technologies that can be used to produce the product.
3. The prices of related products.

Supply in Product/Output Markets

Shift of Supply versus Movement Along a Supply Curve

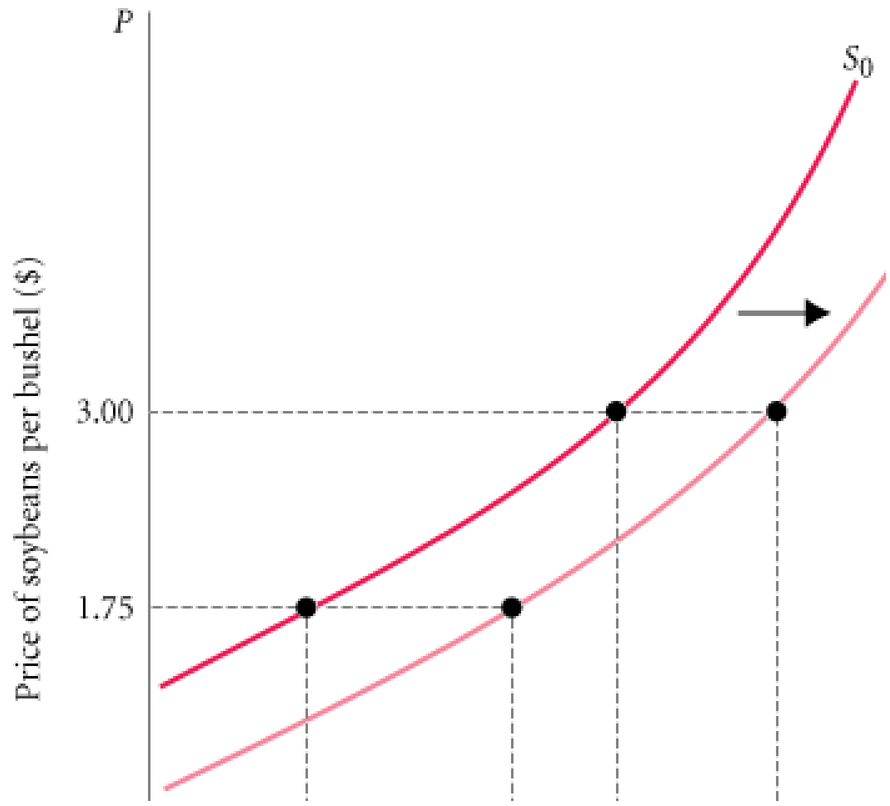
movement along a supply curve The change in quantity supplied brought about by a change in price.

shift of a supply curve The change that takes place in a supply curve corresponding to a new relationship between quantity supplied of a good and the price of that good. The shift is brought about by a change in the original conditions.

Supply in Product/Output Markets

Shift of Supply versus Movement Along a Supply Curve

Shift of Supply Schedule for Soybeans Following Development of a New Disease-Resistant Seed Strain		
	SCHEDULE S_0	SCHEDULE S_1
Price (per Bushel)	Quantity Supplied (Bushels per Year Using Old Seed)	Quantity Supplied (Bushels per Year Using New Seed)
$1.50	0	5,000
1.75	10,000	23,000
2.25	20,000	33,000
3.00	30,000	40,000
4.00	45,000	54,000
5.00	45,000	54,000



Supply in Product/Output Markets

Shift of Supply versus Movement Along a Supply Curve

As with demand, it is very important to distinguish between *movements along* supply curves (changes in quantity supplied) and *shifts* in supply curves (changes in supply):

Change in price of a good or service leads to
→ Change in *quantity supplied* (movement along a supply curve).

Change in income, preferences, or prices of other goods or services leads to
→ Change in *supply* (shift of a supply curve).

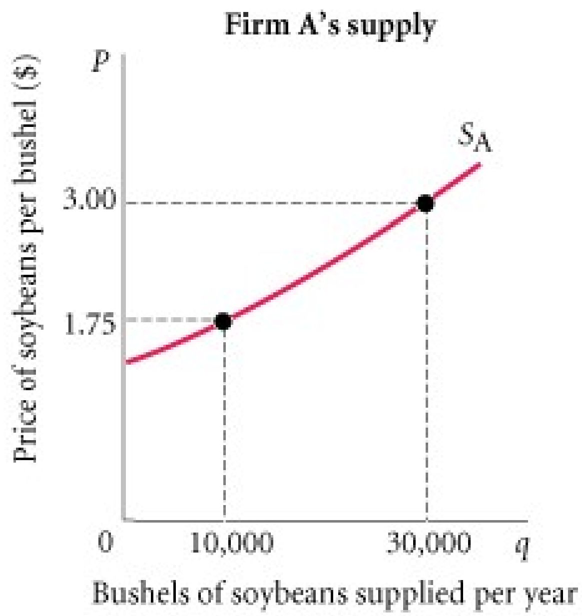
Supply in Product/Output Markets

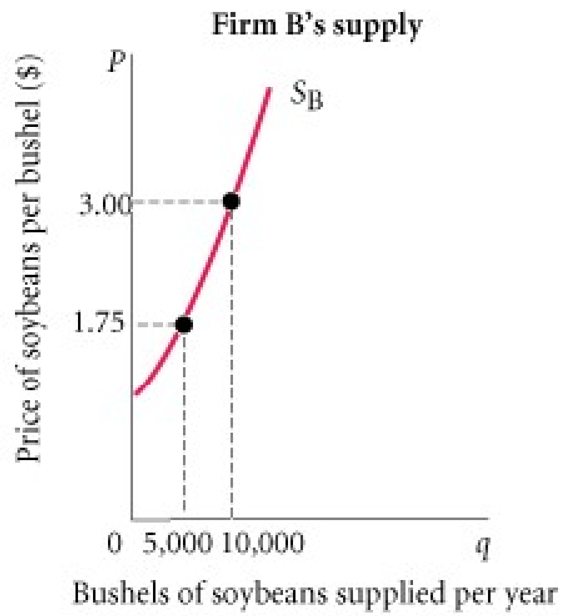
From Individual Supply to Market Supply

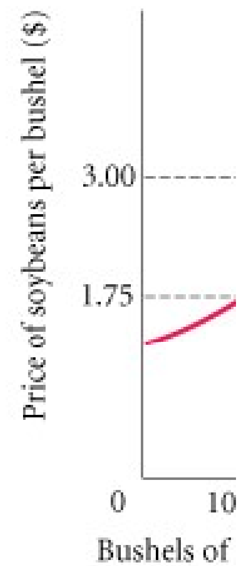
market supply The sum of all that is supplied each period by all producers of a single product.

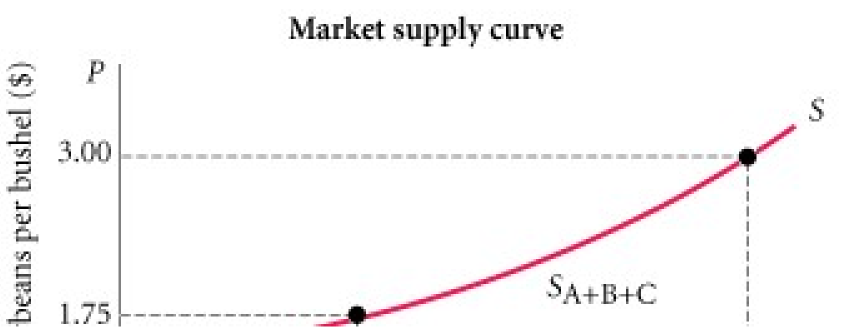
Supply in Product/Output Markets

From Individual Supply to Market Supply









Price	Quantity (q) supplied by A		B		C
$3.00	30,000	+	10,000	+	25,0
1.75	10,000	+	5,000	+	10,0

Market Equilibrium

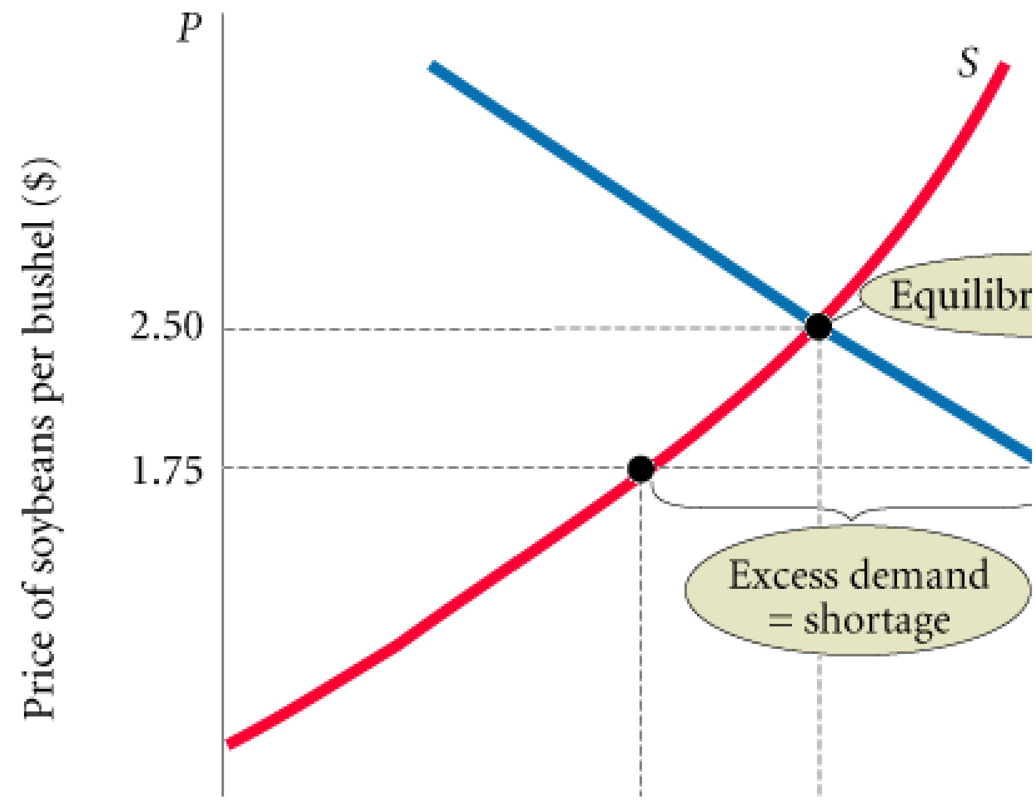
equilibrium The condition that exists when quantity supplied and quantity demanded are equal. At equilibrium, there is no tendency for price to change.

Excess Demand

excess demand or shortage The condition that exists when quantity demanded exceeds quantity supplied at the current price.

Market Equilibrium

Excess Demand



When quantity demanded exceeds quantity supplied, price tends to rise. When the price in a market rises, quantity demanded falls and quantity supplied rises until an equilibrium is reached at which quantity demanded and quantity supplied are equal.

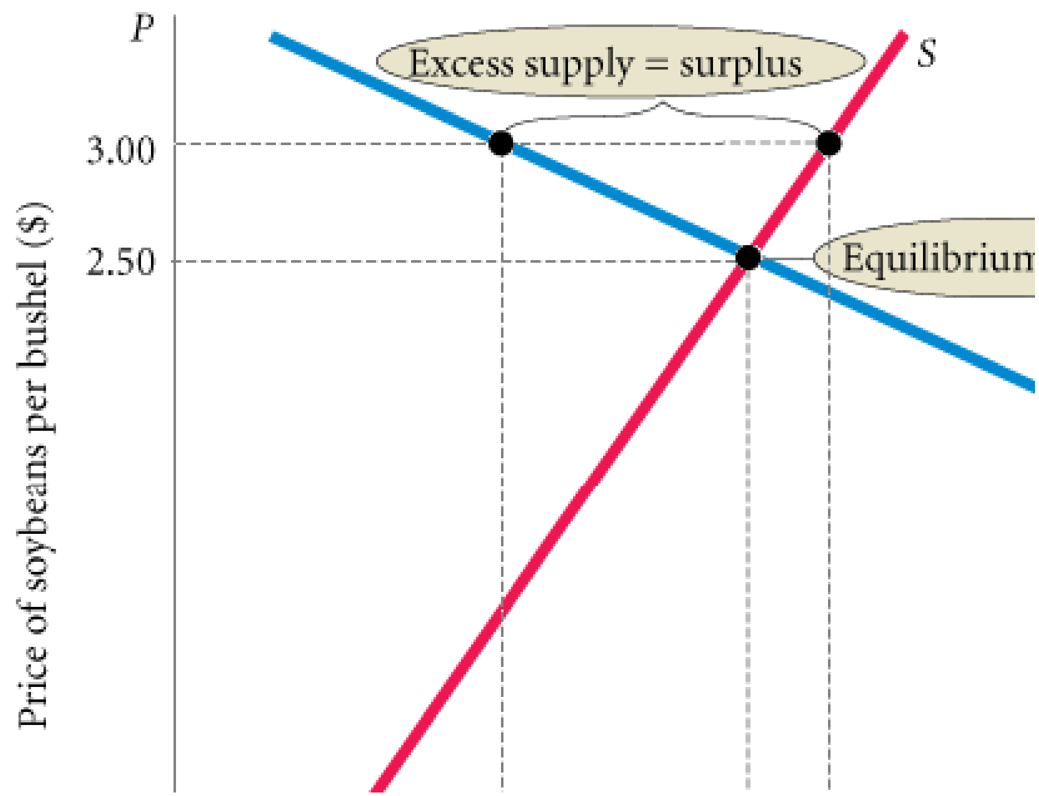
Market Equilibrium

Excess Supply

excess supply *or* **surplus** The condition that exists when quantity supplied exceeds quantity demanded at the current price.

Market Equilibrium

Excess Supply

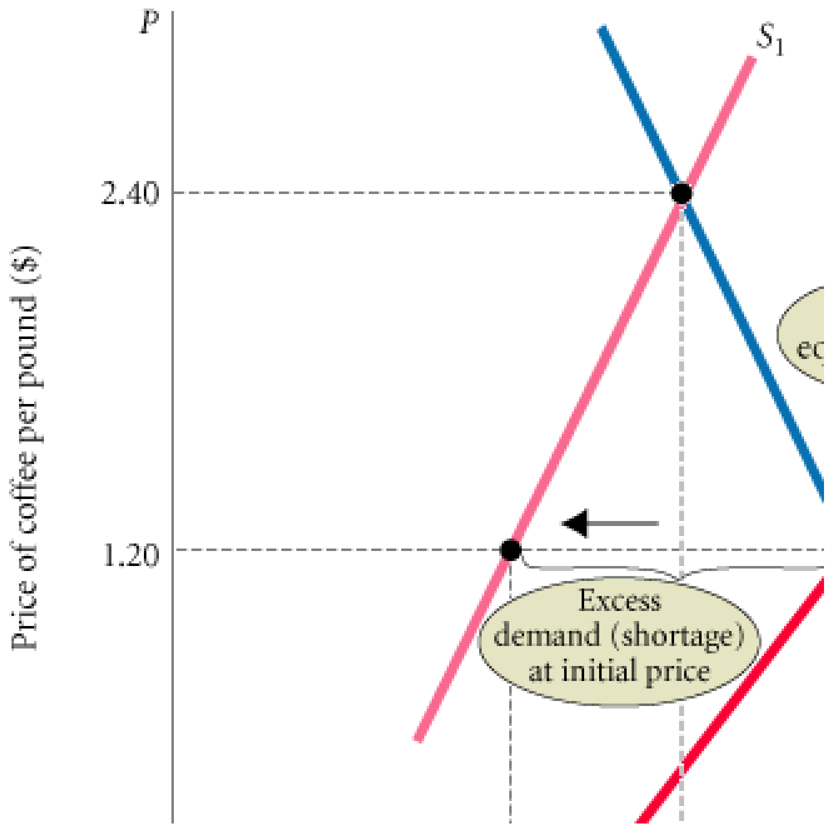


When quantity supplied exceeds quantity demanded at the current price, the price tends to fall. When price falls, quantity supplied is likely to decrease and quantity demanded is likely to increase until an equilibrium price is reached where quantity supplied and quantity demanded are equal.

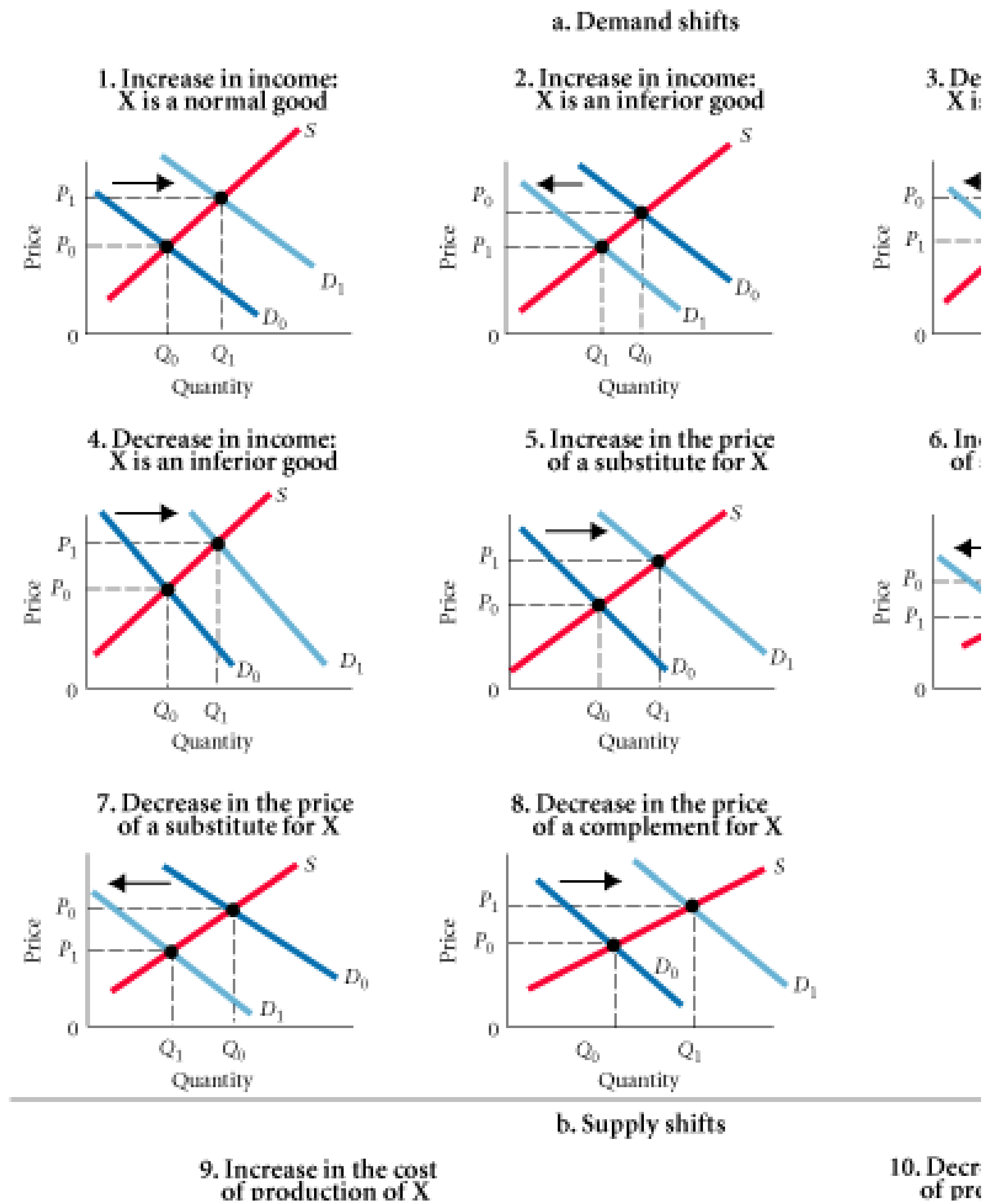
Market Equilibrium

Changes In Equilibrium

When supply and demand curves shift, the equilibrium price and quantity change.



Market Equilibrium

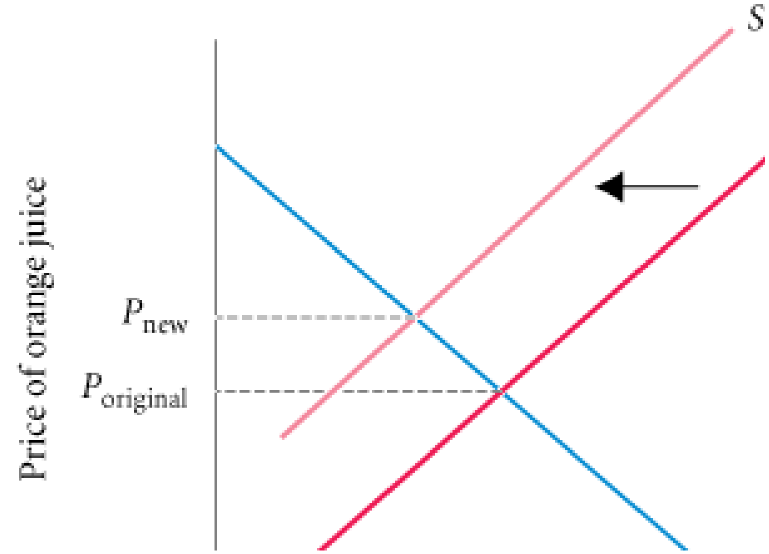


ECONOMICS IN PRACTICE

Bad News for Orange Juice Fanatics

Orange Juice Prices Could Skyrocket After Freeze Destroys Most of California Output

City News



Demand and Supply in Product Markets: A Review

Here are some important points to remember about the mechanics of supply and demand in product markets:

1. A demand curve shows how much of a product a household would buy if it could buy all it wanted at the given price. A supply curve shows how much of a product a firm would supply if it could sell all it wanted at the given price.

2. Quantity demanded and quantity supplied are always per time period—that is, per day, per month, or per year.

3. The demand for a good is determined by price, household income and wealth, prices of other goods and services, tastes and preferences, and expectations.

Demand and Supply in Product Markets: A Review

Here are some important points to remember about the mechanics of supply and demand in product markets:

4. The supply of a good is determined by price, costs of production, and prices of related products. Costs of production are determined by available technologies of production and input prices.

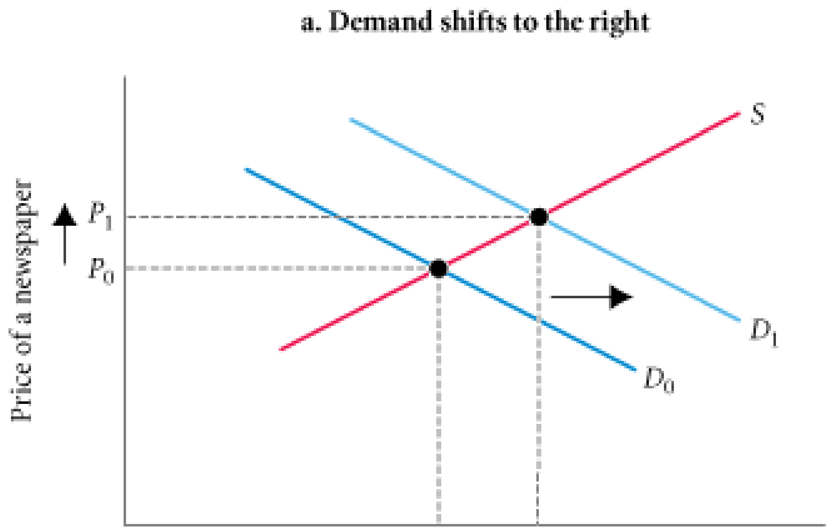
5. Be careful to distinguish between movements along supply and demand curves and shifts of these curves. When the price of a good changes, the quantity of that good demanded or supplied changes—that is, a movement occurs along the curve. When any other factor changes, the curve shifts, or changes position.

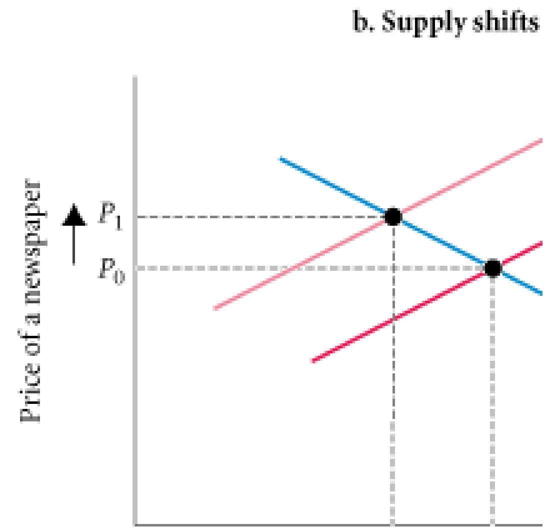
6. Market equilibrium exists only when quantity supplied equals quantity demanded at the current price.

ECONOMICS IN PRACTICE

Why Do the Prices of Newspapers Rise?

In 2006, the average price for a daily edition of a Baltimore newspaper was $0.50. In 2007, the average price had risen to $0.75.





Looking Ahead: Markets and the Allocation of Resources

You can already begin to see how markets answer the basic economic questions of what is produced, how it is produced, and who gets what is produced.

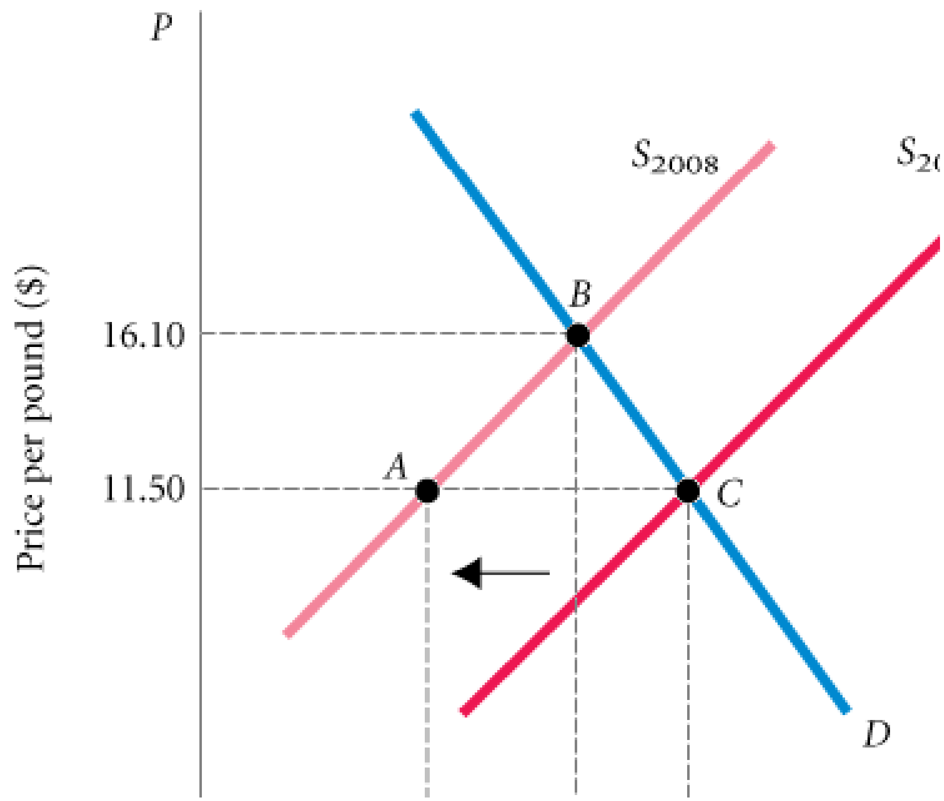
- Demand curves reflect what people are willing and able to pay for products; demand curves are influenced by incomes, wealth, preferences, prices of other goods, and expectations.
- Firms in business to make a profit have a good reason to choose the best available technology—lower costs mean higher profits.
- When a good is in short supply, price rises. As it does, those who are willing and able to continue buying do so; others stop buying.

Applications of Demand and Supply

The Price System: Rationing and Allocating Resources

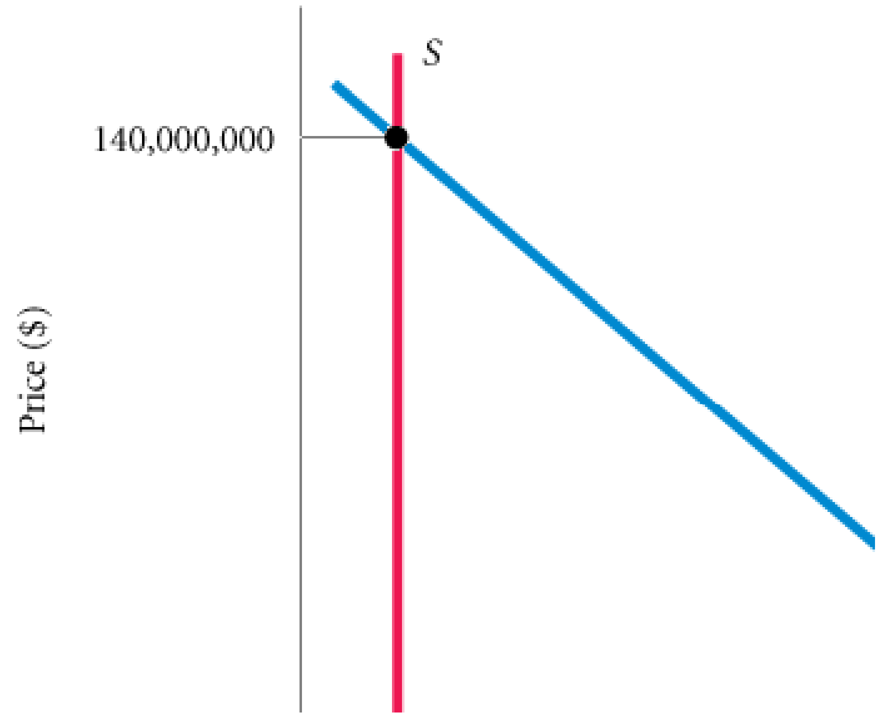
Price Rationing

price rationing The process by which the market system allocates goods and services to consumers when quantity demanded exceeds quantity supplied.



The Price System: Rationing and Allocating Resources

Price Rationing



The adjustment of price is the rationing mechanism in free markets. Price rationing means that whenever there is a need to ration a good—that is, when a shortage exists—in a free market, the price of the good will rise until quantity supplied equals quantity demanded—that is, until the market clears.

The Price System: Rationing and Allocating Resources

Constraints on the Market and Alternative Rationing Mechanisms

On occasion, both governments and private firms decide to use some mechanism other than the market system to ration an item for which there is excess demand at the current price.

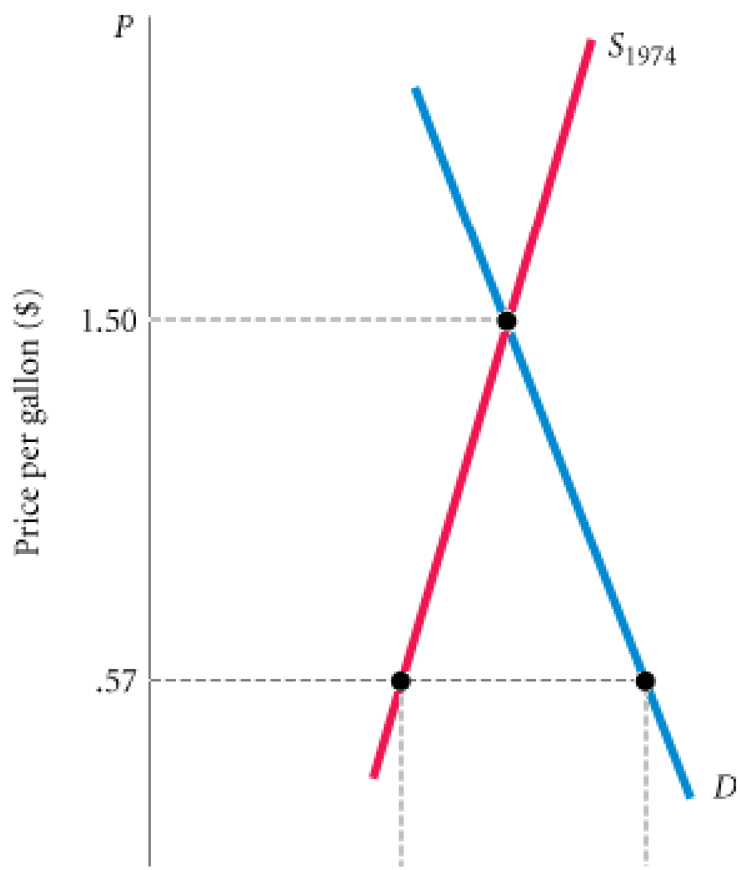
Regardless of the rationale, two things are clear:

1. Attempts to bypass price rationing in the market and to use alternative rationing devices are much more difficult and costly than they would seem at first glance.
2. Very often, such attempts distribute costs and benefits among households in unintended ways.

The Price System: Rationing and Allocating Resources

Constraints on the Market and Alternative Rationing Mechanisms

Oil, Gasoline, and OPEC



price ceiling A maximum price that sellers may charge for a good, usually set by government.

Because the price system was not allowed to function, an alternative rationing system had to be found to distribute the available supply of gasoline.

The Price System: Rationing and Allocating Resources

Constraints on the Market and Alternative Rationing Mechanisms

queuing Waiting in line as a means of distributing goods and services: a non-price rationing mechanism.

favored customers Those who receive special treatment from dealers during situations of excess demand.

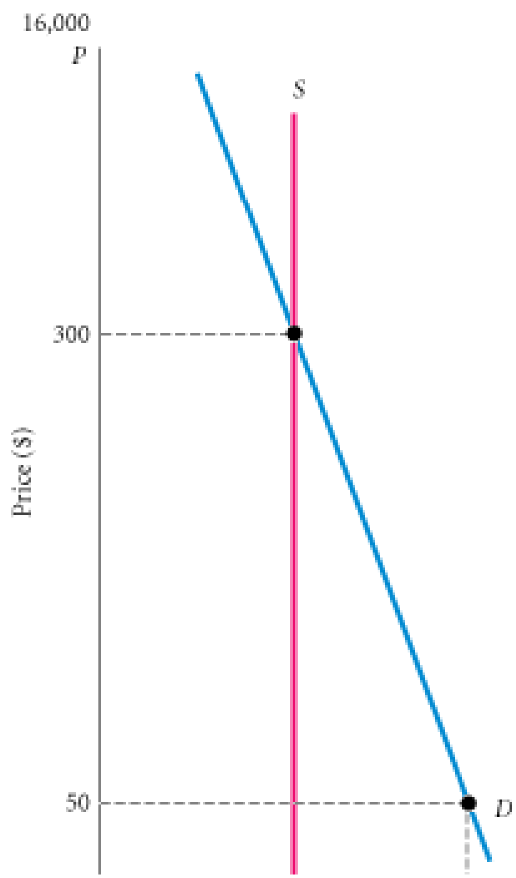
ration coupons Tickets or coupons that entitle individuals to purchase a certain amount of a given product per month.

black market A market in which illegal trading takes place at market-determined prices.

The Price System: Rationing and Allocating Resources

Constraints on the Market and Alternative Rationing Mechanisms

NCAA March Madness: College Basketball's National Championship



The Price System: Rationing and Allocating Resources

Constraints on the Market and Alternative Rationing Mechanisms

No matter how good the intentions of private organizations and governments, it is very difficult to prevent the price system from operating and to stop willingness to pay from asserting itself. Every time an alternative is tried, the price system seems to sneak in the back door. With favored customers and black markets, the final distribution may be even more unfair than that which would result from simple price rationing.

The Price System: Rationing and Allocating Resources

Prices and the Allocation of Resources

Price changes resulting from shifts of demand in output markets cause profits to rise or fall. Profits attract capital; losses lead to disinvestment. Higher wages attract labor and encourage workers to acquire skills. At the core of the system, supply, demand, and prices in input and output markets determine the allocation of resources and the ultimate combinations of things produced.

The Price System: Rationing and Allocating Resources

Prices and the Allocation of Resources

ECONOMICS IN PRACTICE

The Price Mechanism at Work for Shakespeare

Every summer, New York City puts on free performances of Shakespeare in the Park.

The true cost of a ticket is $0 plus the opportunity cost of the time spent in line.

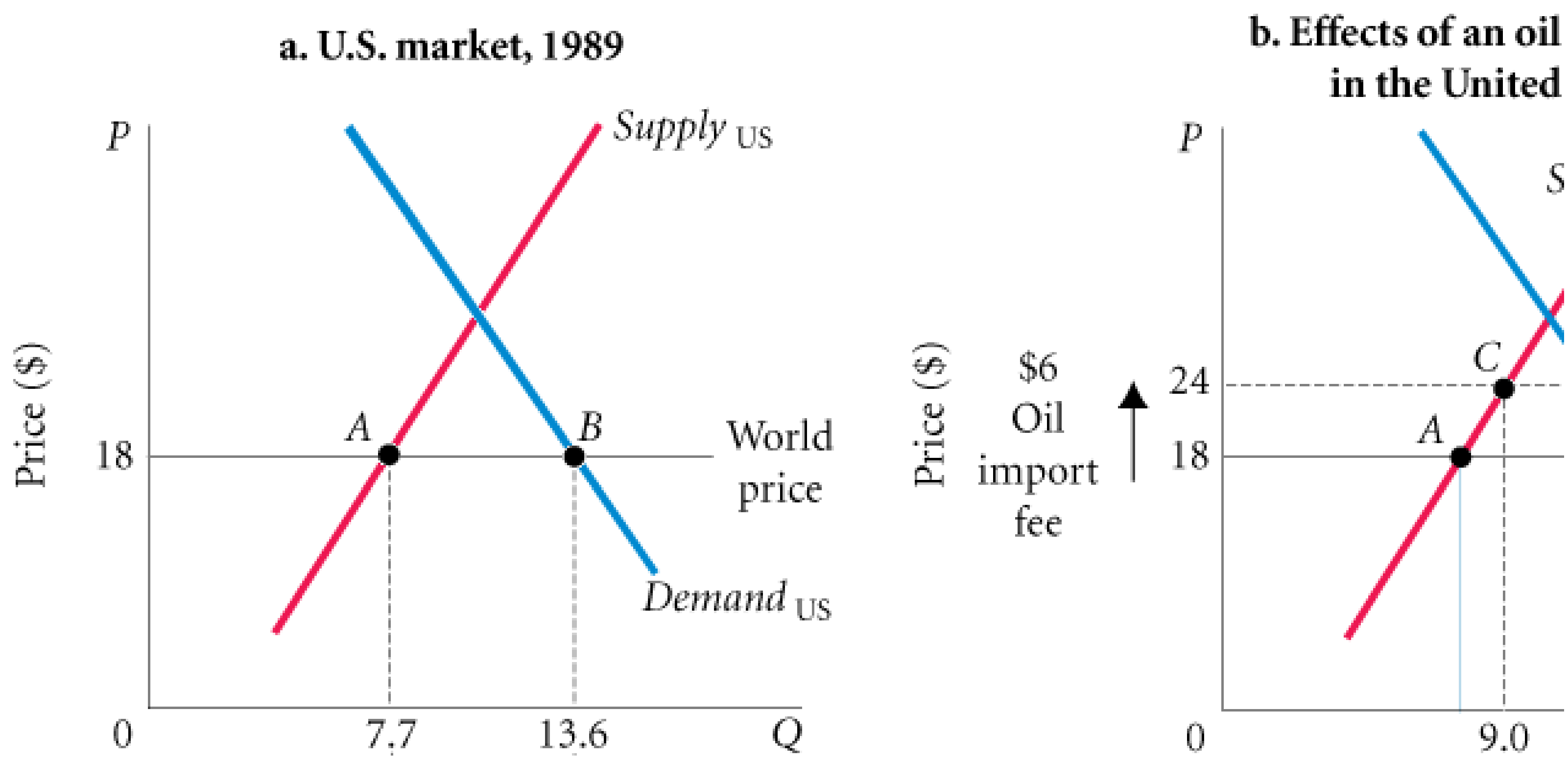
The Price System: Rationing and Allocating Resources

Price Floors

price floor A minimum price below which exchange is not permitted.

minimum wage A price floor set for the price of labor.

Supply and Demand Analysis: An Oil Import Fee



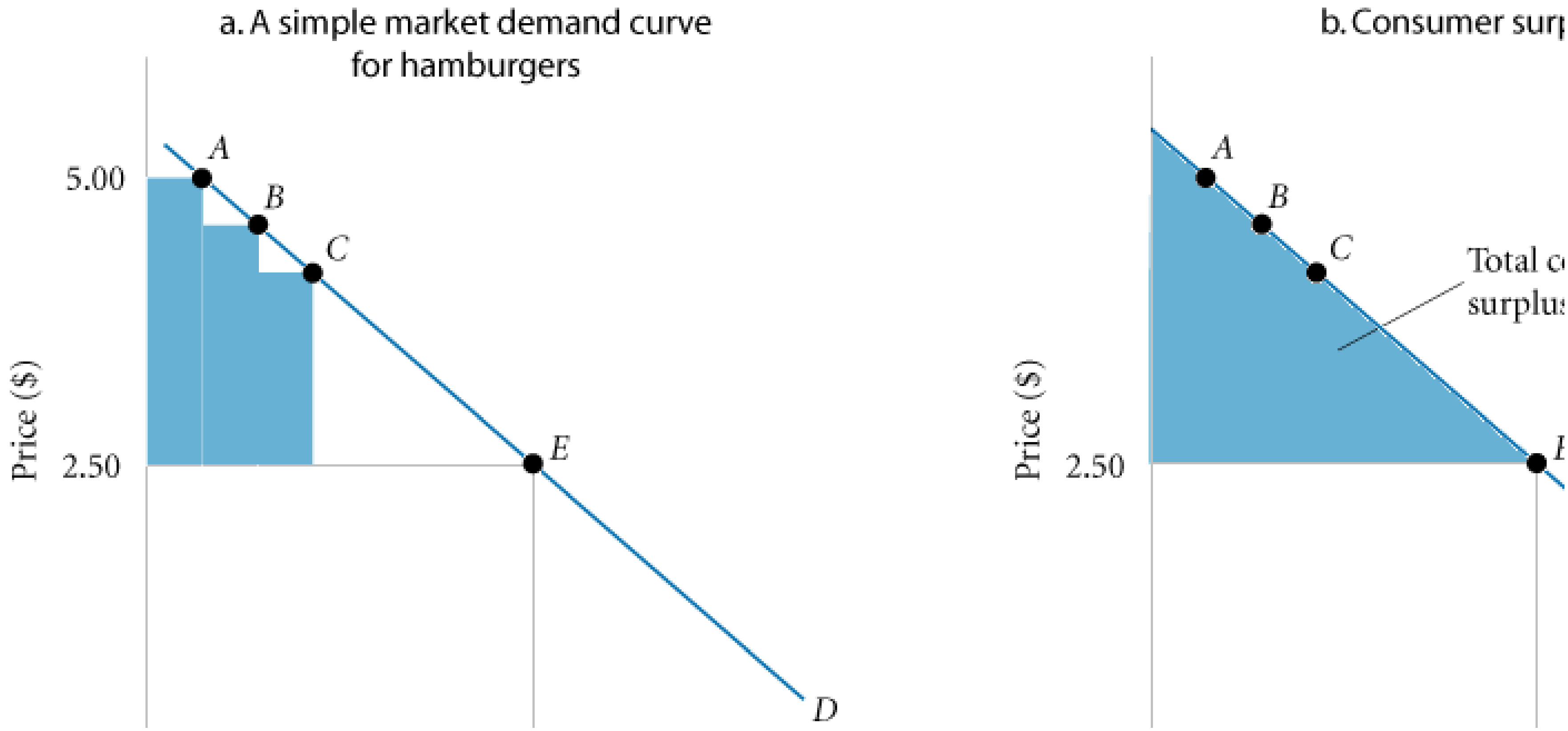
Supply and Demand and Market Efficiency

Consumer Surplus

consumer surplus The difference between the maximum amount a person is willing to pay for a good and its current market price.

Supply and Demand and Market Efficiency

Consumer Surplus



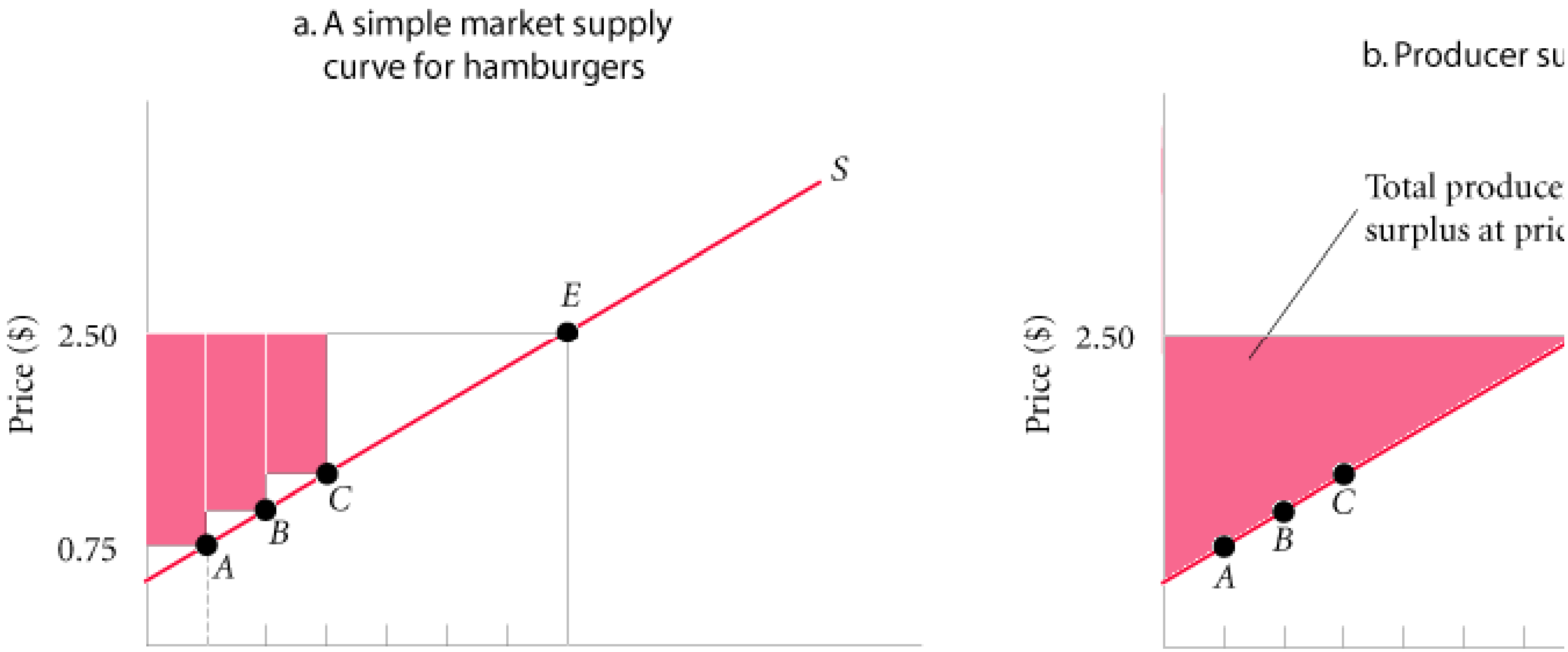
Supply and Demand and Market Efficiency

Producer Surplus

producer surplus The difference between the current market price and the full cost of production for the firm.

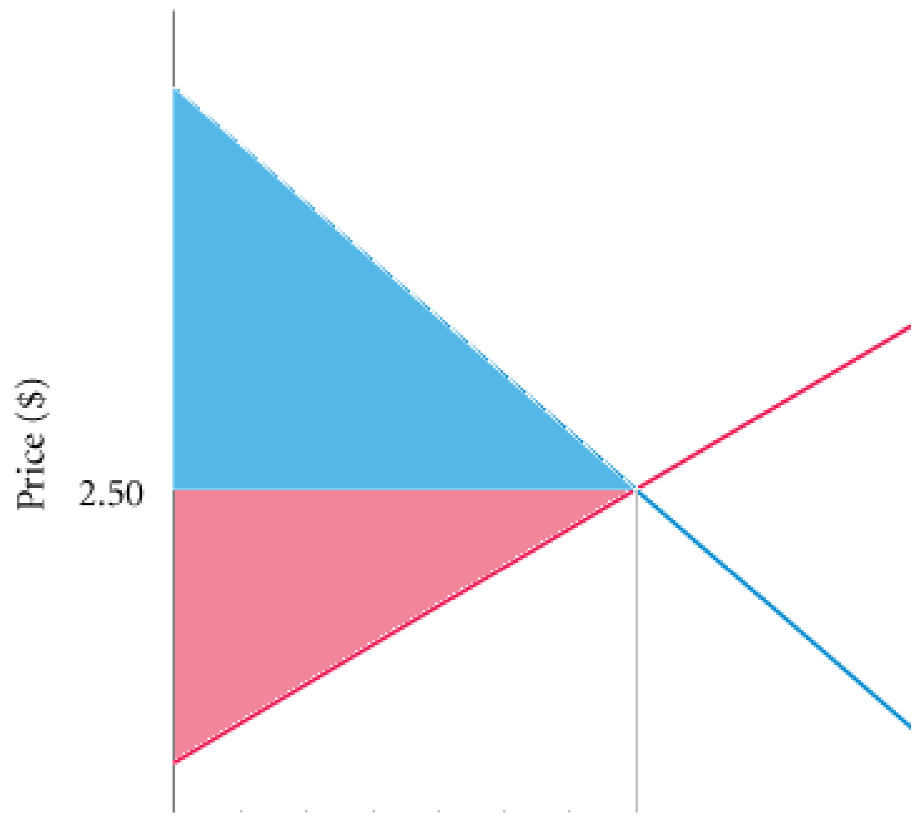
Supply and Demand and Market Efficiency

Producer Surplus



Supply and Demand and Market Efficiency

Competitive Markets Maximize the Sum of Producer and Consumer Surplus



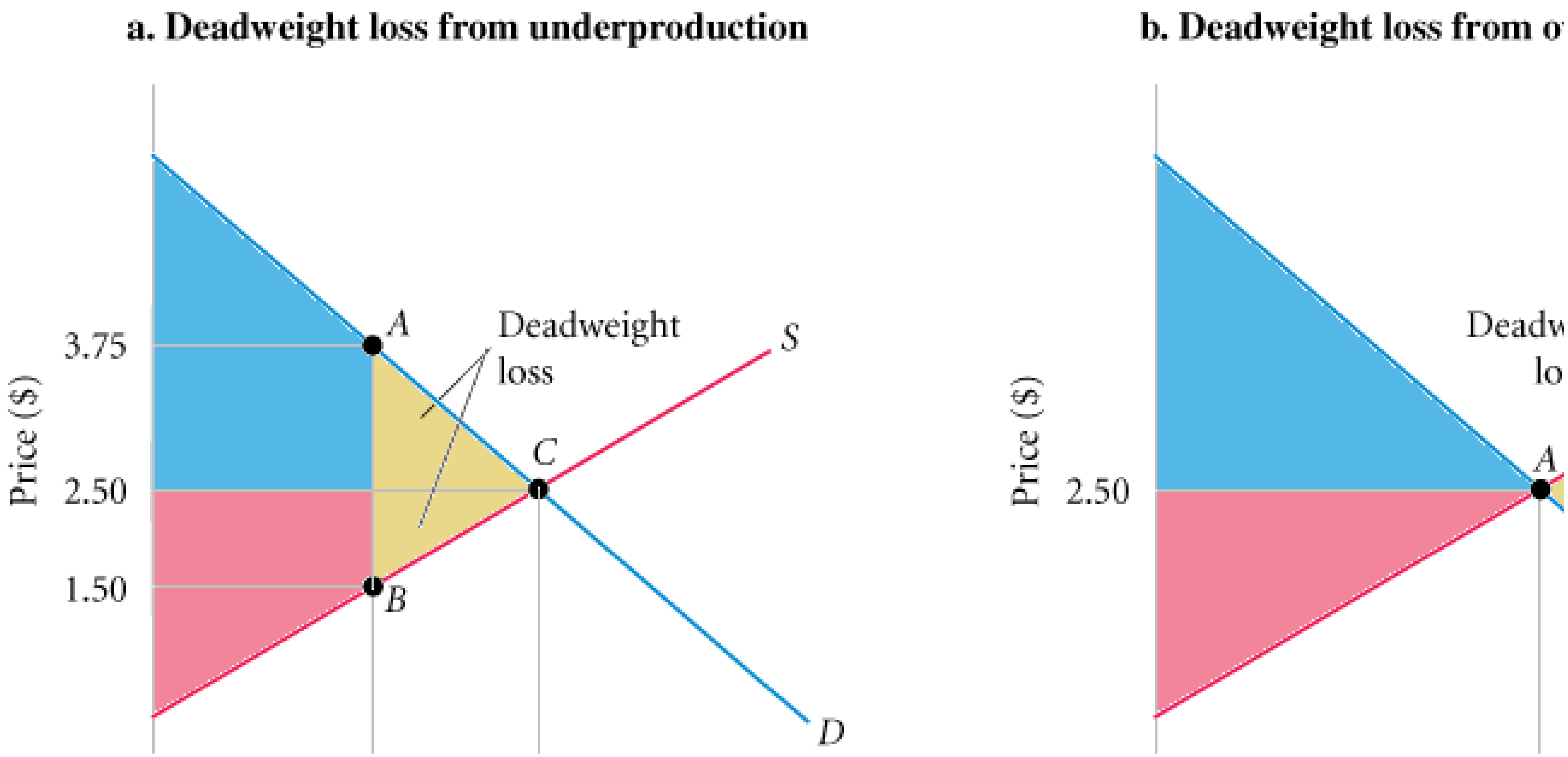
Total producer and consumer surplus is greatest where supply and demand curves intersect at equilibrium.

Supply and Demand and Market Efficiency

Competitive Markets Maximize the Sum of Producer and Consumer Surplus

deadweight loss The net loss of producer and consumer surplus from underproduction or overproduction.

Supply and Demand and Market Efficiency



Exercise

- The following relations describe demand and supply conditions in the lumber/forest products industry:

$$QD = 80{,}000 - 20{,}000P \text{ (Demand)}$$

$$QS = -20{,}000 + 20{,}000P \text{ (Supply)}$$

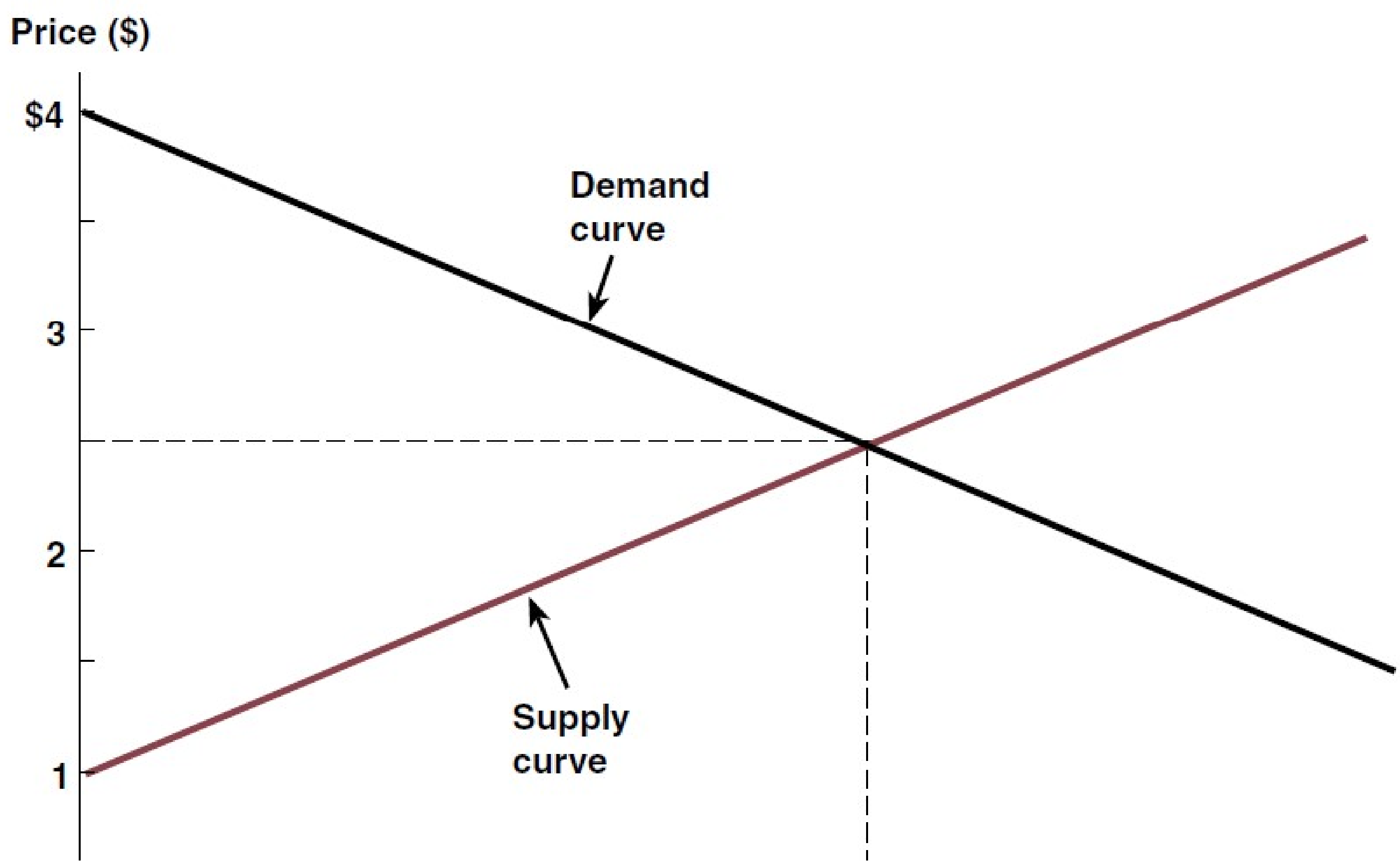
A. Set up a table or spreadsheet to illustrate the effect of price (*P*), *on the quantity supplied* (*QS*), *quantity demanded (QD), and the resulting surplus (+) or shortage (–) as represented* by the difference between the quantity demanded and the quantity supplied at various price levels. Calculate the value for each respective variable based on a range for *P from* \$1.00 to \$3.50 in increments of 10¢ (i.e., \$1.00, \$1.10, \$1.20, . . . \$3.50).

B. Using price (*P*) *on the vertical or Y-axis and quantity (Q) on the horizontal or X-axis, plot the* demand and supply curves for the lumber/forest products industry over the range of prices indicated previously.

Lumber and Forest Industry Supply and Demand Relationsh

Price	Quantity Demanded	Quantity Supplied	Surpl Shor
$1.00	60,000	0	–6
1.10	58,000	2,000	–5
1.20	56,000	4,000	–5
1.30	54,000	6,000	–4
1.40	52,000	8,000	–4
1.50	50,000	10,000	–4
1.60	48,000	12,000	–3
1.70	46,000	14,000	–3
1.80	44,000	16,000	–2
1.90	42,000	18,000	–2
2.00	40,000	20,000	–2
2.10	38,000	22,000	–1
2.20	36,000	24,000	–1
2.30	34,000	26,000	–
2.40	32,000	28,000	–
2.50	30,000	30,000	
2.60	28,000	32,000	
2.70	26,000	34,000	
2.80	24,000	36,000	1
2.90	22,000	38,000	1

Demand and Supply Curves for
Lumber Products



Elasticity

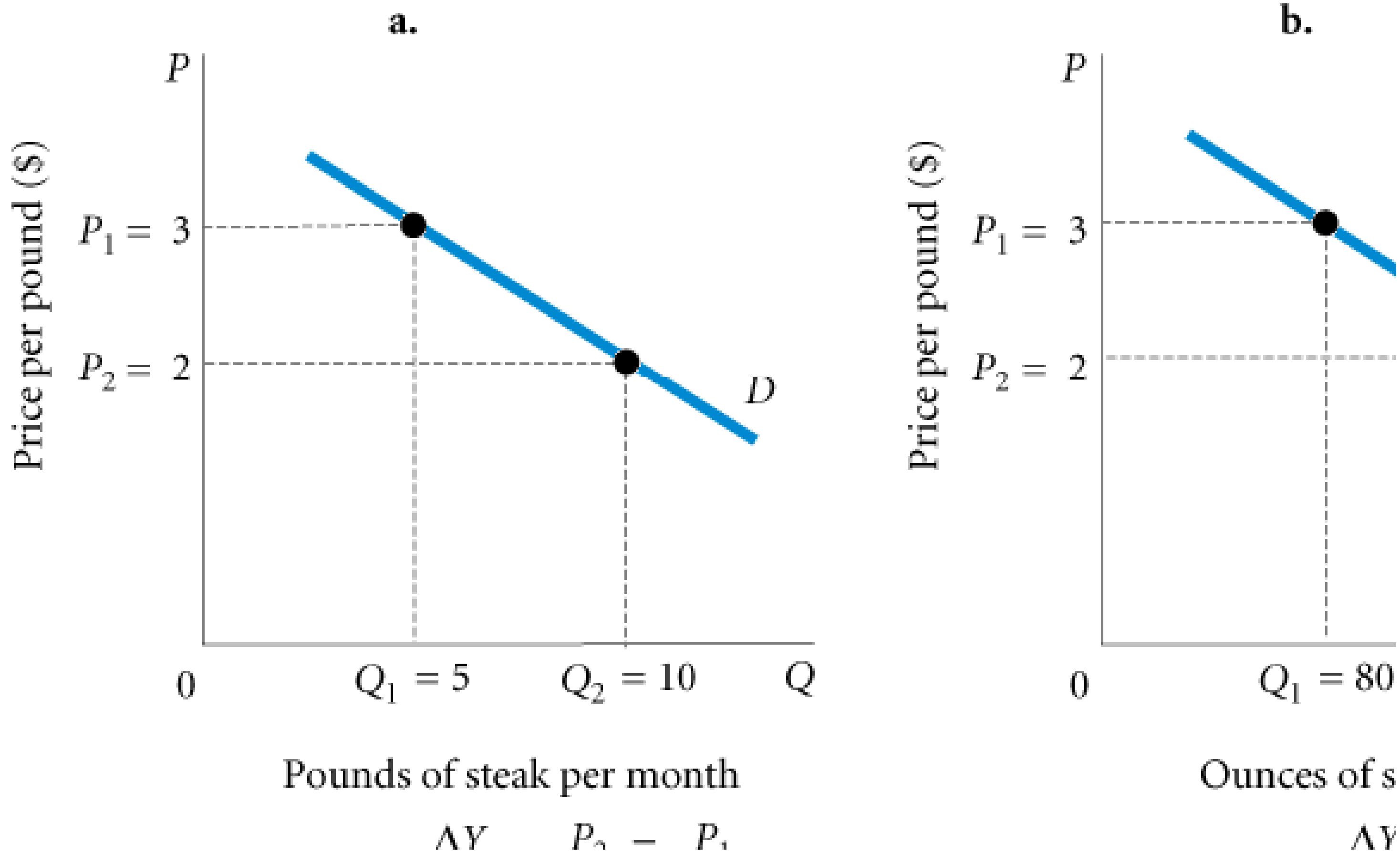
Elasticity

elasticity A general concept used to quantify the response in one variable when another variable changes.

$$\text{elasticity of } A \text{ with respect to } B = \frac{\%\Delta A}{\%\Delta B}$$

Price Elasticity of Demand

Slope and Elasticity



Price Elasticity of Demand

Slope and Elasticity

price elasticity of demand The ratio of the percentage of change in quantity demanded to the percentage of change in price; measures the responsiveness of quantity demanded to changes in price.

$$\text{price elasticity of demand} = \frac{\%\ \text{change in quantity demanded}}{\%\ \text{change in price}}$$

Price Elasticity of Demand

Types of Elasticity

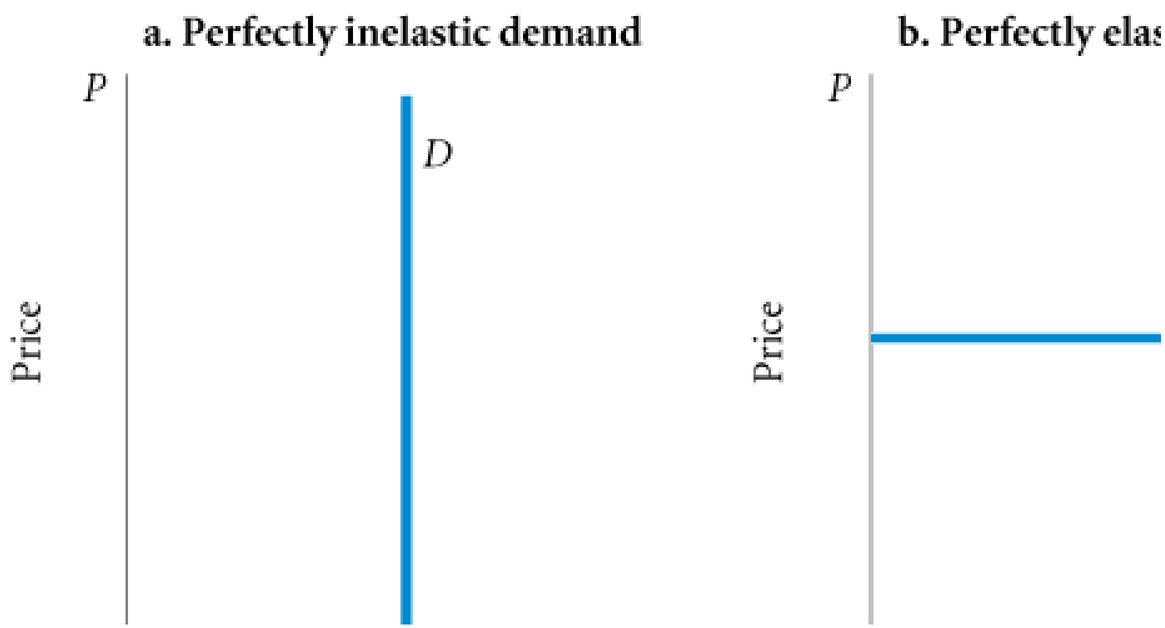
Hypothetical Demand Elasticities for Four Products

Product	**% Change In Price (% ΔP)**	**% Change In Quantity Demanded (% ΔQ_D)**	**Elasticity (% $\Delta Q_D \div \%\Delta P$)**	
Insulin	+10%	0%	0	→ Perfectly inelastic
Basic telephone service	+10%	-1%	-.1	→ Inelastic
Beef	+10%	-10%	-1.0	→ Unitarily elastic
Bananas	+10%	-30%	-3.0	→ Elastic

perfectly inelastic demand Demand in which quantity demanded does not respond at all to a change in price.

Price Elasticity of Demand

Types of Elasticity



Price Elasticity of Demand

Types of Elasticity

inelastic demand Demand that responds somewhat, but not a great deal, to changes in price. Inelastic demand always has a numerical value between zero and -1.

A warning: You must be very careful about signs. Because it is generally understood that demand elasticities are negative (demand curves have a negative slope), they are often reported and discussed without the negative sign.

Price Elasticity of Demand

Price $\rightarrow$ $P \propto \frac{1}{Q}$ $E = -ve$

Types of Elasticity

$(1.6) \rightarrow 1.6$

$(0.6) \rightarrow 0.6$

unitary elasticity A demand relationship in which the percentage change in quantity of a product demanded is the same as the percentage change in price in absolute value (a demand elasticity of -1).

elastic demand A demand relationship in which the percentage change in quantity demanded is larger than the percentage change in price in absolute value (a demand elasticity with an absolute value greater than 1).

perfectly elastic demand Demand in which quantity drops to zero at the slightest increase in price.

Price Elasticity of Demand

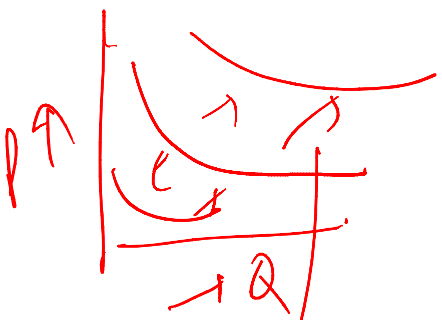
DD / SS

eq point

excess / surplus

deficit / Shortage

Types of Elasticity



A good way to remember the difference between the two “perfect” elasticities is:

Perfectly Elastic

and Perfectly Inelastic

Agriculture commodities

necessity

magnitude

Inelastic

Unitarily elastic

elastic

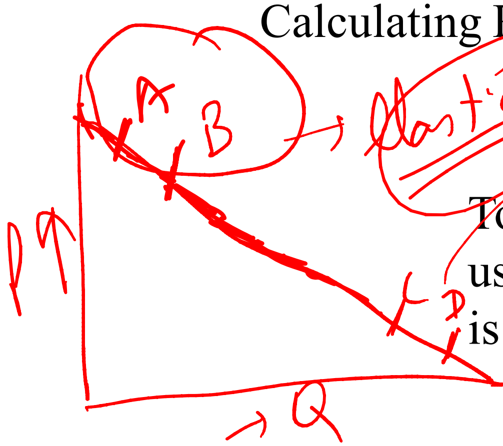
25$

less

Calculating Elasticities

$\pi = TR - TC = P \times Q - (FC + VC)$

Calculating Percentage Changes



elastic

Inelastic

To calculate percentage change in quantity demanded using the initial value as the base, the following formula is used:

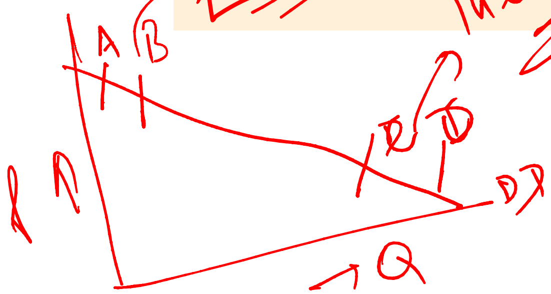
$$\%\ \text{change in quantity demanded} = \frac{\text{change in quantity demanded}}{Q_1} \times 100\%$$

$$= \frac{Q_2 - Q_1}{Q_1} \times 100\%$$

$(Q_1 + Q_2)/2$

elastic

Inelastic



Arc price elasticity

mid-point formula for calculation of elasticity

Calculating Elasticities

Calculating Percentage Changes

↑P ↓P

TR↑ TC ↑

We can calculate the percentage change in price in a similar way. Once again, let us use the initial value of P—that is, P_1—as the base for calculating the percentage. By using P_1 as the base, the formula for calculating the percentage of change in P is

$$\%\text{ change in price} = \frac{\text{change in price}}{P_1} \times 100\%$$

$$= \frac{P_2 - P_1}{P_1} \times 100\%$$

$\frac{P_1 + P_2}{2}$

Value of elasticity

0 → P.I.

∞ → P.E.

0.1-0.9 → In. Ela.

1 → Un

>1 → Elastic

Calculating Elasticities

Elasticity Is a Ratio of Percentages

Once all the changes in quantity demanded and price have been converted to percentages, calculating elasticity is a matter of simple division. Recall the formal definition of elasticity:

$$\text{price elasticity of demand} = \frac{\%\ \text{change in quantity demanded}}{\%\ \text{change in price}}$$

Calculating Elasticities

The Midpoint Formula

midpoint formula A more precise way of calculating percentages using the value halfway between P_1 and P_2 for the base in calculating the percentage change in price, and the value halfway between Q_1 and Q_2 as the base for calculating the percentage change in quantity demanded.

$$\%\text{ change in quantity demanded} = \frac{\text{change in quantity demanded}}{(Q_1 + Q_2)/2} \times 100\%$$

$$= \frac{Q_2 - Q_1}{(Q_1 + Q_2)/2} \times 100\%$$

Calculating Elasticities

The Midpoint Formula

Using the point halfway between P_1 and P_2 as the base for calculating the percentage change in price, we get

$$\% \text{ change in price} = \frac{\text{change in price}}{(P_1 + P_2)/2} \text{ x } 100\%$$

$$= \frac{P_2 - P_1}{(P_1 + P_2)/2} \text{ x } 100\%$$

Calculating Elasticities

The Midpoint Formula

First, Calculate Percentage Change in Quantity Demanded ($\%\Delta Q_D$):

$$\text{\% change in quantity demanded} = \frac{\text{change in quantity demanded}}{(Q_1 + Q_2)/2} \times 100\% = \frac{Q_2 - Q_1}{(Q_1 + Q_2)/2} \times 100\%$$

By substituting the numbers from Figure 5.1(a):

$$\text{\% change in quantity demanded} = \frac{10 - 5}{(5 + 10)/2} \times 100\% = \frac{5}{7.5} \times 100\% = 66.7\%$$

Next, Calculate Percentage Change in Price ($\%\Delta P$):

$$\text{\% change in price} = \frac{\text{change in price}}{(P_1 + P_2)/2} \times 100\% = \frac{P_2 - P_1}{(P_1 + P_2)>2} \times 100\%$$

Price elasticit
percentage ch
demanded an
change in pric

$$\frac{\%\Delta Q_D}{\%\Delta P} =$$

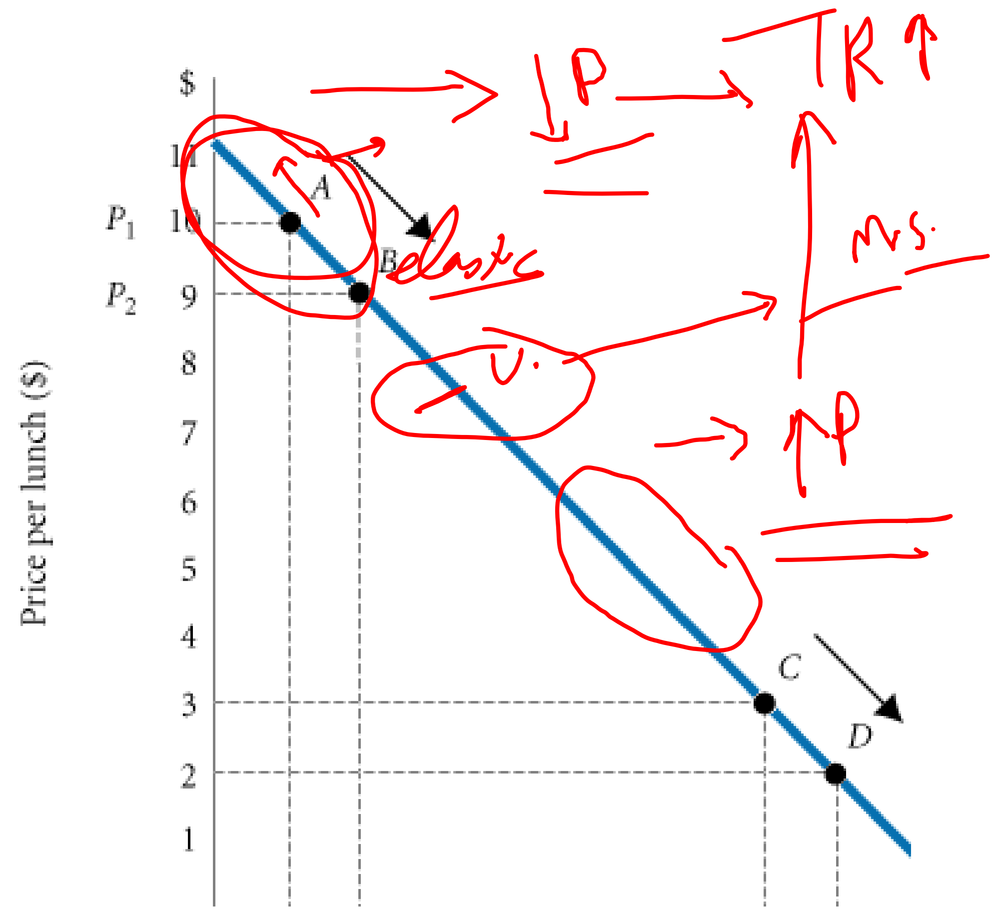
$=$

$= \mathbf{Pr}$

Calculating Elasticities

Elasticity Changes Along a Straight-Line Demand Curve

Demand Schedule for Office Dining Room Lunches	
Price (per Lunch)	**Quantity Demanded (Lunches per Month)**
$11	0
10	2
9	4
8	6
7	8
6	10
5	12
4	14
3	16
2	18
1	20
0	22



Calculating Elasticities

$\pi = TR - TC$

Elasticity and Total Revenue

$\downarrow P \qquad \uparrow P$

In any market, P x Q is total revenue (TR) received by producers:

$TR = P$ x Q

total revenue = price x quantity

When price (P) declines, quantity demanded (Q_D) increases. The two factors, P and Q_D move in opposite directions:

Effects of price changes on quantity demanded:

$P \uparrow \rightarrow Q_D \downarrow$

and

$P \downarrow \rightarrow Q_D \uparrow$

Calculating Elasticities

Elasticity and Total Revenue

Because total revenue is the product of P and Q, whether TR rises or falls in response to a price increase depends on which is bigger: the percentage increase in price or the percentage decrease in quantity demanded.

0.1–0.9 → Inelastic

10% – 2% = TR↑

Effects of price increase on a product with inelastic demand: $\uparrow P \times Q_D \downarrow = TR \uparrow$

If the percentage decline in quantity demanded following a price increase is larger than the percentage increase in price, total revenue will fall.

Effects of price increase on a product with ~~inelastic~~ elastic demand: $\uparrow P \times Q_D \downarrow = TR \downarrow$

Calculating Elasticities

Elasticity and Total Revenue

The opposite is true for a price cut. When demand is elastic, a cut in price increases total revenues:

effect of price cut on a product with elastic demand:	$\downarrow P \times Q_D \uparrow = TR \uparrow$

When demand is inelastic, a cut in price reduces total revenues:

effect of price cut on a product with inelastic demand:	$\downarrow P \times Q_D \uparrow = TR \downarrow$

The Determinants of Demand Elasticity

Availability of Substitutes

Perhaps the most obvious factor affecting demand elasticity is the availability of substitutes.

The Importance of Being Unimportant

When an item represents a relatively small part of our total budget, we tend to pay little attention to its price.

The Time Dimension

The elasticity of demand in the short run may be very different from the elasticity of demand in the long run. In the longer run, demand is likely to become more elastic, or responsive, simply because households make adjustments over time and producers develop substitute goods.

The Determinants of Demand Elasticity

ECONOMICS IN PRACTICE

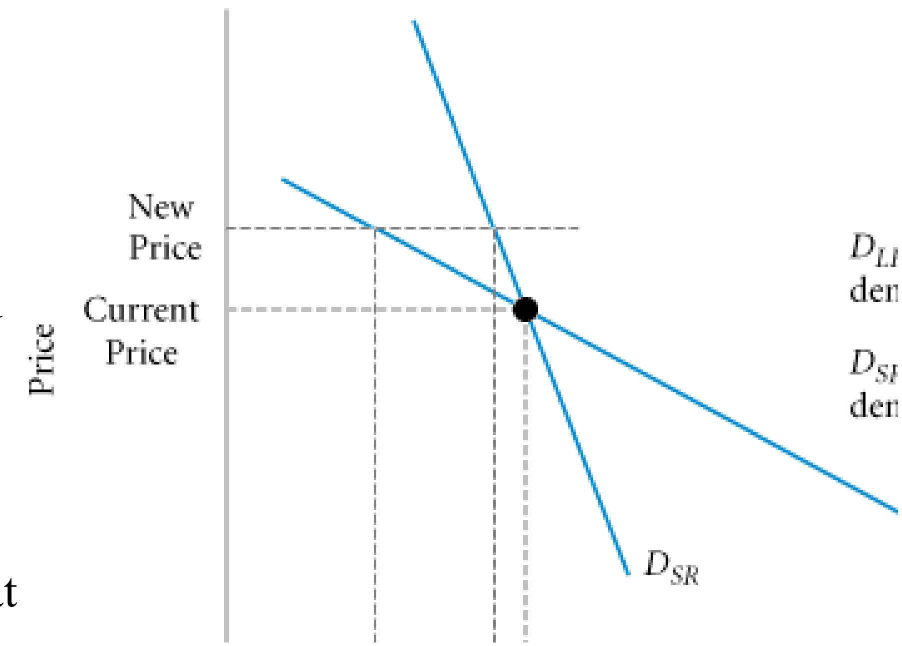
Bill aims to raise tax on cigarettes

Seattle Times

The Determinants of Demand Elasticity

ECONOMICS IN PRACTICE

The graph shows the expected relationship between long-run and short-run demand for Frank's sandwiches. Notice if you raise prices above the current level, the expected quantity change read off the short-run curve is less than that from the long-run curve.



Other Important Elasticities

Income Elasticity of Demand

income elasticity of demand A measure of the responsiveness of demand to changes in income.

$$\text{income elasticity of demand} = \frac{\%\text{ change in quantity demanded}}{\%\text{ change in income}}$$

Other Important Elasticities

Cross-Price Elasticity Of Demand

cross-price elasticity of demand A measure of the response of the quantity of one good demanded to a change in the price of another good.

$$\text{cross-price elasticity of demand} = \frac{\%\ \text{change in quantity of } Y \text{ demanded}}{\%\ \text{change in price of } X}$$

$= 0 \Rightarrow$ Unrelated

Other Important Elasticities

Elasticity Of Supply

elasticity of supply A measure of the response of quantity of a good supplied to a change in price of that good. Likely to be positive in output markets.

$$\text{elasticity of supply} = \frac{\%\ \text{change in quantity supplied}}{\%\ \text{change in price}}$$

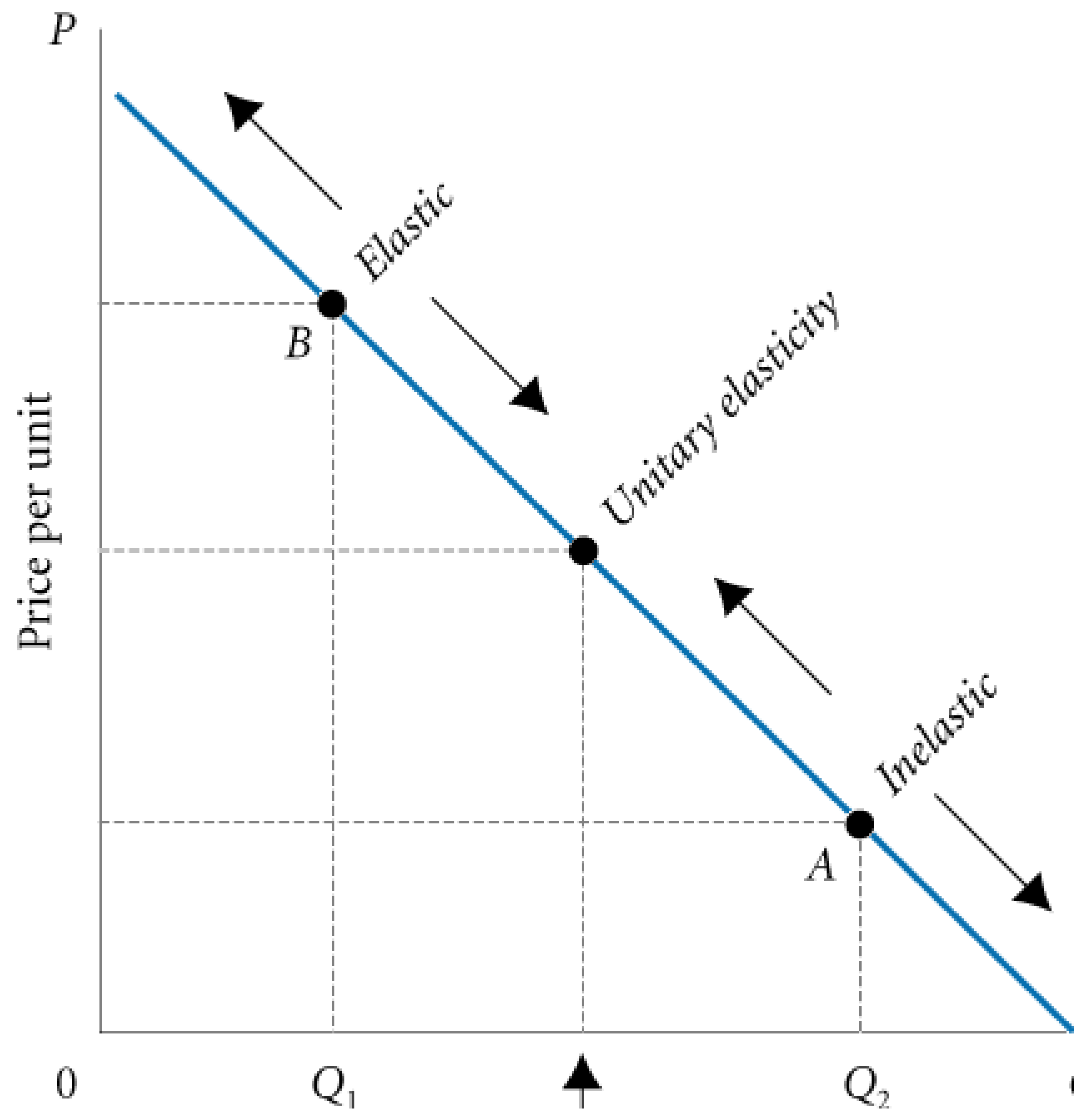
Other Important Elasticities

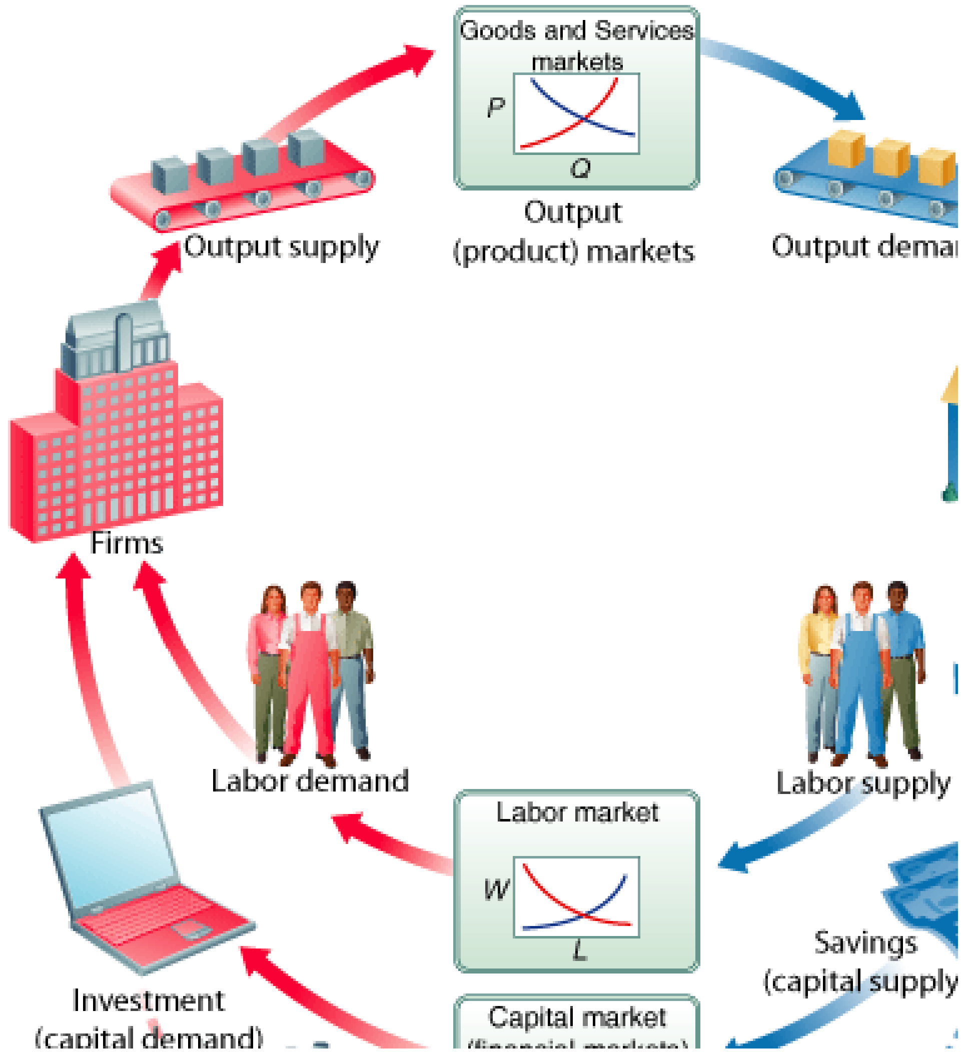
Elasticity Of Supply

elasticity of labor supply A measure of the response of labor supplied to a change in the price of labor.

$$\text{elasticity of labor supply} = \frac{\%\ \text{change in quantity of labor supplied}}{\%\ \text{change in the wage rate}}$$

POINT ELASTICITY





Goods and Services markets
P
Q
Output (product) markets
Output supply
Output dema
Firms
Labor demand
Labor supply
Labor market
W
L
Savings (capital supply
Investment (capital demand)
Capital market

Assumptions

perfect knowledge The assumption that households possess a knowledge of the qualities and prices of everything available in the market and that firms have all available information concerning wage rates, capital costs, and output prices.

perfect competition An industry structure in which there are many firms, each small relative to the industry and producing virtually identical products, and in which no firm is large enough to have any control over prices.

homogeneous products Undifferentiated outputs; products that are identical to or indistinguishable from one another.

Household Choice in Output Markets

The Determinants of Household Demand

Several factors influence the quantity of a given good or service demanded by a single household:

- The price of the product
- The income available to the household
- The household's amount of accumulated wealth
- The prices of other products available to the household
- The household's tastes and preferences
- The household's expectations about future income, wealth, and prices

Household Choice in Output Markets

The Budget Constraint

budget constraint The limits imposed on household choices by income, wealth, and product prices.

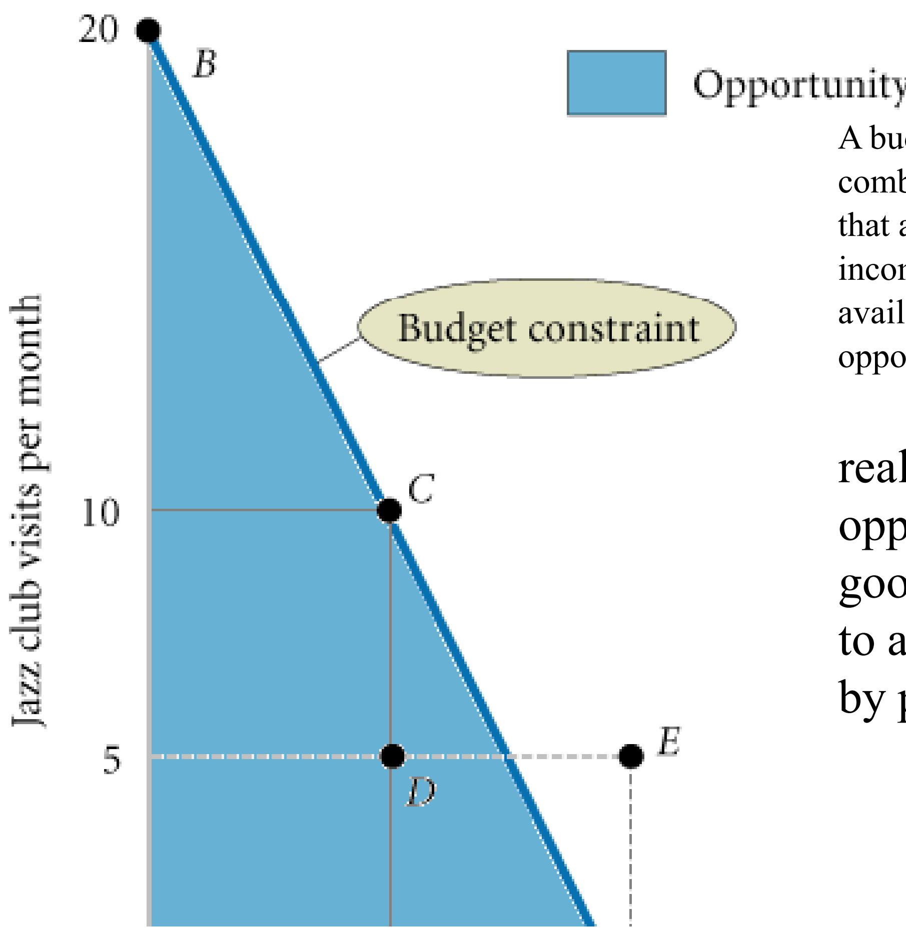
Possible Budget Choices of a Person Earning $1,000 Per Month After Taxes

Option	Monthly Rent	Food	Other Expenses	Total	Available ?
A	$ 400	$250	$350	$1,000	Yes
B	600	200	200	1,000	Yes
C	700	150	150	1,000	Yes
D	1,000	100	100	1,200	No

choice set or opportunity set The set of options that is defined and limited by a budget constraint.

Household Choice in Output Markets

Preferences, Tastes, Trade-Offs, and Opportunity Cost



A budget constraint separates those combinations of goods and services that are available, given limited income, from those that are not. The available combinations make up the opportunity set.

real income Set of opportunities to purchase real goods and services available to a household as determined by prices and money income.

HOUSEHOLD CHOICE IN OUTPUT MARKETS

The Equation Of The Budget Constraint

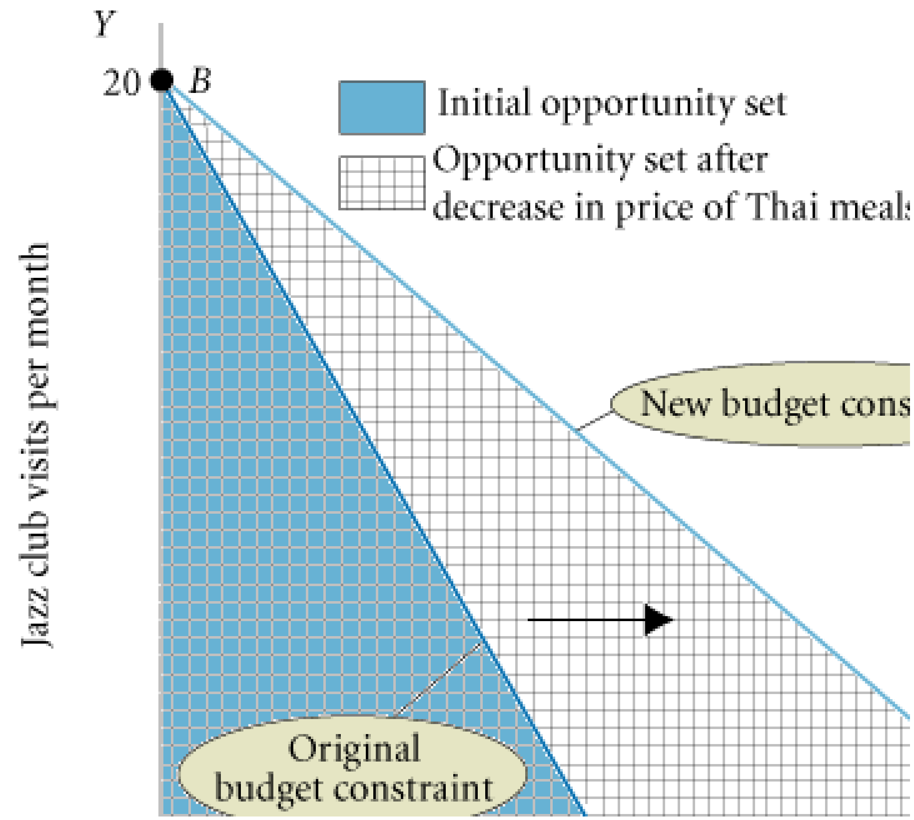
In general, the budget constraint can be written:

$$P_X X + P_Y Y = I,$$

where P_X = the price of X, X = the quantity of X consumed, P_Y = the price of Y, Y = the quantity of Y consumed, and I = household income.

HOUSEHOLD CHOICE IN OUTPUT MARKETS

Budget Constraints Change When Prices Rise or Fall



The Basis of Choice: Utility

utility The satisfaction, or reward, a product yields relative to its alternatives. The basis of choice.

Diminishing Marginal Utility

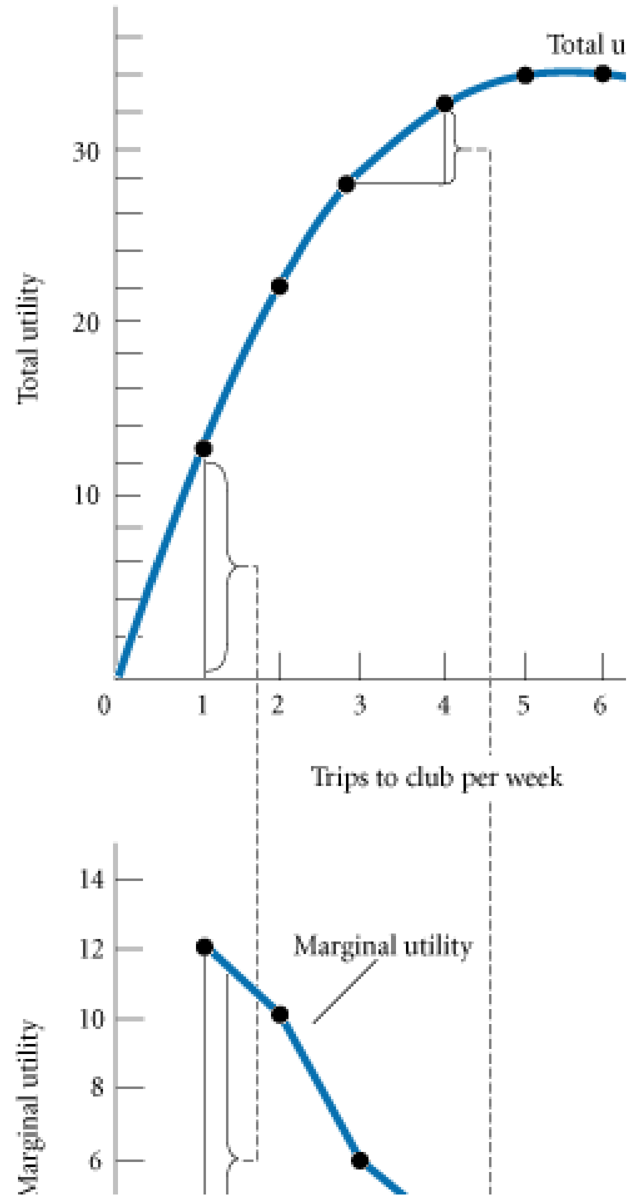
marginal utility (*MU*) The additional satisfaction gained by the consumption or use of one more unit of something.

total utility The total amount of satisfaction obtained from consumption of a good or service.

law of diminishing marginal utility The more of any one good consumed in a given period, the less satisfaction (utility) generated by consuming each additional (marginal) unit of the same good.

The Basis of Choice: Utility

Total Utility and Marginal Utility of Trips to the Club Per Week		
Trips to Club	**Total Utility**	**Marginal Utility**
1	12	12
2	22	10
3	28	6
4	32	4
5	34	2
6	34	0



Trips to club	Total Utility
1	12
2	22
3	28
4	32
5	34
6	34

Basketball game	Total Utility
1	21
2	33
3	42
4	48
5	51
6	51

PT = $3; PB = 6$

The Basis of Choice: Utility

Allocating Income To Maximize Utility

Allocation of Fixed Expenditure per Week Between Two Alternatives

(1) Trips to Club per Week	(2) Total Utility	(3) Marginal Utility (*MU*)	(4) Price (*P*)	(5) Marginal Utility per Dollar (*MU*/P)
1	12	12	$3.00	4.0
2	22	10	3.00	3.3
3	28	6	3.00	2.0
4	32	4	3.00	1.3
5	34	2	3.00	0.7
6	34	0	3.00	0

(1) Basketball Games per Week	(2) Total Utility	(3) Marginal Utility (*MU*)	(4) Price (*P*)	(5) Marginal Utility per Dollar (*MU/P*)
1	21	21	$6.00	3.5
2	33	12	6.00	2.0
3	42	9	6.00	1.5
4	48	6	6.00	1.0
5	51	3	6.00	.5
6	51	0	6.00	0

The Basis of Choice: Utility

The Utility-Maximizing Rule

In general, utility-maximizing consumers spread out their expenditures until the following condition holds:

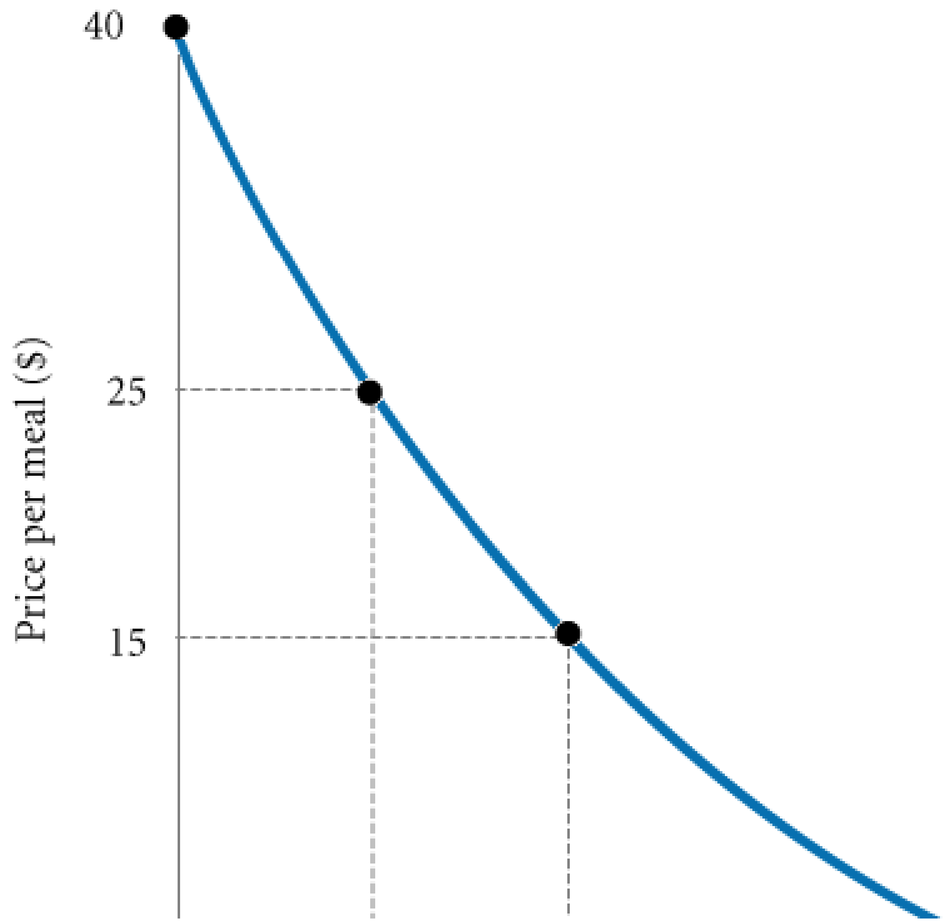
$$\text{utility-maximizing rule:} \quad \frac{MU_X}{P_X} = \frac{MU_Y}{P_Y} \quad \text{for all goods}$$

utility-maximizing rule Equating the ratio of the marginal utility of a good to its price for all goods.

diamond/water paradox A paradox stating that (1) the things with the greatest value in use frequently have little or no value in exchange and (2) the things with the greatest value in exchange frequently have little or no value in use.

The Basis of Choice: Utility

Diminishing Marginal Utility and Downward-Sloping Demand



Income and Substitution Effects

The Income Effect

Price changes affect households in two ways. First, if we assume that households confine their choices to products that improve their well-being, then a decline in the price of any product, *ceteris paribus*, will make the household unequivocally better off.

In other words, if a household continues to buy the same amount of every good and service after the price decrease, it will have income left over. That extra income may be spent on the product whose price has declined, hereafter called good *X*, or on other products.

The change in consumption of *X* due to this improvement in well-being is called the *income effect of a price change*.

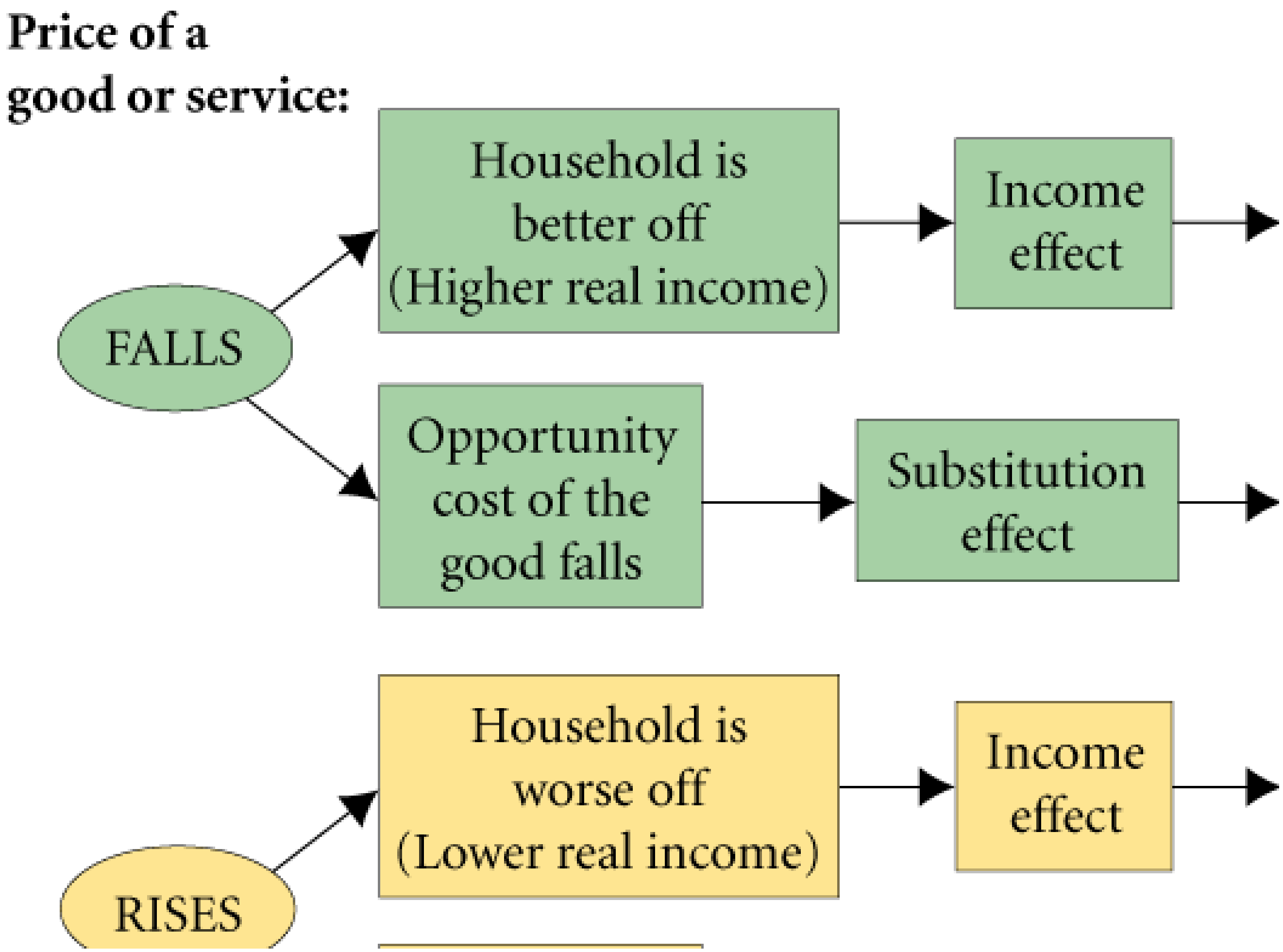
Income and Substitution Effects

The Substitution Effect

When the price of a product falls, that product also becomes relatively cheaper. That is, it becomes more attractive relative to potential substitutes. A fall in the price of product X might cause a household to shift its purchasing pattern away from substitutes toward X. This shift is called the *substitution effect of a price change*.

Everything works in the opposite direction when a price rises, ceteris paribus. When the price of a product rises, that item becomes more expensive relative to potential substitutes and the household is likely to substitute other goods for it.

Income and Substitution Effects



Household Choice in Input Markets

The Labor Supply Decision

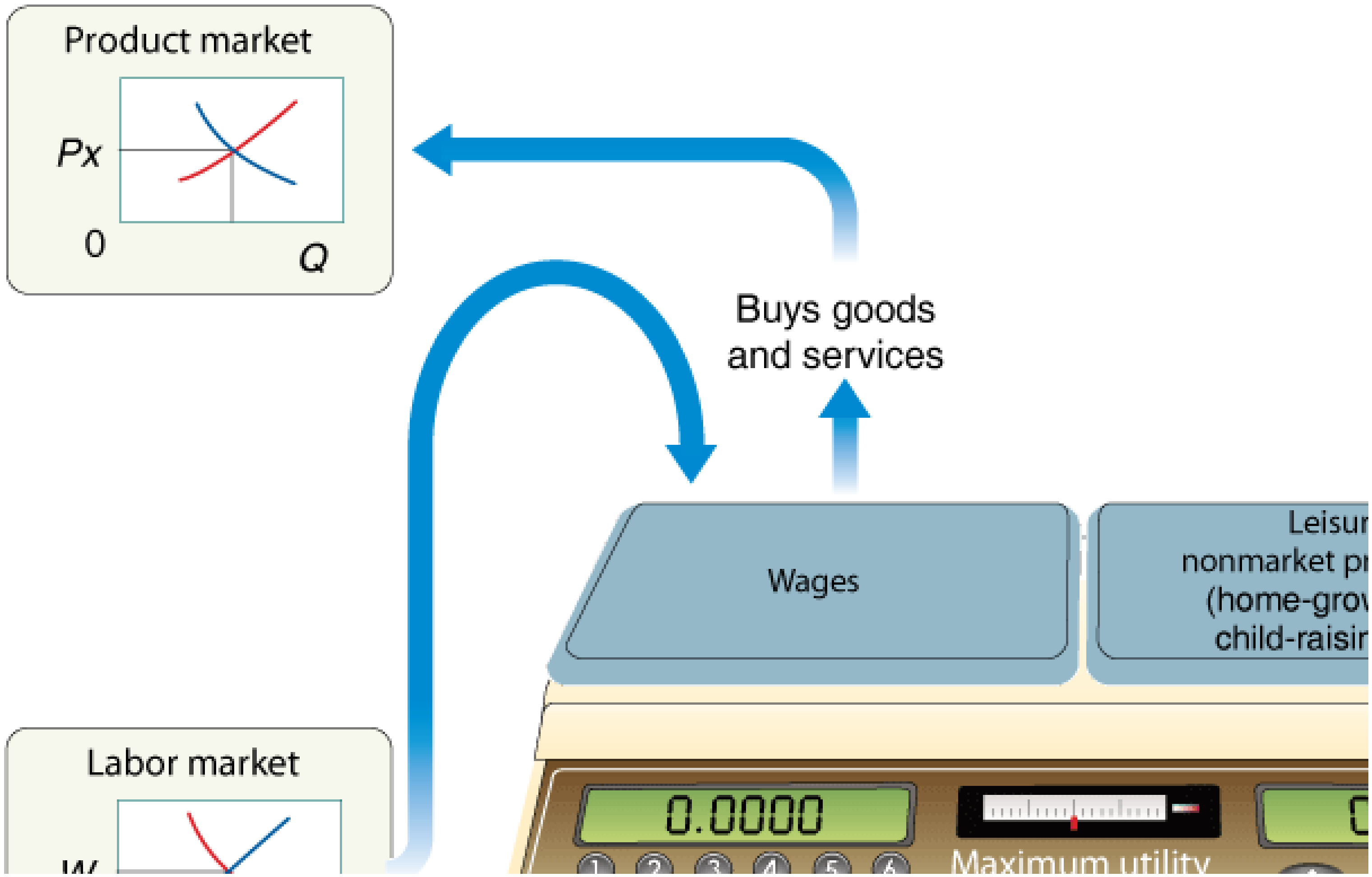
As in output markets, households face constrained choices in input markets. They must decide

1. Whether to work
2. How much to work
3. What kind of a job to work at

In essence, household members must decide how much labor to supply. The choices they make are affected by

1. Availability of jobs
2. Market wage rates
3. Skills they possess

Household Choice in Input Markets



Household Choice in Input Markets

The Price of Leisure

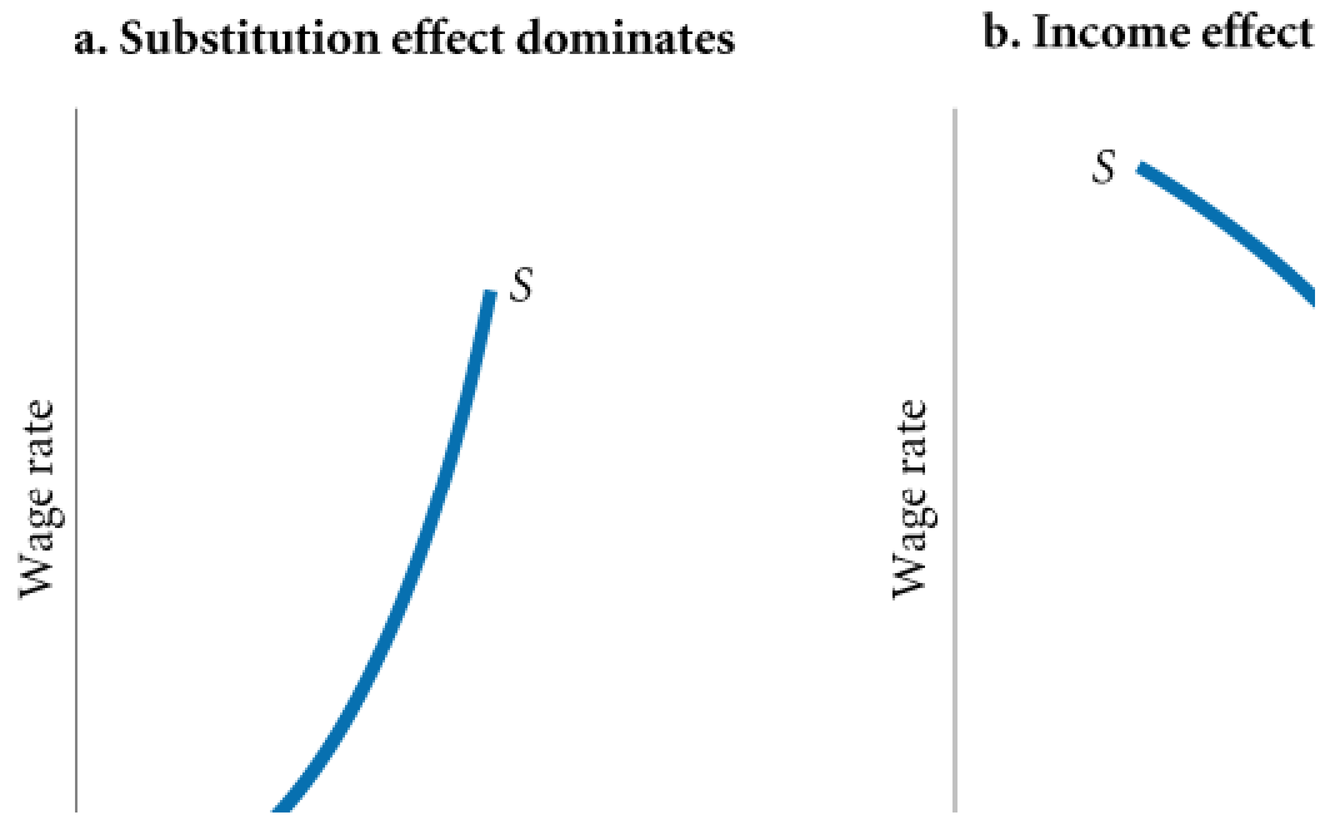
Trading off one good for another involves buying less of one and more of another, so households simply reallocate money from one good to the other. “Buying” more leisure, however, means reallocating time between work and nonwork activities. For each hour of leisure that I decide to consume, I give up one hour’s wages. Thus the wage rate is the *price of leisure*.

Household Choice in Input Markets

Income and Substitution Effects of a Wage Change

labor supply curve A curve that shows the quantity of labor supplied at different wage rates. Its shape depends on how households react to changes in the wage rate.

Household Choice in Input Markets



ECONOMICS IN PRACTICE

Google: Is It Work or Is It Leisure?

By providing many services at the workplace, Google has potentially affected the trade-off people make between work and leisure.

In the end, without increasing wages, Google may have reduced the marginal utility of leisure and made people more willing to work longer hours.

Household Choice in Input Markets

Saving and Borrowing: Present versus Future Consumption

Just as changes in wage rates affect household behavior in the labor market, changes in interest rates affect household behavior in capital markets.

Most empirical evidence indicates that saving tends to increase as the interest rate rises. In other words, the substitution effect is larger than the income effect.

financial capital market The complex set of institutions in which suppliers of capital (households that save) and the demand for capital (business firms wanting to invest) interact.

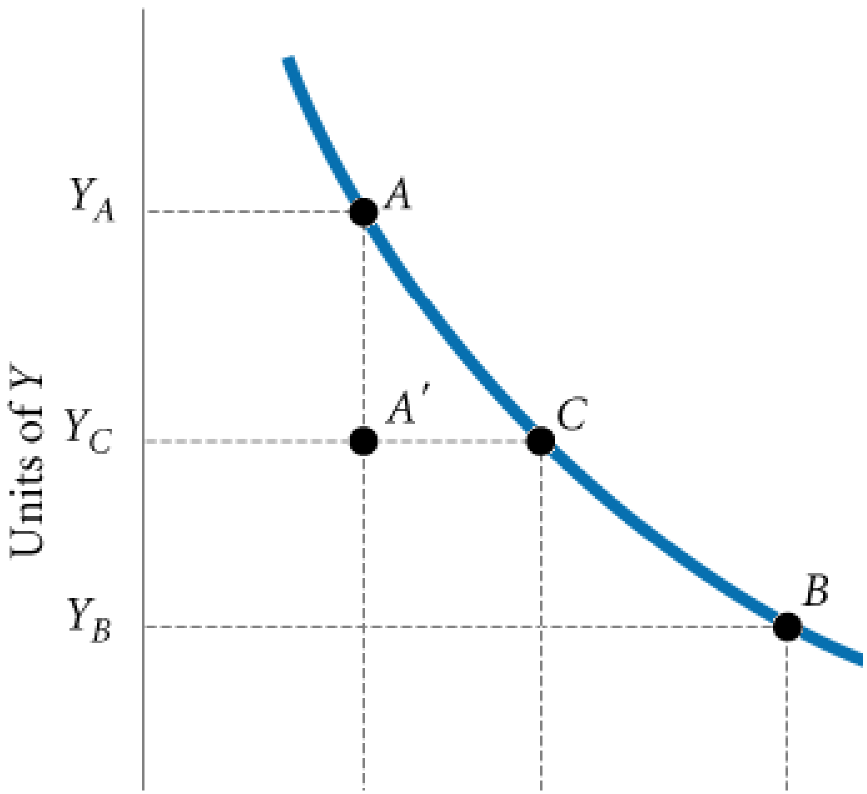
INDIFFERENCE CURVES

ASSUMPTIONS

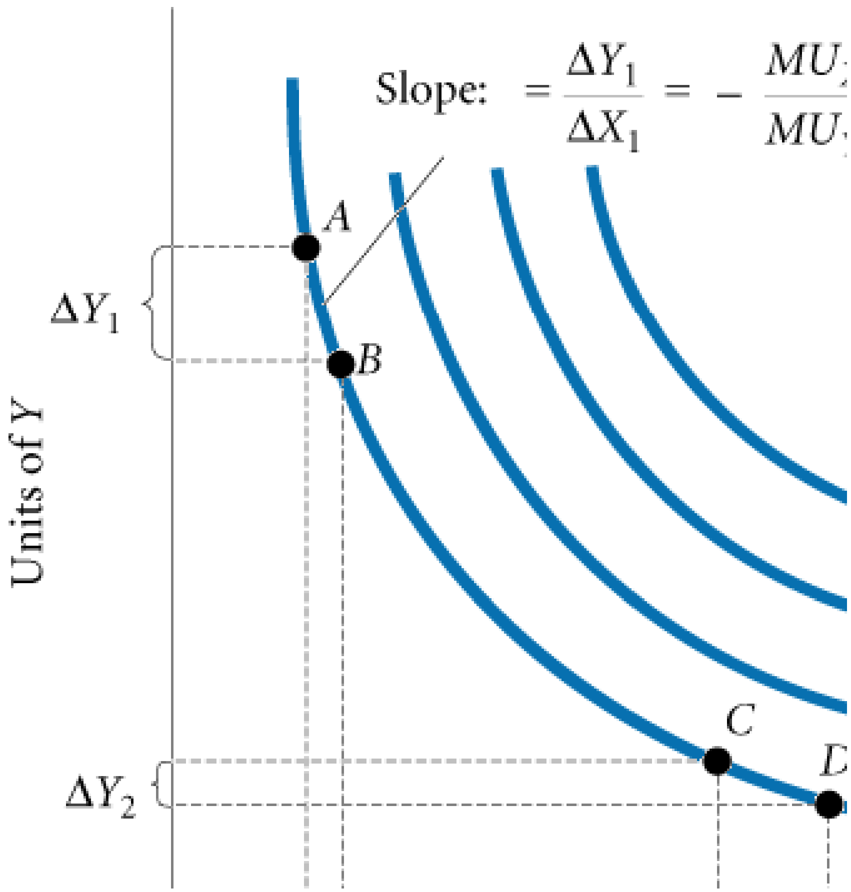
- We base the following analysis on four assumptions:

1. We assume that this analysis is restricted to goods that yield positive marginal utility, or, more simply, that "more is better."
2. The **marginal rate of substitution** is defined as MU_X/MU_Y, or the ratio at which a household is willing to substitute X for Y. We assume a diminishing marginal rate of substitution.
3. We assume that consumers have the ability to choose among the combinations of goods and services available.
4. We assume that consumer choices are consistent with a simple assumption of rationality.

DERIVING INDIFFERENCE CURVES



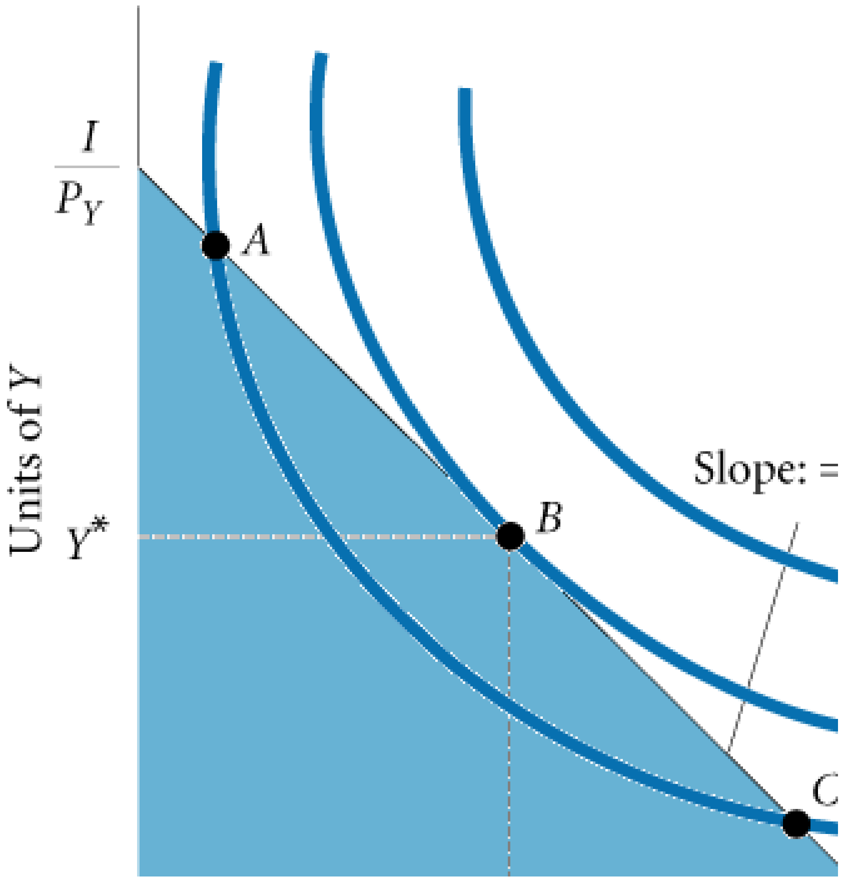
PROPERTIES OF INDIFFERENCE CURVES



$$MU_X \cdot \Delta X = -(MU_Y \cdot \Delta Y)$$

$$\frac{\Delta Y}{\Delta X} = -\left(\frac{MU_X}{MU_Y}\right)$$

The slope of an indifference curve is the ratio of the marginal utility of *X* to the marginal utility of *Y*, and it is negative.

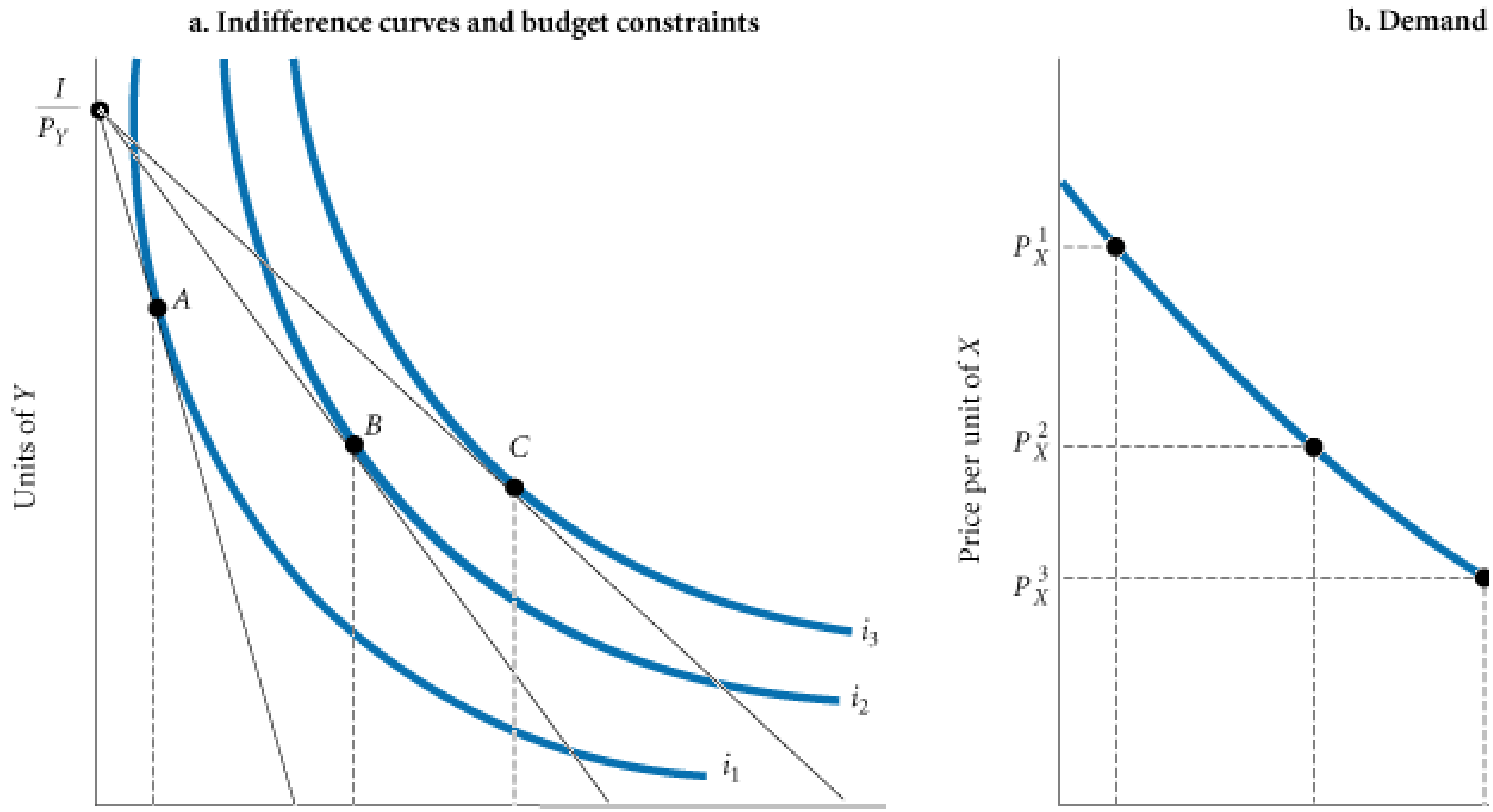


At point B:

$$-\frac{MU_X}{MU_Y} = -\frac{P_X}{P_Y}$$

$$\frac{MU_X}{P_X} = \frac{MU_Y}{P_Y}$$

DERIVING A DEMAND CURVE FROM INDIFFERENCE CURVES AND BUDGET CONSTRAINTS



1 2 3

1 2

The Production Process: The Behavior of Profit-maximizing Firms

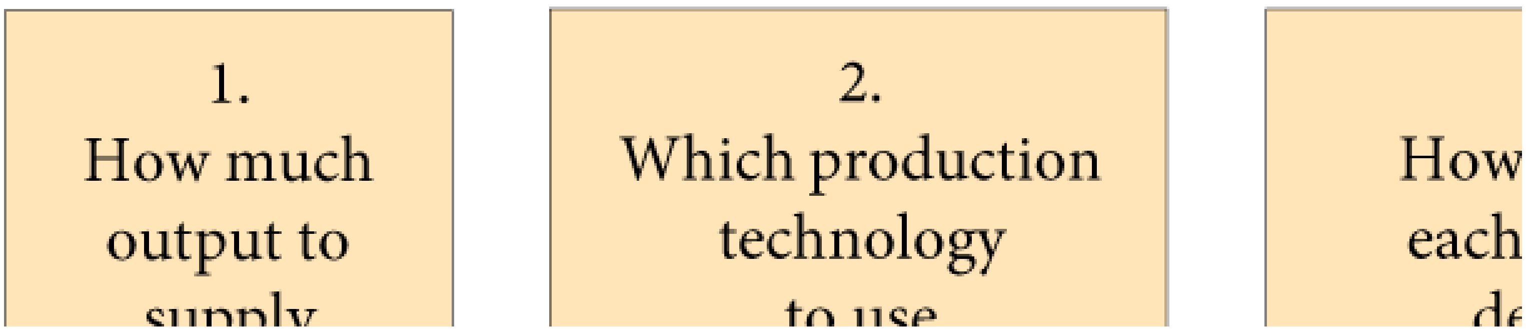
production The process by which inputs are combined, transformed, and turned into outputs.

Production Is Not Limited to Firms

firm An organization that comes into being when a person or a group of people decides to produce a good or service to meet a perceived demand. Most firms exist to make a profit.

The Behavior of Profit-Maximizing Firms

All firms must make several basic decisions to achieve what we assume to be their primary objective—maximum profits.



The Behavior of Profit-Maximizing Firms

Profits and Economic Costs

profit (economic profit) The difference between total revenue and total cost.

profit = total revenue - total cost

total revenue The amount received from the sale of the product (q x P).

The Behavior of Profit-Maximizing Firms

Profits and Economic Costs

total cost (total economic cost) The total of (1) out-of-pocket costs, (2) normal rate of return on capital, and (3) opportunity cost of each factor of production.

The term *profit* will from here on refer to *economic profit*. So whenever we say profit = total revenue - total cost, what we really mean is

economic profit = total revenue - total economic cost

The Behavior of Profit-Maximizing Firms

Profits and Economic Costs

Normal Rate of Return

normal rate of return A rate of return on capital that is just sufficient to keep owners and investors satisfied. For relatively risk-free firms, it should be nearly the same as the interest rate on risk-free government bonds.

Calculating Total Revenue, Total Cost, and Profit	
Initial Investment: Market Interest Rate Available:	**$20,000 0.10 or 10%**
Total revenue (3,000 belts x $10 each)	**$30,000**
Costs	
Belts from Supplier	$15,000
Labor cost	14,000
Normal return/Opportunity Cost of Capital ($20,000 x 0.10)	2,000
Total Cost	**$31,000**
Profit = total revenue - total cost	**–$1,000**

The Behavior of Profit-Maximizing Firms

Short-Run Versus Long-Run Decisions

short run The period of time for which two conditions hold: The firm is operating under a fixed scale (fixed factor) of production, and firms can neither enter nor exit an industry.

long run That period of time for which there are no fixed factors of production: Firms can increase or decrease the scale of operation, and new firms can enter and existing firms can exit the industry.

The Behavior of Profit-Maximizing Firms

The Bases of Decisions: Market Price of Outputs, Available Technology, and Input Prices

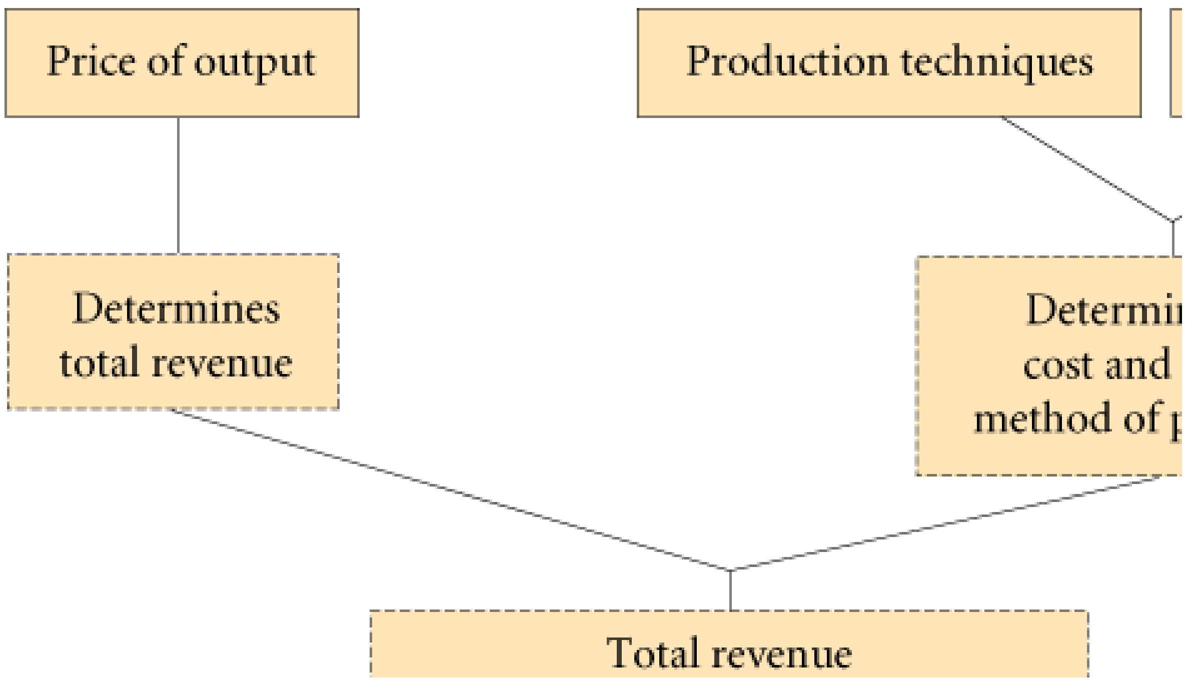
In the language of economics, I need to know three things:

1. The market price of output
2. The techniques of production that are available
3. The prices of inputs

Output price determines potential revenues. The techniques available tell me how much of each input I need, and input prices tell me how much they will cost. Together, the available production techniques and the prices of inputs determine costs.

The Behavior of Profit-Maximizing Firms

The Bases of Decisions: Market Price of Outputs, Available Technology, and Input Prices



optimal method of production The production method that minimizes cost.

The Production Process

production technology The quantitative relationship between inputs and outputs.

labor-intensive technology Technology that relies heavily on human labor instead of capital.

capital-intensive technology Technology that relies heavily on capital instead of human labor.

The Production Process

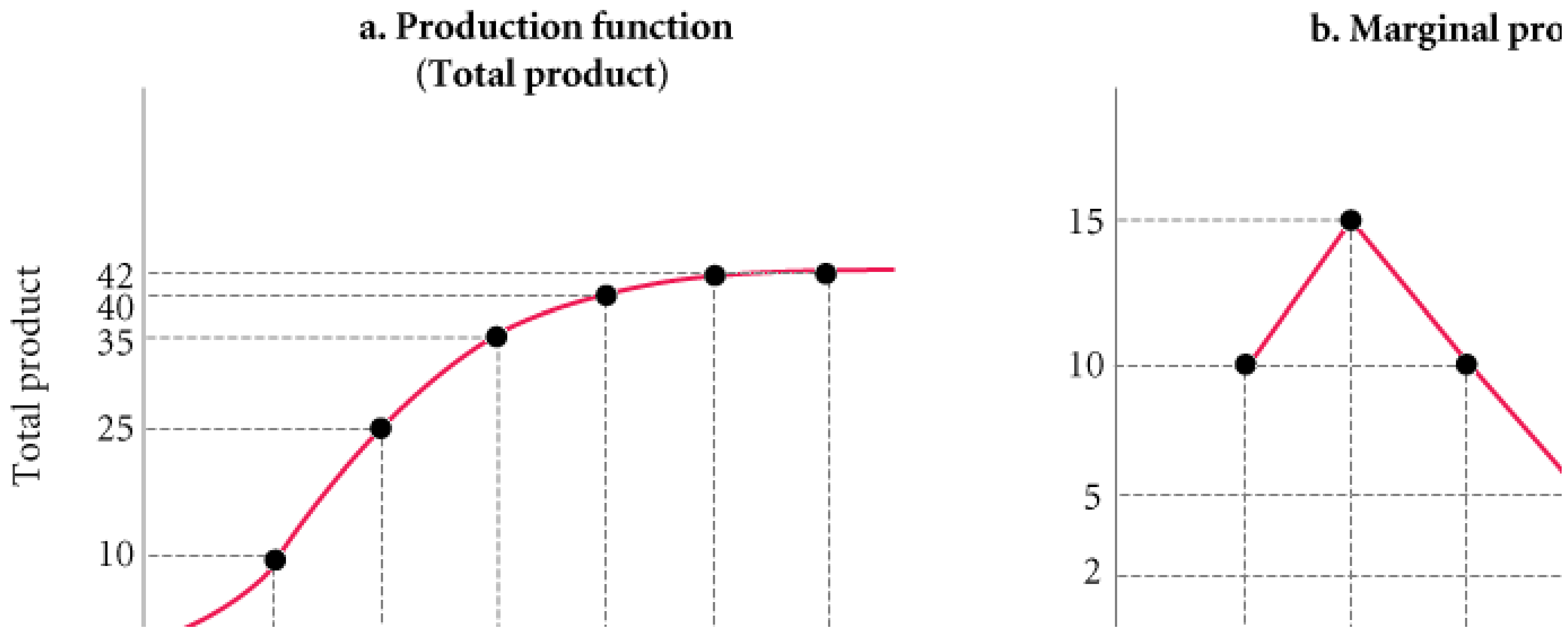
Production Functions: Total Product, Marginal Product, And Average Product

production function *or* total product function A numerical or mathematical expression of a relationship between inputs and outputs. It shows units of total product as a function of units of inputs.

Production Function			
(1) Labor Units (Employees)	**(2) Total Product (Sandwiches per Hour)**	**(3) Marginal Product of Labor**	**(4) Average Product of Labor (Total Product + Labor Units)**
0	0	–	–
1	10	10	10.0
2	25	15	12.5
3	35	10	11.7
4	40	5	10.0
5	42	2	8.4
6	42	0	7.0

The Production Process

Production Functions: Total Product, Marginal Product, And Average Product



The Production Process

Production Functions: Total Product, Marginal Product, And Average Product

Marginal Product and the Law of Diminishing Returns

marginal product The additional output that can be produced by adding one more unit of a specific input, *ceteris paribus*.

law of diminishing returns When additional units of a variable input are added to fixed inputs after a certain point, the marginal product of the variable input declines.

Diminishing returns always apply in the short run, and in the short run every firm will face diminishing returns. This means that every firm finds it progressively more difficult to increase its output as it approaches capacity production.

The Production Process

Production Functions: Total Product, Marginal Product, And Average Product

Marginal Product Versus Average Product

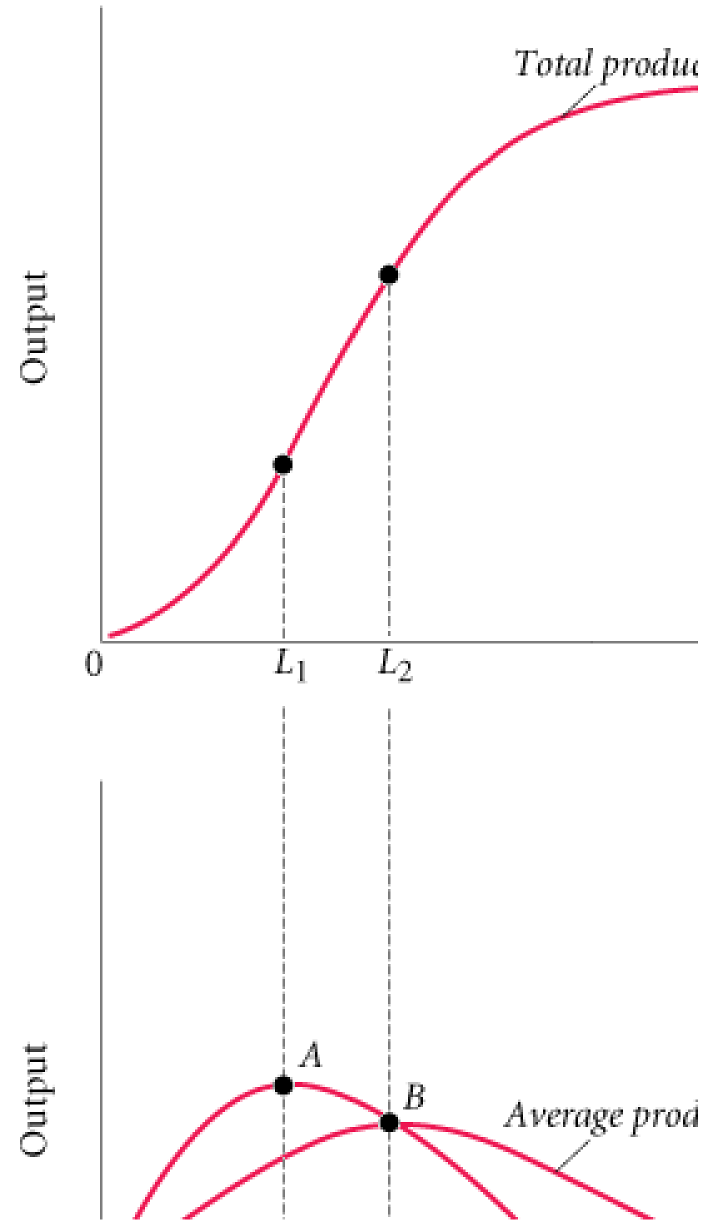
average product The average amount produced by each unit of a variable factor of production.

$$\text{average product of labor} = \frac{\text{total product}}{\text{total units of labor}}$$

The Production Process

Production Functions: Total Product, Marginal Product, And Average Product

Marginal Product Versus Average Product



The Production Process

Production Functions with Two Variable Factors of Production

ECONOMICS IN PRACTICE

How Fast Should a Truck Driver Go?

Modern technology, in the form of on-board computers, allows a modern trucking firm to monitor driving speed and instructs drivers.

Choice of Technology

Inputs Required to Produce 100 Diapers Using Alternative Technologies		
Technology	Units of Capital (K)	Units of Labor (L)
A	2	10
B	3	6
C	4	4
D	6	3
E	10	2

Cost-Minimizing Choice Among Alternative Technologies (100 Diapers)				
			(4)	(5)
			Cost = $(L \times P_L) + (K \times P_K)$	
(1) Technology	(2) Units of Capital (K)	(3) Units of Labor (L)	PL= \$1 PK = \$1	PL = \$5 PK = \$1
A	2	10	\$12	\$52
B	3	6	9	33
C	4	4	8	24
D	6	3	9	21
E	10	2	12	20

Choice of Technology

Two things determine the cost of production: (1) technologies that are available and (2) input prices. Profit-maximizing firms will choose the technology that minimizes the cost of production given current market input prices.

ECONOMICS IN PRACTICE

UPS Technology Speeds Global Shipping

New UPS Technologies Aim to Speed Worldwide Package Delivery

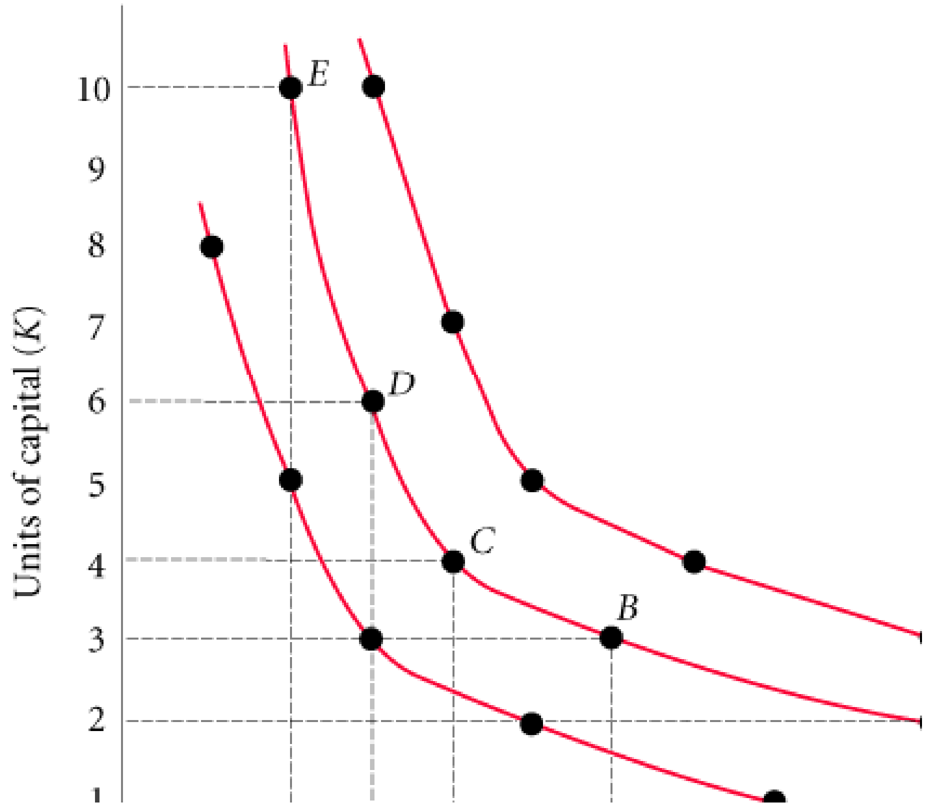
Information Week

ISOQUANTS AND ISOCOSTS

NEW LOOK AT TECHNOLOGY: ISOQUANTS

Alternative Combinations of Capital (*K*) and Labor (*L*) Required to Produce 50, 100, and 150 Units of Output

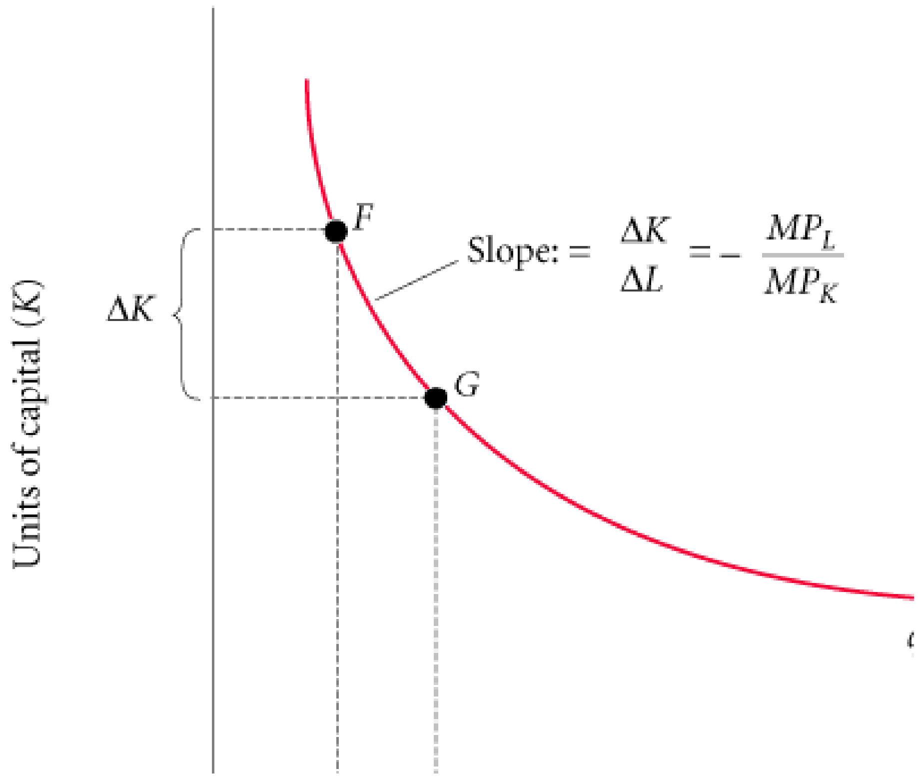
	$Q_X = 50$		$Q_X = 100$		$Q_X = 150$	
	K	***L***	***K***	***L***	***K***	***L***
A	1	8	2	10	3	10
B	2	5	3	6	4	7
C	3	3	4	4	5	5
D	5	2	6	3	7	4
E	8	1	10	2	10	3



Isoquant A graph that shows all the combinations of capital and labor that can be used to produce a given amount of output.

ISOQUANTS AND ISOCOSTS

NEW LOOK AT TECHNOLOGY: ISOQUANTS



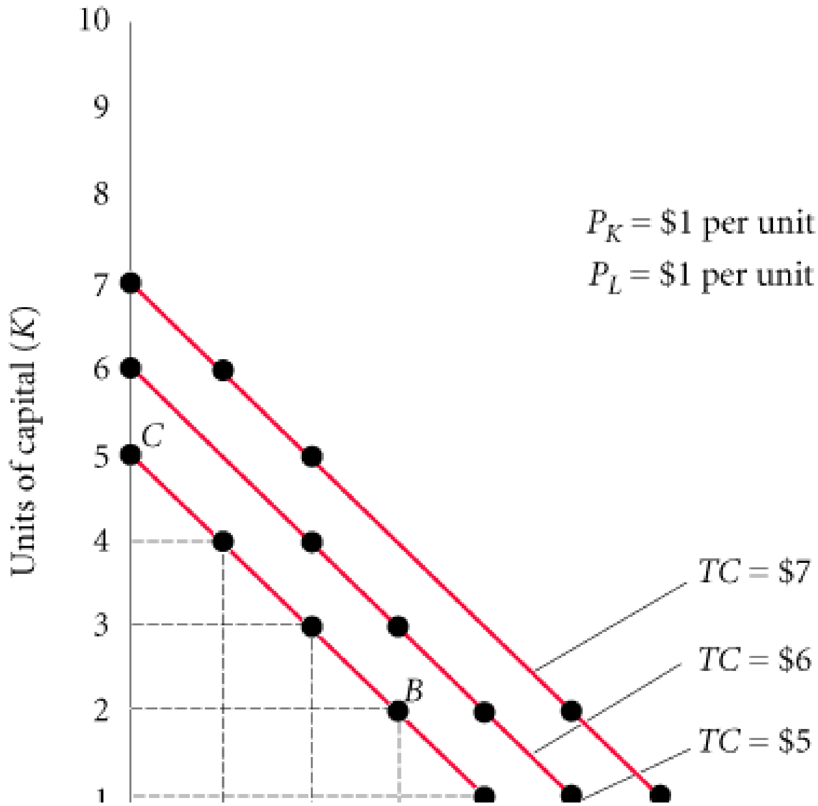
Slope of isoquant:

$$\frac{\Delta K}{\Delta L} = -\frac{MP_L}{MP_K}$$

marginal rate of technical substitution The rate at which a firm can substitute capital for labor and hold output constant.

ISOQUANTS AND ISOCOSTS

FACTOR PRICES AND INPUT COMBINATIONS: ISOCOSTS

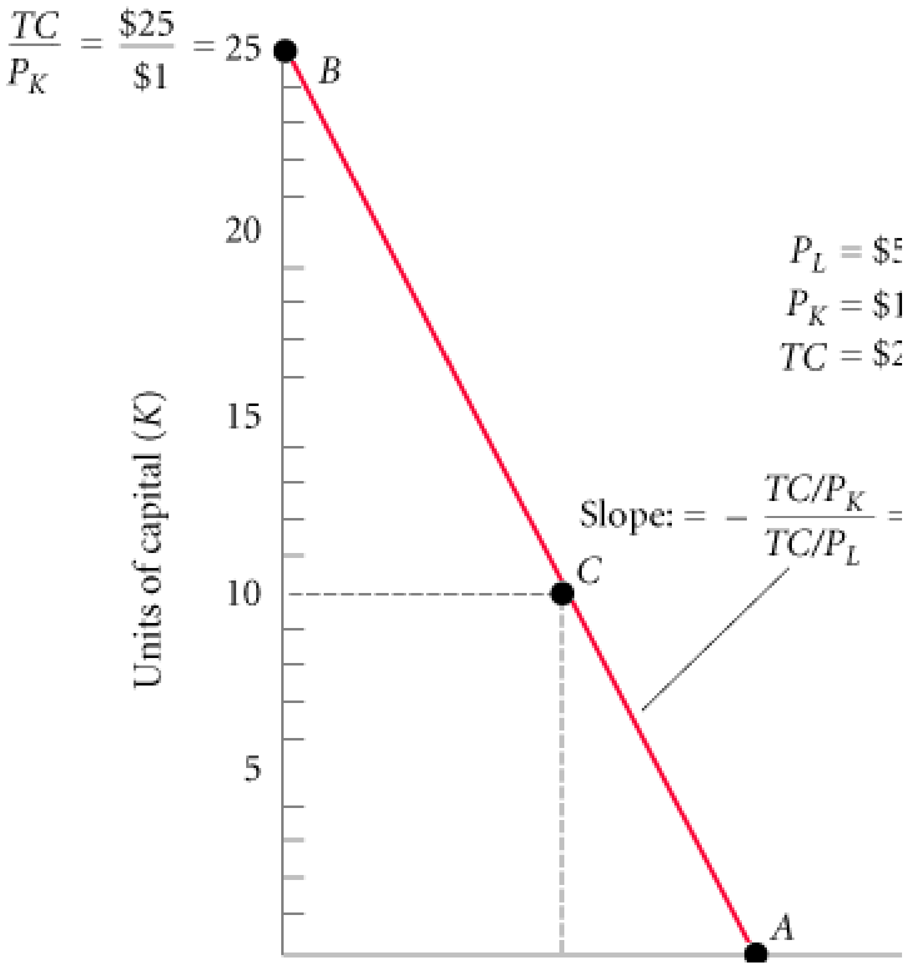


An isocost line shows all the combinations of capital and labor that are available for a given total cost.

isocost line A graph that shows all the combinations of capital and labor available for a given total cost.

ISOQUANTS AND ISOCOSTS

FACTOR PRICES AND INPUT COMBINATIONS: ISOCOSTS



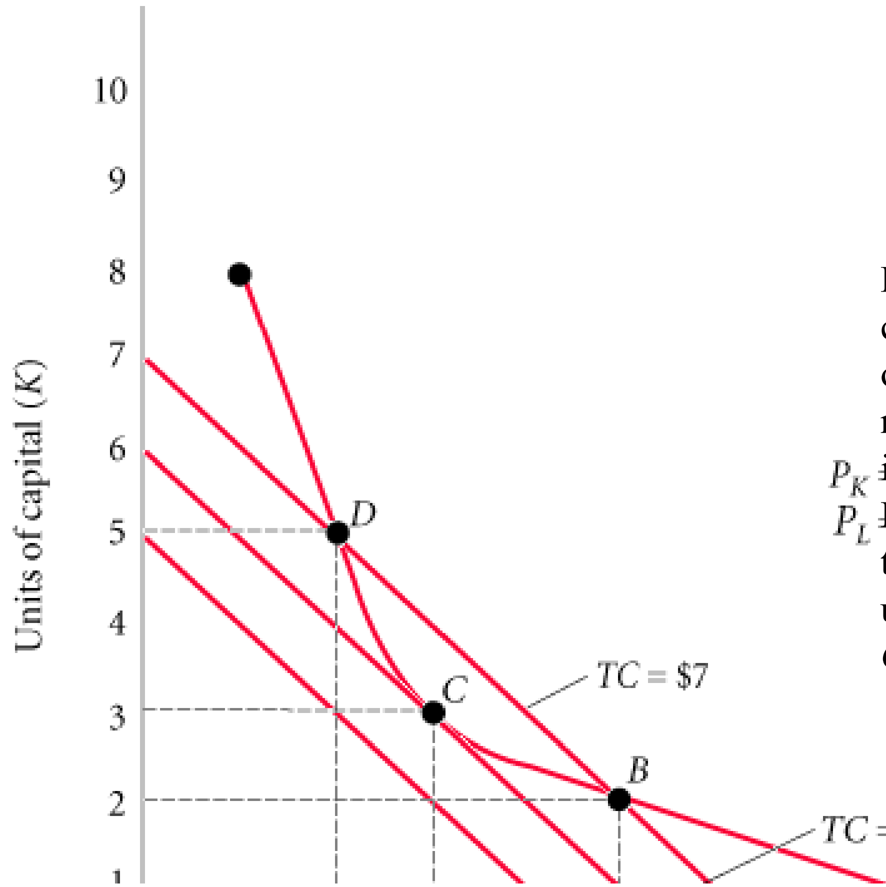
One way to draw an isocost line is to determine the endpoints of that line and draw a line connecting them.

Slope of isocost line:

$$\frac{\Delta K}{\Delta L} = -\frac{TC / P_K}{TC / P_L} = -\frac{P_L}{P_K}$$

ISOQUANTS AND ISOCOSTS

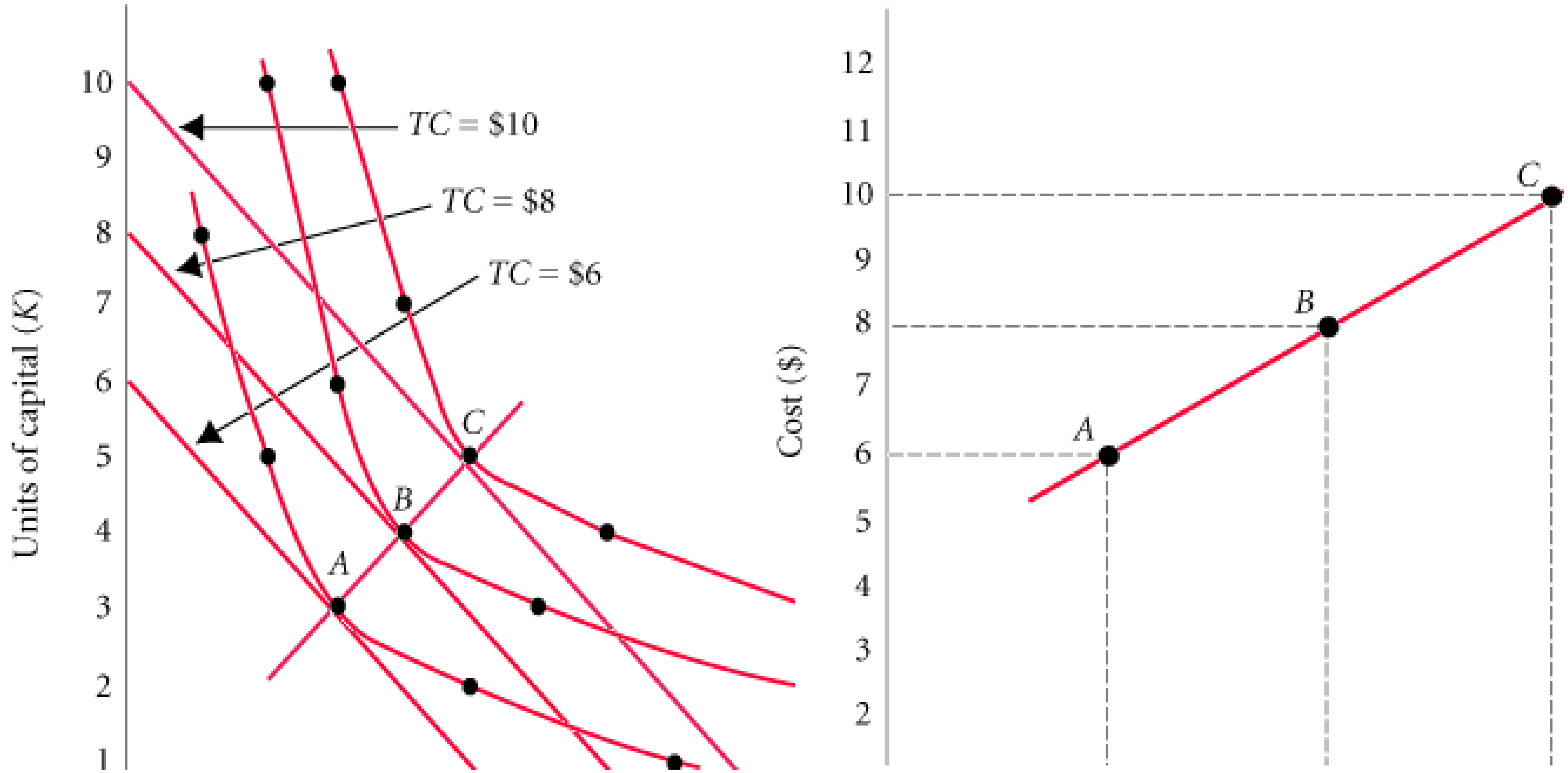
FINDING THE LEAST-COST TECHNOLOGY WITH ISOQUANTS AND ISOCOSTS



Profit-maximizing firms will minimize costs by producing their chosen level of output with the technology represented by the point at which the isoquant is tangent to an isocost line. Here the cost-minimizing technology—3 units of capital and 3 units of labor—is represented by point *C*.

ISOQUANTS AND ISOCOSTS

FINDING THE LEAST-COST TECHNOLOGY WITH ISOQUANTS AND ISOCOSTS



ISOQUANTS AND ISOCOSTS

THE COST-MINIMIZING EQUILIBRIUM CONDITION

At the point where a line is just tangent to a curve, the two have the same slope. At each point of tangency, the following must be true:

$$\text{slope of isoquant} = -\frac{MP_L}{MP_K} = \text{slope of isocost} = -\frac{P_L}{P_K}$$

Thus,

$$\frac{MP_L}{MP_K} = \frac{P_L}{P_K}$$

Dividing both sides by P_L and multiplying both sides by MP_K, we get

$$\frac{MP_L}{P_L} = \frac{MP_K}{P_K}$$

Short-Run Costs and Output Decisions

You have seen that firms in perfectly competitive industries make three specific decisions.

DECISIONS	**are based on**	INFORMAT
1. The quantity of output to *supply*		1. The price of
2. How to produce that output (which technique to use)		2. Techniques production a
3. The quantity of each input		3. The price of

Decisions Facing Firms

Costs in the Short Run

fixed cost Any cost that does not depend on the firms level of output. These costs are incurred even if the firm is producing nothing. There are no fixed costs in the long run.

variable cost A cost that depends on the level of production chosen.

total cost (*TC*) Fixed costs plus variable costs.

$$TC = TFC + TVC$$

Costs in the Short Run

Fixed Costs

Total Fixed Cost (*TFC*)

total fixed costs (*TFC*) *or* overhead The total of all costs that do not change with output even if output is zero.

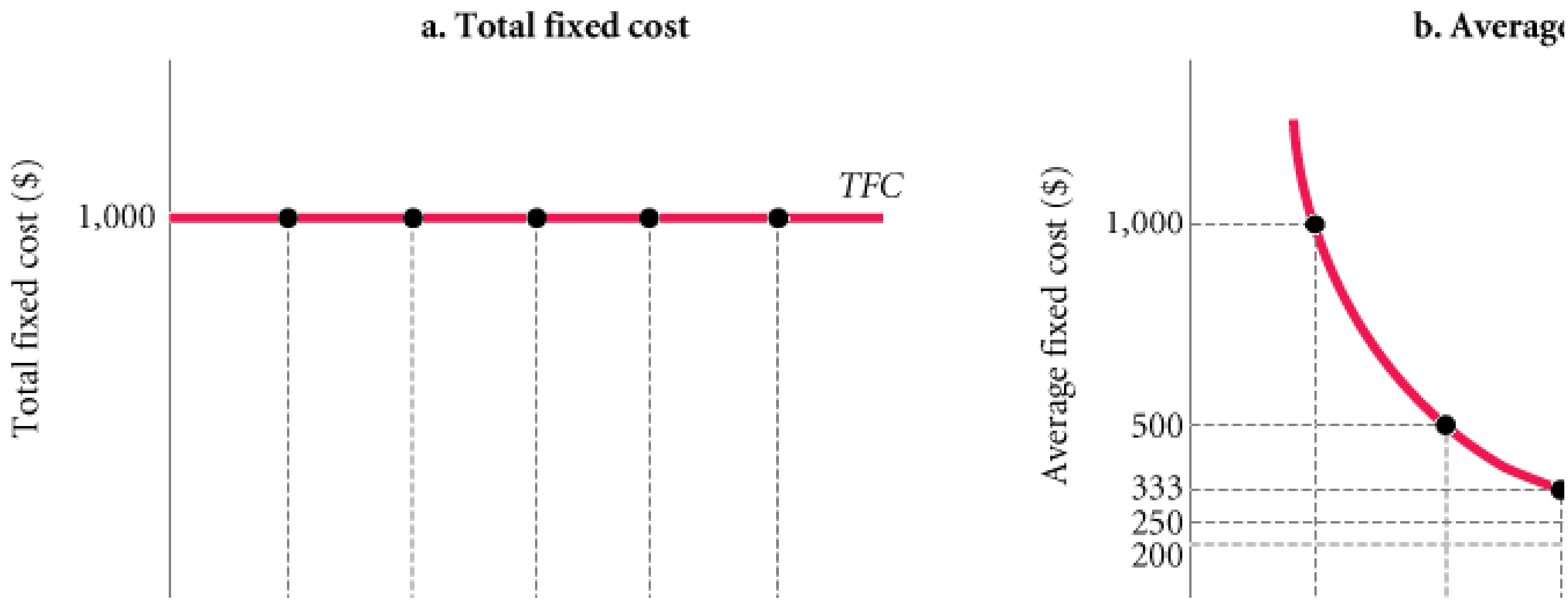
Short-Run Fixed Cost (Total and Average) of a Hypothetical Firm

(1) *Q*	(2) *TFC*	(3) *AFC* (*TFC/Q*)
0	$1,000	$ –
1	1,000	1,000
2	1,000	500
3	1,000	333
4	1,000	250
5	1,000	200

Costs in the Short Run

Fixed Costs

Total Fixed Cost (*TFC*)



Short-Run Fixed Cost (Total and Average) of a Hypothetical Firm

Costs in the Short Run

Fixed Costs

Average Fixed Cost (*AFC*)

average fixed cost (*AFC*) Total fixed cost divided by the number of units of output; a per-unit measure of fixed costs.

$$AFC = \frac{TFC}{q}$$

spreading overhead The process of dividing total fixed costs by more units of output. Average fixed cost declines as quantity rises.

Costs in the Short Run

Variable Costs

Total Variable Cost (*TVC*)

total variable cost (*TVC*) The total of all costs that vary with output in the short run.

total variable cost curve A graph that shows the relationship between total variable cost and the level of a firm's output.

Costs in the Short Run

Variable Costs

Total Variable Cost (*TVC*)

Derivation of Total Variable Cost Schedule from Technology and Factor Prices

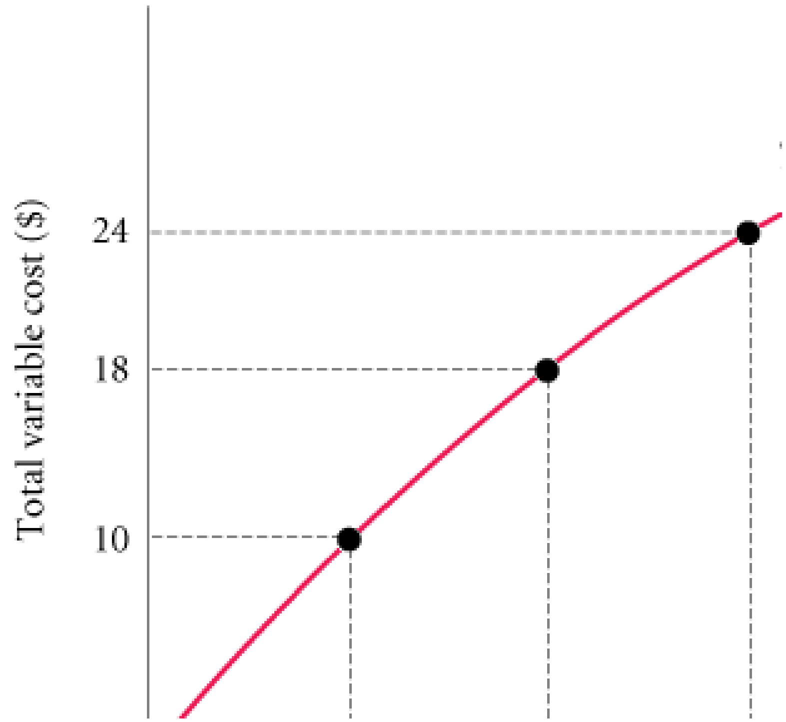
Produce	**Using Technique**	**Units of Input Required (Production Function) K**	**L**	**Total Variable Cost Assuming P_K = \$2, P_L = \$1 $TVC = (K \times P_K) + (L \times P_L)$**
1 unit of output	*A*	4	4	(4 x \$2) + (4 x \$1) = \$12
	B	2	6	(2 x \$2) + (6 x \$1) = $\boxed{\$10}$
2 units of output	*A*	7	6	(7 x \$2) + (6 x \$1) = \$20
	B	4	10	(4 x \$2) + (10 x \$1) = $\boxed{\$18}$
3 units of output	*A*	9	6	(9 x \$2) + (6 x \$1) = $\boxed{\$24}$
	B	6	14	(6 x \$2) + (14 x \$1) = \$26

Costs in the Short Run

Variable Costs

Total Variable Cost (*TVC*)

Total Variable Cost Curve



Costs in the Short Run

Variable Costs

Marginal Cost (*MC*)

marginal cost (*MC*) The increase in total cost that results from producing 1+ more unit of output. Marginal costs reflect changes in variable costs.

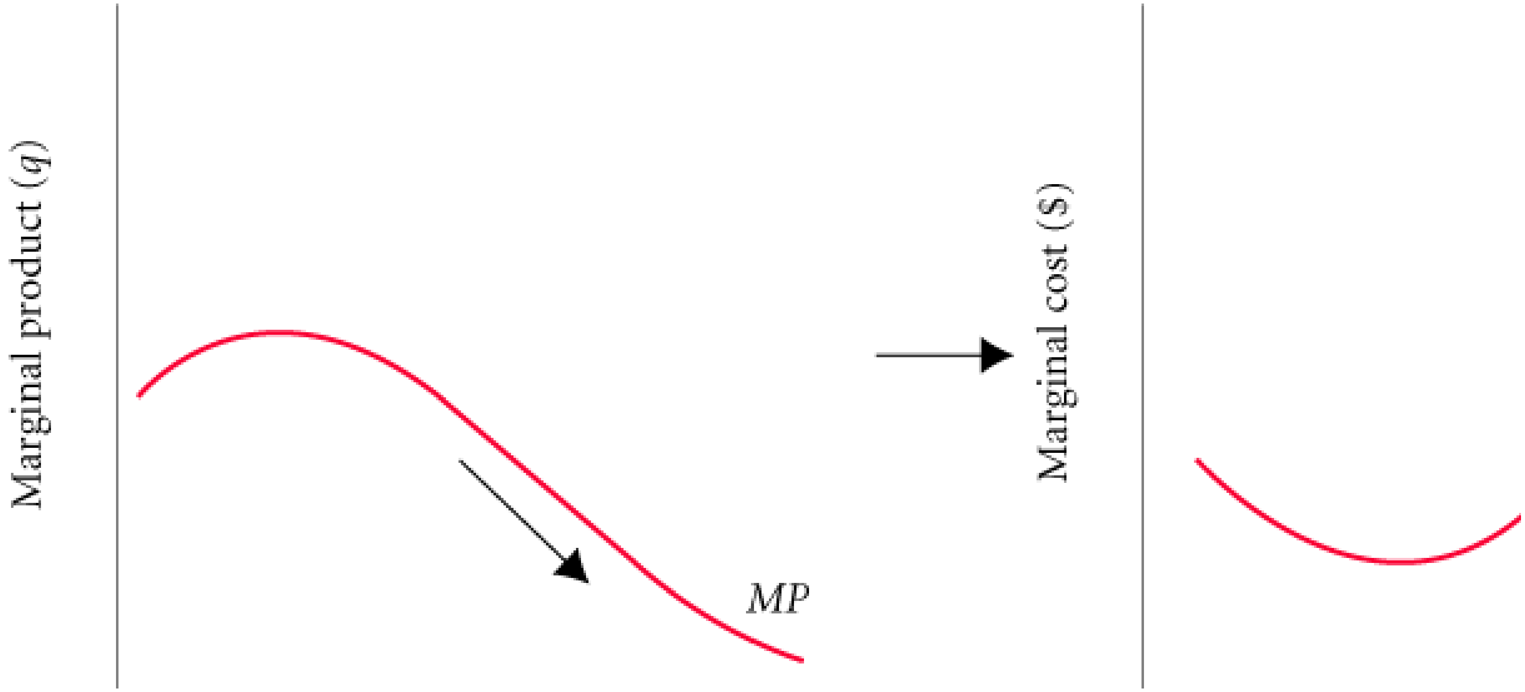
Derivation of Marginal Cost from Total Variable Cost

Units of Output	Total Variable Costs ($)	Marginal Costs ($)
0	0	
1	10	10
2	18	8
3	24	6

Costs in the Short Run

Variable Costs

The Shape of the Marginal Cost Curve in the Short Run



Declining Marginal Product Implies That Marginal Cost Will Eventually Rise with Output

Costs in the Short Run

Variable Costs

The Shape of the Marginal Cost Curve in the Short Run

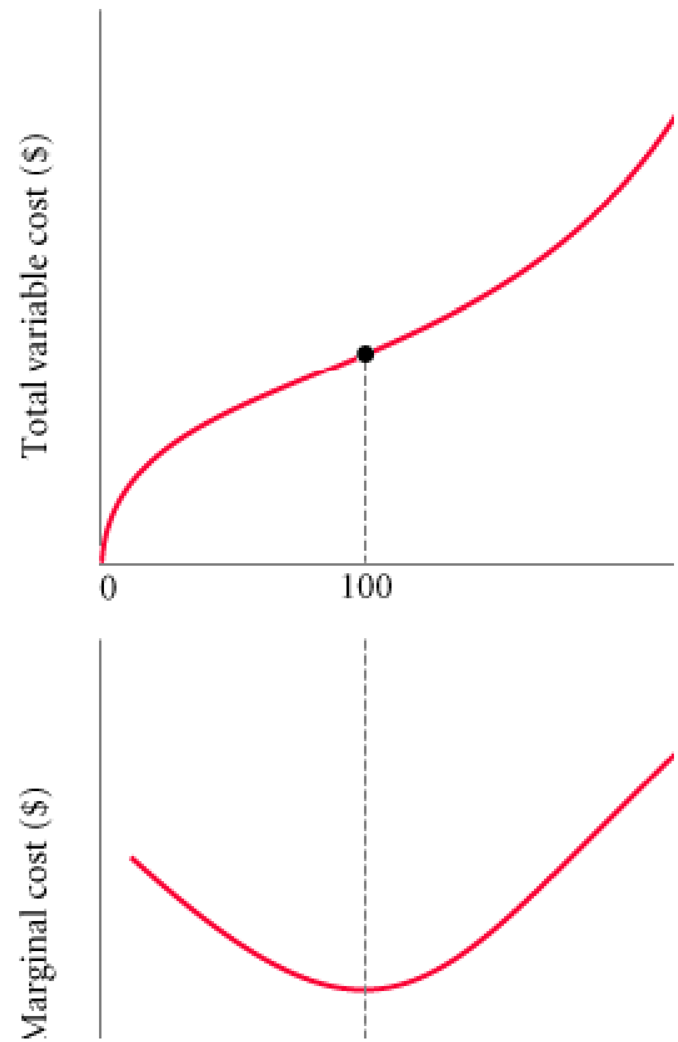
In the short run, every firm is constrained by some fixed input that (1) leads to diminishing returns to variable inputs and (2) limits its capacity to produce. As a firm approaches that capacity, it becomes increasingly costly to produce successively higher levels of output. Marginal costs ultimately increase with output in the short run.

Costs in the Short Run

Variable Costs

Graphing Total Variable Costs and Marginal Costs

Total Variable Cost and Marginal Cost for a Typical Firm



$$\text{slope of } TVC = \frac{\Delta TVC}{\Delta q} = \frac{\Delta TVC}{1} = \Delta TVC = MC$$

Costs in the Short Run

Variable Costs

Average Variable Cost (*AVC*)

average variable cost (*AVC*) Total variable cost divided by the number of units of output.

$$AVC = \frac{TVC}{q}$$

Short-Run Costs of a Hypothetical Firm

(1) *q*	(2) *TVC*	(3) *TFC*
0	$ 0	$ 1,000
1	10	1,000
2	18	1,000
3	24	1,000
4	32	1,000
5	42	1,000
-	-	-
-	-	-
-	-	-
500	8,000	1,000

MC, AVC, TC, AFC, ATC

Costs in the Short Run

Variable Costs

Average Variable Cost (*AVC*)

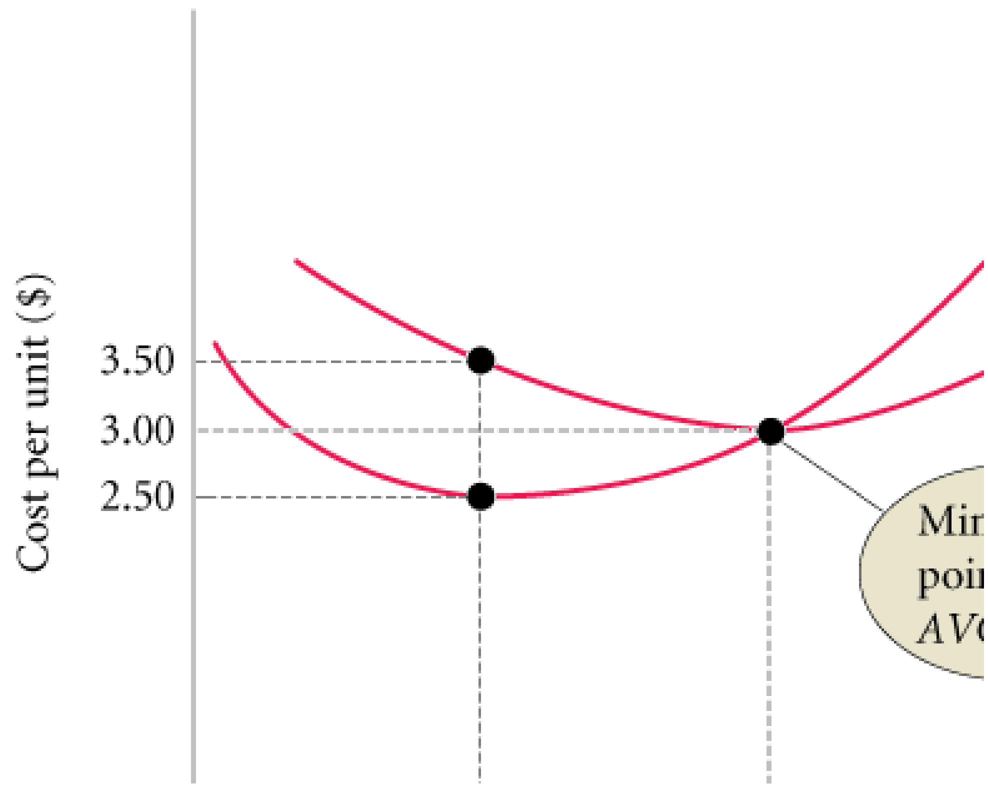
Short-Run Costs of a Hypothetical Firm

(1) *q*	(2) *TVC*	(3) *MC* (Δ *TVC*)	(4) *AVC* (*TVC/q*)	(5) *TFC*	(6) *TC* (*TVC* + *TFC*)	(7) *AFC* (*TFC/q*)	(8) *ATC* (*TC/q* or *AFC* + *AVC*)
0	$ 0	$ –	$ –	$1,000	$ 1,000	$ –	$ –
1	10	10	10	1,000	1,010	1,000	1,010
2	18	8	9	1,000	1,018	500	509
3	24	6	8	1,000	1,024	333	341
4	32	8	8	1,000	1,032	250	258
5	42	10	8.4	1,000	1,042	200	208.4
–	–	–	–	–	–	–	–
–	–	–	–	–	–	–	–
–	–	–	–	–	–	–	–
500	8,000	20	16	1,000	9,000	2	18

Costs in the Short Run

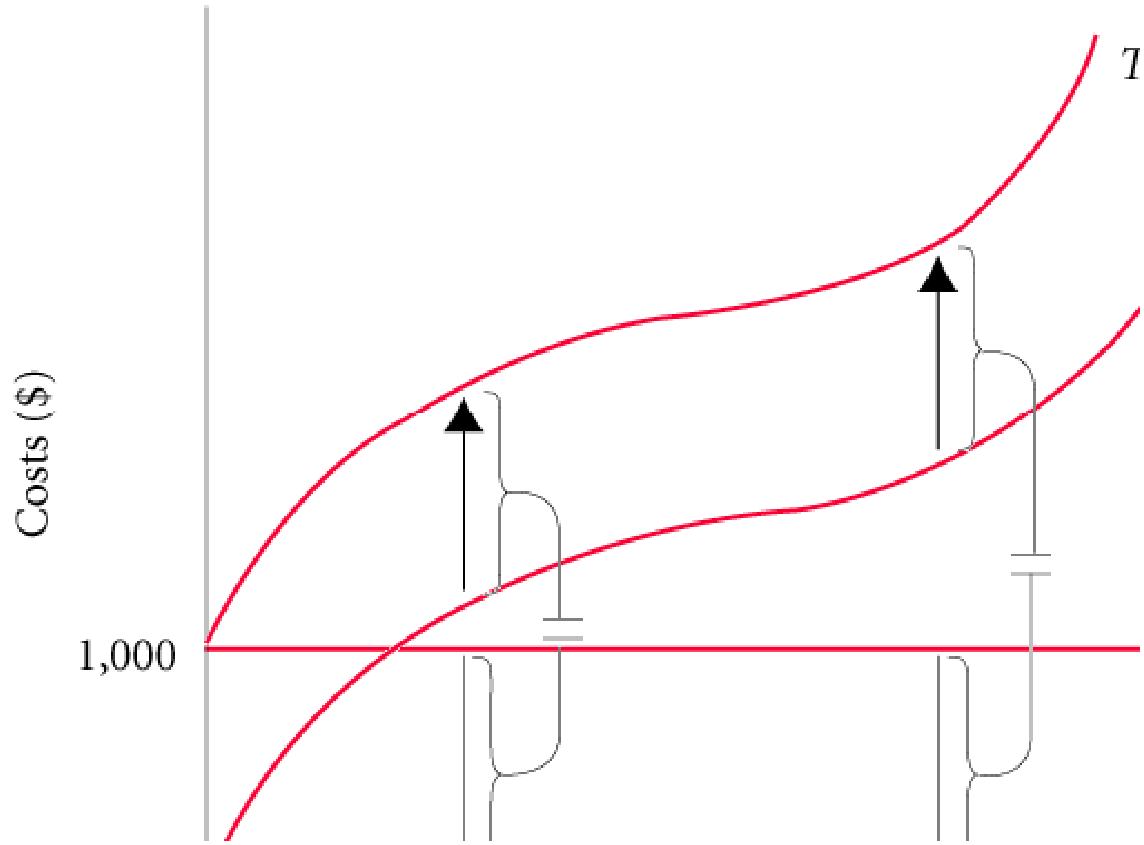
Variable Costs

Graphing Average Variable Costs and Marginal Costs



Costs in the Short Run

Total Costs



Total Cost = Total Fixed Cost + Total Variable Cost

Costs in the Short Run

Total Costs

Average Total Cost (*ATC*)

average total cost (*ATC*) Total cost divided by the number of units of output.

$$ATC = \frac{TC}{q}$$

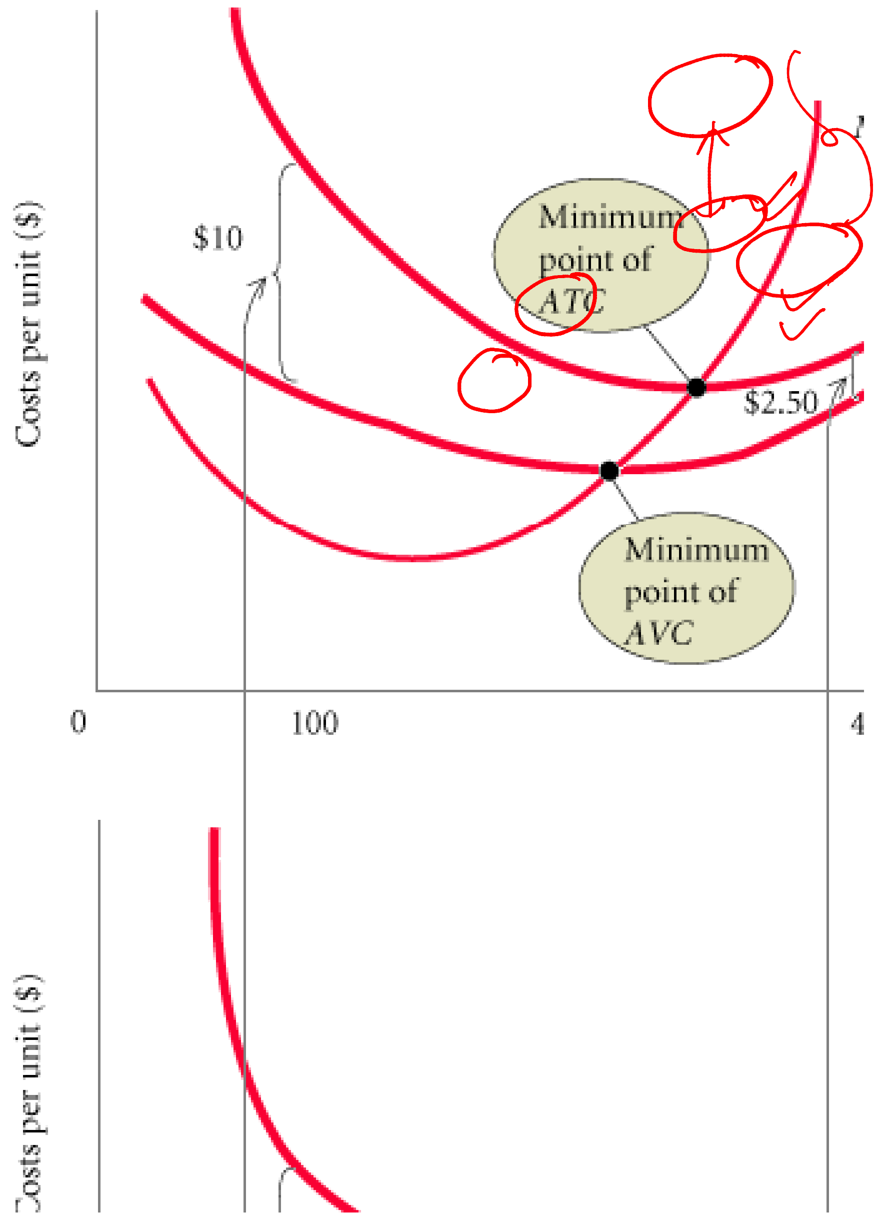
$$ATC = AFC + AVC$$

Costs in the Short Run

Total Costs

Average Total Cost (*ATC*)

Average Total Cost = Average Variable Cost + Average Fixed Cost



Costs in the Short Run

Total Costs

The Relationship Between Average Total Cost and Marginal Cost

The relationship between average *total* cost and marginal cost is exactly the same as the relationship between average *variable* cost and marginal cost.

If marginal cost is *below* average total cost, average total cost will *decline* toward marginal cost. If marginal cost is *above* average total cost, average total cost will *increase*. As a result, marginal cost intersects average *total* cost at *ATC*'s minimum point, for the same reason that it intersects the average *variable* cost curve at its minimum point.

Costs in the Short Run

Short-Run Costs: A Review

A Summary of Cost Concepts

Term	Definition	Equation
Accounting costs	Out-of-pocket costs or costs as an accountant would define them. Sometimes referred to as *explicit costs*.	–
Economic costs	Costs that include the full opportunity costs of all inputs. These include what are often called *implicit costs*.	–
Total fixed costs	Costs that do not depend on the quantity of output produced. These must be paid even if output is zero.	TFC
Total variable costs	Costs that vary with the level of output.	TVC
Total cost	The total economic cost of all the inputs used by a firm in production.	TC = TFC + TVC
Average fixed costs	Fixed costs per unit of output.	$AFC = TFC/q$
Average variable costs	Variable costs per unit of output.	$AVC = TVC/q$
Average total costs	Total costs per unit of output.	$ATC = TC/q$ $ATC = AFC + AVC$
Marginal costs	The increase in total cost that results from producing 1 additional unit of output.	$MC = \Delta TC/\Delta q$

Refer to the figure below. What is the value of total variable cost when 300 units of output are produced?

a. $1,800

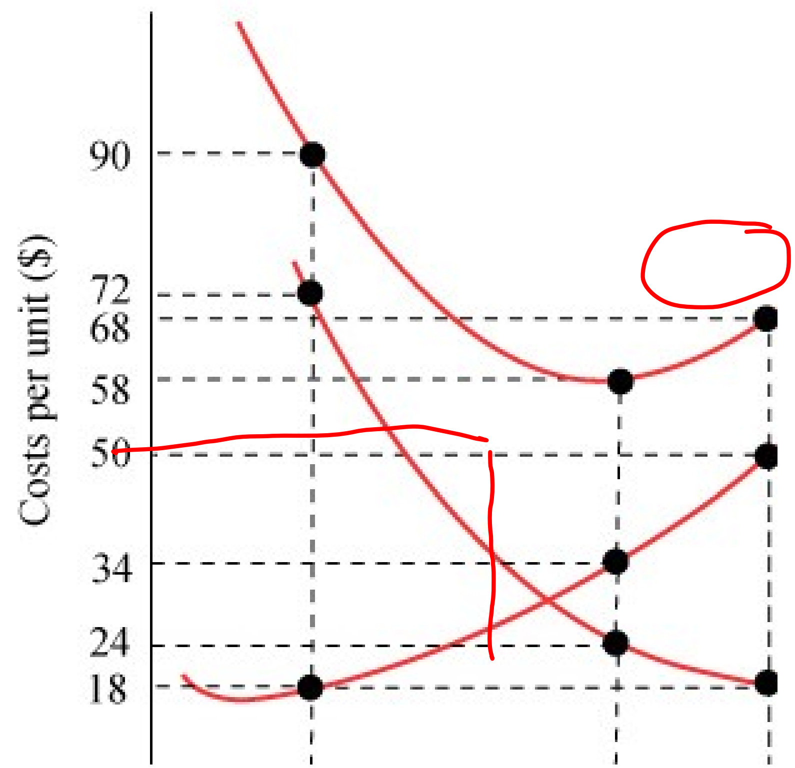
b. $10,200

c. $20,000

d. $7,200

e. $17,400

34×300



Refer to the figure below. What is the value of total variable cost when 300 units of output are produced?

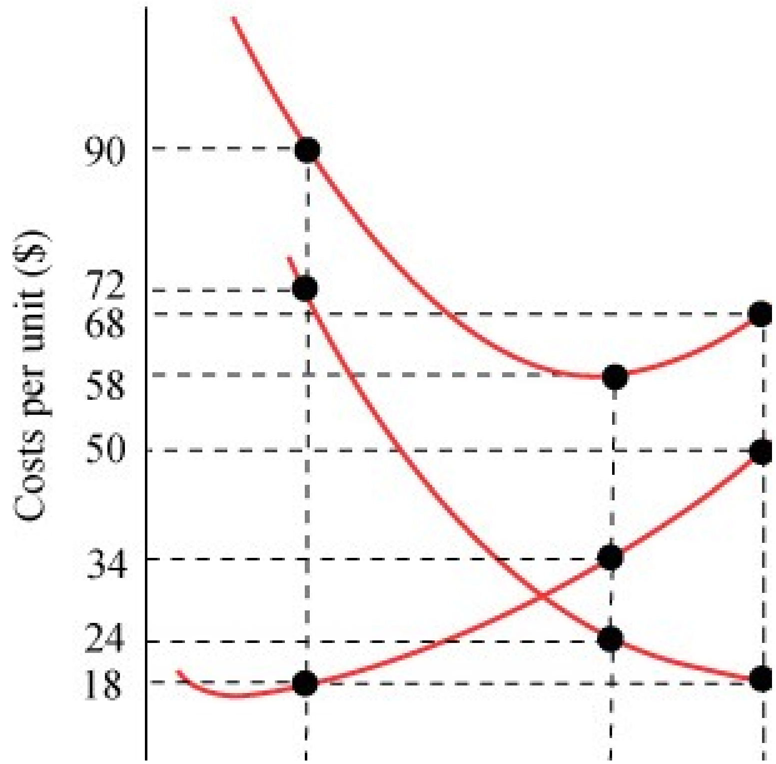
a. $1,800

b. $10,200

c. $20,000

d. $7,200

e. $17,400



Output Decisions: Revenues, Costs, and Profit Maximization

Perfect Competition

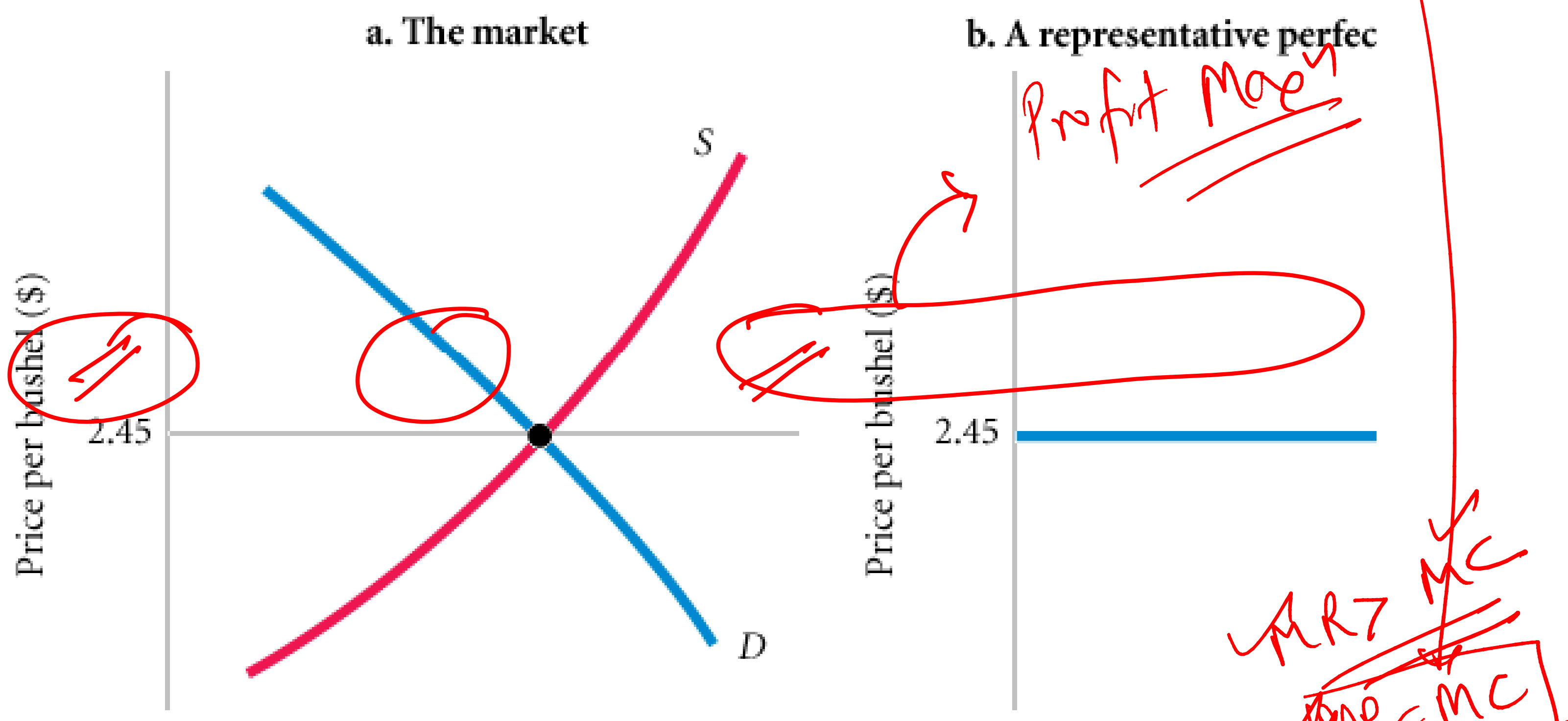
perfect competition An industry structure in which there are many firms, each small relative to the industry, producing virtually identical products and in which no firm is large enough to have any control over prices. In perfectly competitive industries, new competitors can freely enter and exit the market.

homogeneous products Undifferentiated products; products that are identical to, or indistinguishable from, one another.

Output Decisions: Revenues, Costs, and Profit Maximization

$\pi = TR - TC$

Perfect Competition



Demand Facing a Single Firm In a Perfectly Competitive Market

Output Decisions: Revenues, Costs, and Profit Maximization

Total Revenue (*TR*) and Marginal Revenue (*MR*)

total revenue (*TR*) The total amount that a firm takes in from the sale of its product: the price per unit times the quantity of output the firm decides to produce (P x q).

$$\text{total revenue} = \text{price x quantity}$$

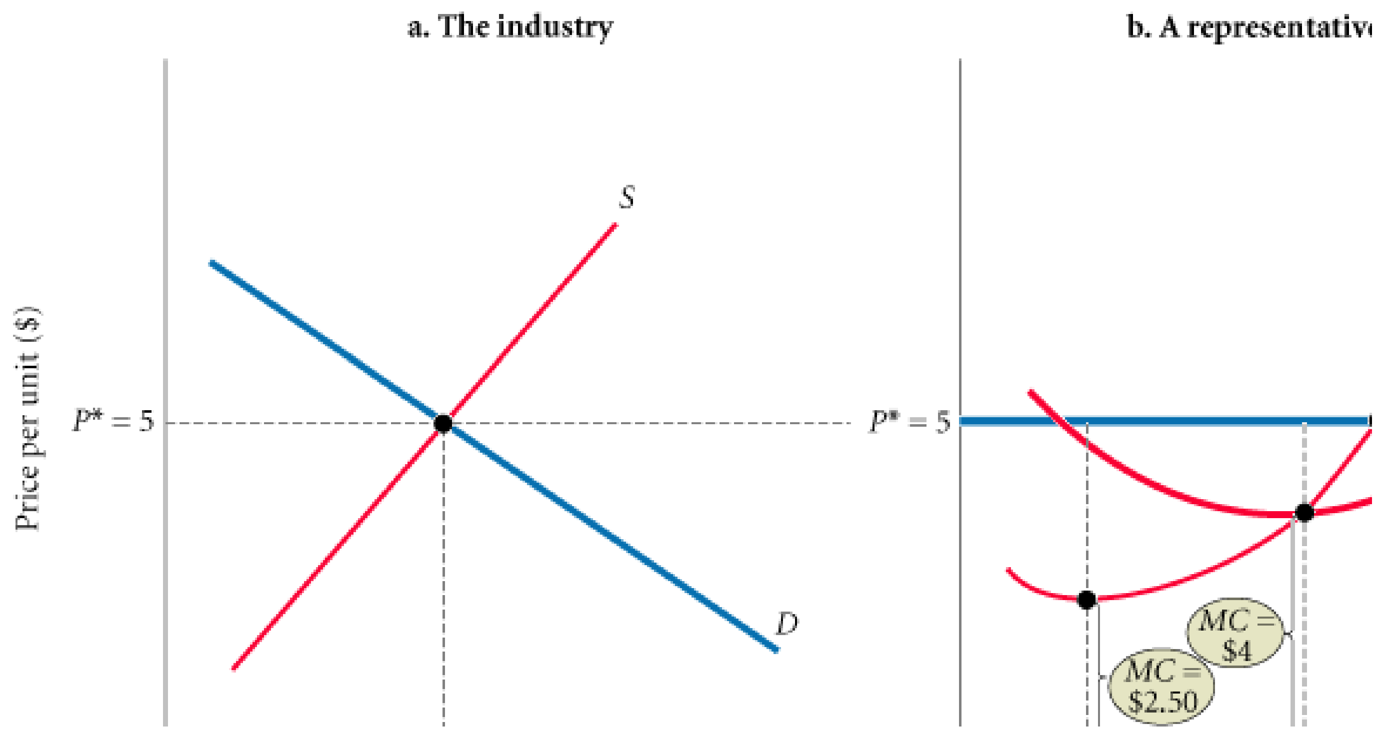
$$TR = P \, x \, q$$

marginal revenue (*MR*) The additional revenue that a firm takes in when it increases output by one additional unit. In perfect competition, $P = MR$.

Output Decisions: Revenues, Costs, and Profit Maximization

Comparing Costs and Revenues to Maximize Profit

The Profit-Maximizing Level of Output



The Profit-Maximizing Level of Output for a Perfectly Competitive Firm

Output Decisions: Revenues, Costs, and Profit Maximization

Comparing Costs and Revenues to Maximize Profit

The Profit-Maximizing Level of Output

As long as marginal revenue is greater than marginal cost, even though the difference between the two is getting smaller, added output means added profit. Whenever marginal revenue exceeds marginal cost, the revenue gained by increasing output by 1 unit per period exceeds the cost incurred by doing so.

The profit-maximizing perfectly competitive firm will produce up to the point where the price of its output is just equal to short-run marginal cost—the level of output at which $P^* = MC$.

The profit-maximizing output level for *all* firms is the output level where $MR = MC$.

Output Decisions: Revenues, Costs, and Profit Maximization

Comparing Costs and Revenues to Maximize Profit

A Numerical Example

MC Curve is a supply curve.

Profit Analysis for a Simple Firm

(1) *q*	(2) *TFC*	(3) *TVC*	(4) *MC*	(5) *P = MR*	(6) *TR* (*P* x *q*)	(7) *TC* (*TFC* + *TVC*)	(8) *PROFIT* (*TR* – *TC*)
0	$ 10	$ 0	$ –	$ 15	$ 0	$ 10	$ -10
1	10	10	10	15	15	20	-5
2	10	15	5	15	30	25	5
3	10	20	5	15	45	30	15
4	10	30	10	15	60	40	20
5	10	50	20	15	75	60	15
6	10	80	30	15	90	90	0

Output Decisions: Revenues, Costs, and Profit Maximization

Comparing Costs and Revenues to Maximize Profit

A Numerical Example

ECONOMICS IN PRACTICE

Case Study in Marginal Analysis: An Ice Cream Parlor

An analysis of fixed costs, variable costs, revenues, profits, and opening longer hours were used by this ice cream parlor to determine whether to stay in business.

Long-Run Costs and Output Decisions

We begin our discussion of the long run by looking at firms in three short-run circumstances:

(1) firms earning economic profits,

(2) firms suffering economic losses but continuing to operate to reduce or minimize those losses, and

(3) firms that decide to shut down and bear losses just equal to fixed costs.

breaking even The situation in which a firm is earning exactly a normal rate of return.

Short-Run Conditions and Long-Run Directions

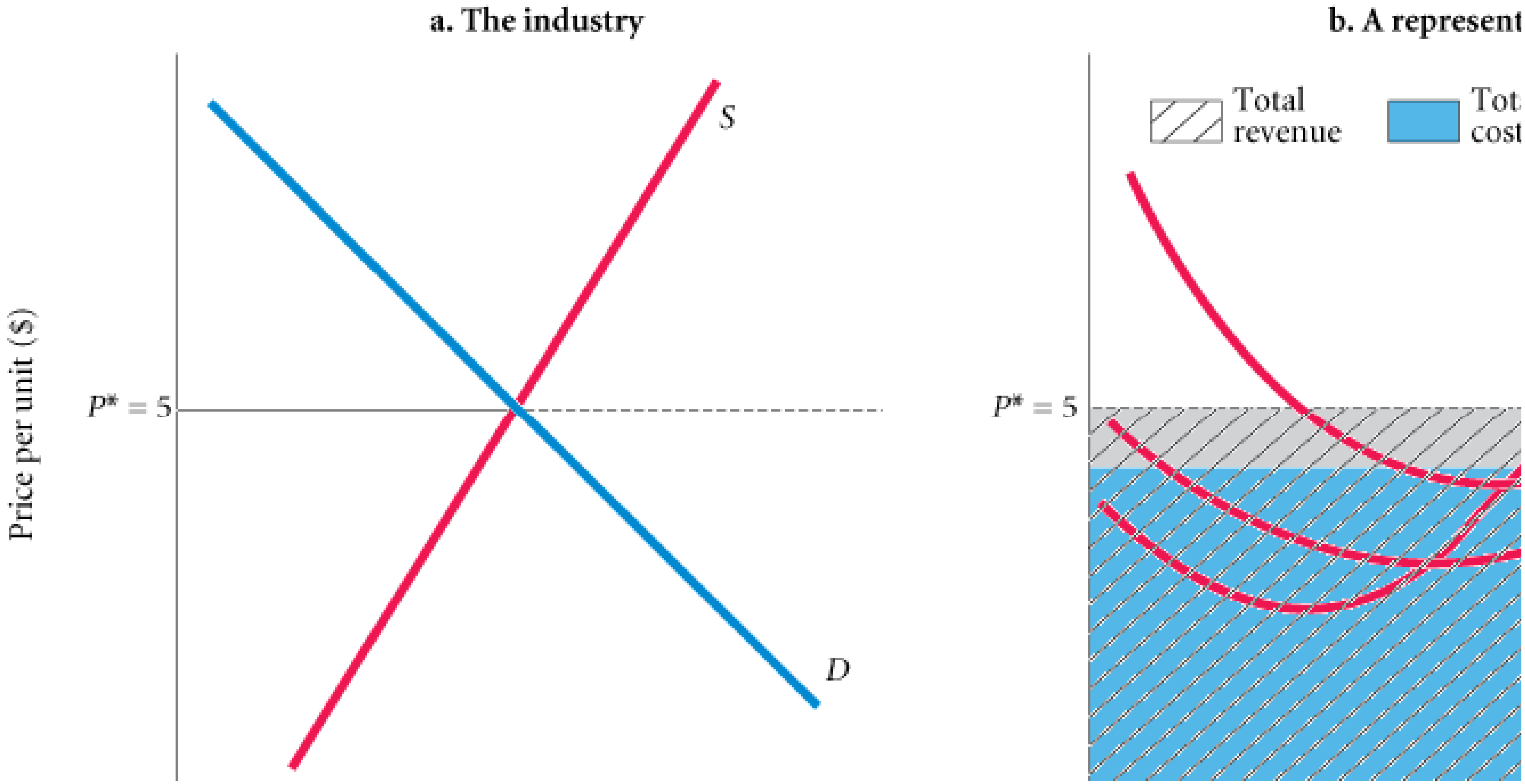
Maximizing Profits

Example: The Blue Velvet Car Wash

Blue Velvet Car Wash Weekly Costs					
Total Fixed Costs (*TFC*)		Total Variable Costs (*TVC*) (800 Washes)		Total Costs (*TC* = *TFC* + *TVC*)	$ **3,600**
1. Normal return to investors	$ 1,000	1. Labor	$ 1,000	Total revenue (*TR*) at *P* = $5 (800 x $5)	$ **4,000**
		2. Materials	600		
2. Other fixed costs (maintenance contract, insurance, etc.)	1,000		**$ 1,600**	Profit (*TR* – *TC*)	$ **400**
	$ 2,000				

Short-Run Conditions and Long-Run Directions

Maximizing Profits



Short-Run Conditions and Long-Run Directions

Minimizing Losses

operating profit (or loss) *or* **net operating revenue** Total revenue minus total variable cost (TR - TVC).

- If revenues exceed variable costs, operating profit is positive and can be used to offset fixed costs and reduce losses, and it will pay the firm to keep operating.
- If revenues are smaller than variable costs, the firm suffers operating losses that push total losses above fixed costs. In this case, the firm can minimize its losses by shutting down.

Short-Run Conditions and Long-Run Directions

Minimizing Losses

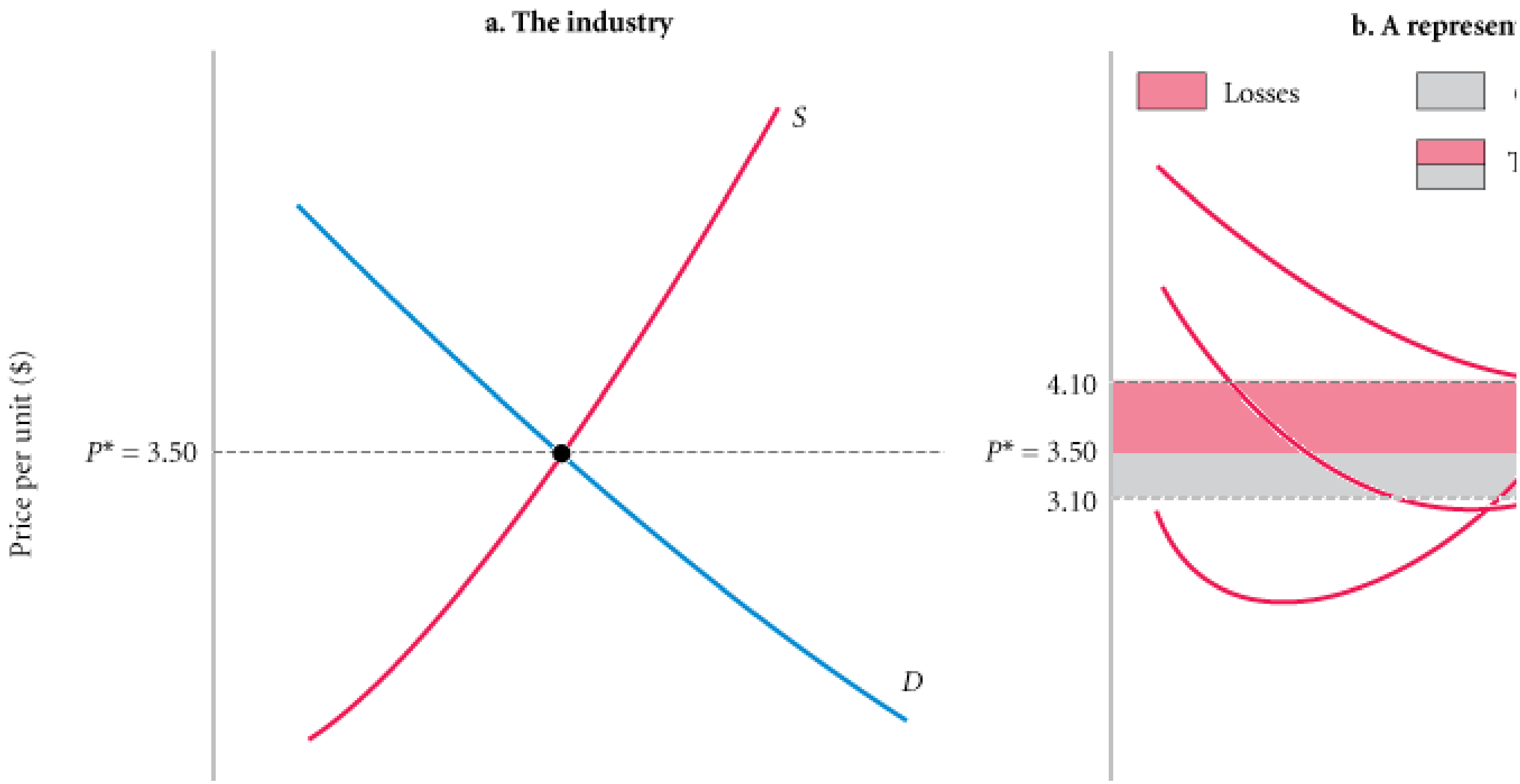
Producing at a Loss to Offset Fixed Costs: The Blue Velvet Revisited

A Firm Will Operate If Total Revenue Covers Total Variable Cost

CASE 1: Shut Down		CASE 2: Operate at Price = $3	
Total Revenue (q = 0)	$ 0	Total Revenue ($3 x 800)	$ 2,400
Fixed costs	$ 2,000	Fixed costs	$ 2,000
Variable costs	+ 0	Variable costs	+ 1,600
Total costs	$ 2,000	Total costs	$ 3,600
Profit/loss (*TR* – *TC*)	– $ 2,000	Operating profit/loss (*TR* – *TVC*)	$ 800
		Total profit/loss (*TR* – *TC*)	– $ 1,200

Short-Run Conditions and Long-Run Directions

Minimizing Losses



Short-Run Conditions and Long-Run Directions

Minimizing Losses

Shutting Down to Minimize Loss

A Firm Will Shut Down If Total Revenue Is Less Than Total Variable Cost

Case 1: Shut Down		**CASE 2: Operate at Price = $1.50**	
Total Revenue (q = 0)	$ 0	Total revenue ($1.50 x 800)	$ 1,200
Fixed costs	$ 2,000	Fixed costs	$ 2,000
Variable costs	+ 0	Variable costs	+ 1,600
Total costs	$ 2,000	Total costs	$ 3,600
Profit/loss (*TR* – *TC*):	– $ 2,000	Operating profit/loss (*TR* – *TVC*)	– $ 400
		Total profit/loss (*TR* – *TC*)	– $ 2,400

Short-Run Conditions and Long-Run Directions

Minimizing Losses

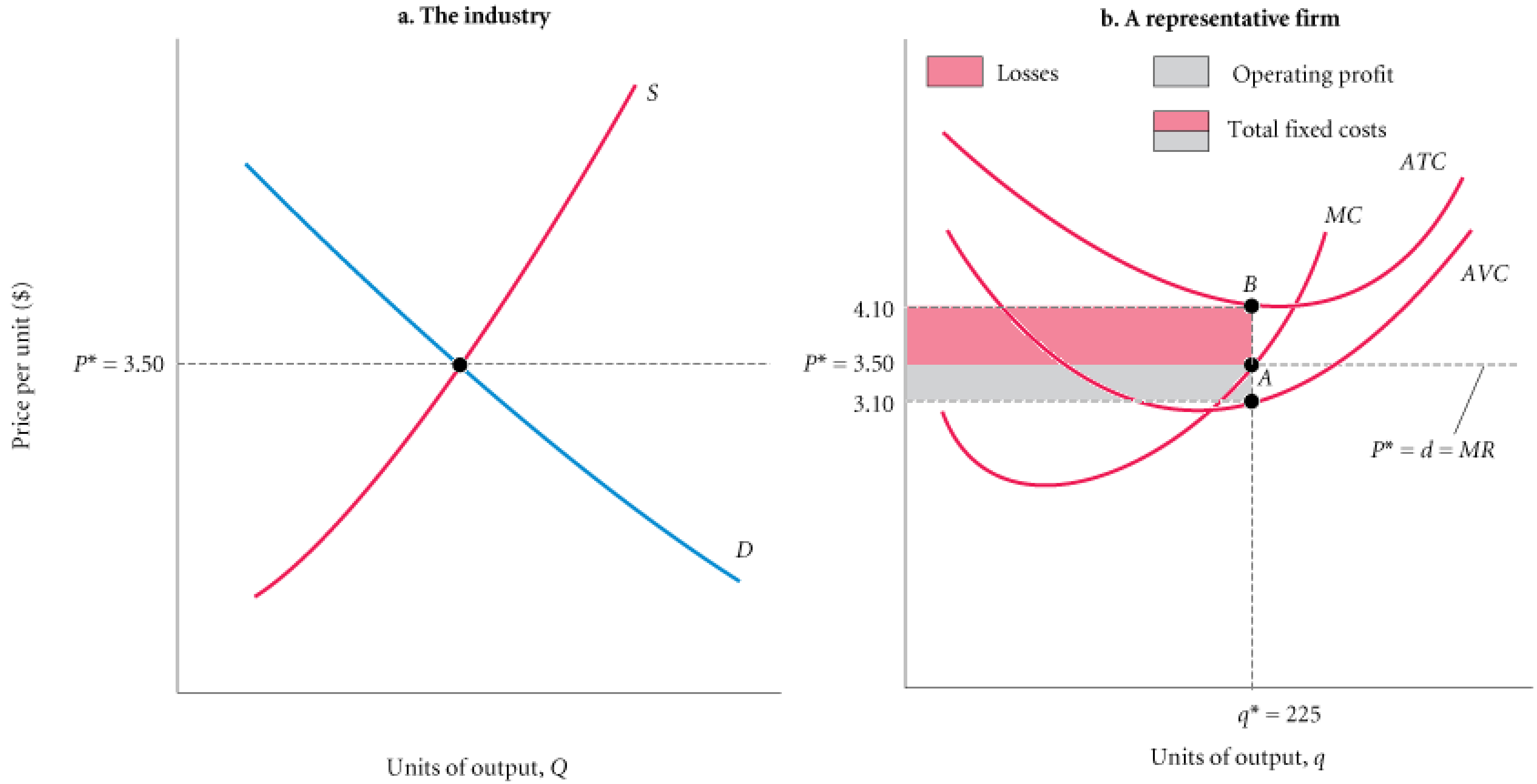
Producing at a Loss to Offset Fixed Costs: The Blue Velvet Revisited

A Firm Will Operate If Total Revenue Covers Total Variable Cost

CASE 1: Shut Down		**CASE 2: Operate at Price = $3**	
Total Revenue (q = 0)	$ 0	Total Revenue ($3 x 800)	$ 2,400
Fixed costs	$ 2,000	Fixed costs	$ 2,000
Variable costs	+ 0	Variable costs	+ 1,600
Total costs	$ 2,000	Total costs	$ 3,600
Profit/loss (*TR* – *TC*)	– $ 2,000	Operating profit/loss (*TR* – *TVC*)	$ 800
		Total profit/loss (*TR* – *TC*)	– $ 1,200

Short-Run Conditions and Long-Run Directions

Minimizing Losses



Profit Versus Revenue Maximization. Presto Products, Inc., manufactures small electrical appliances and has recently introduced an innovative new dessert maker for frozen yogurt and tofu that has the clear potential to offset the weak pricing and sluggish volume growth experienced during recent periods.

Monthly demand and cost relations for Presto's frozen dessert maker are as follows:

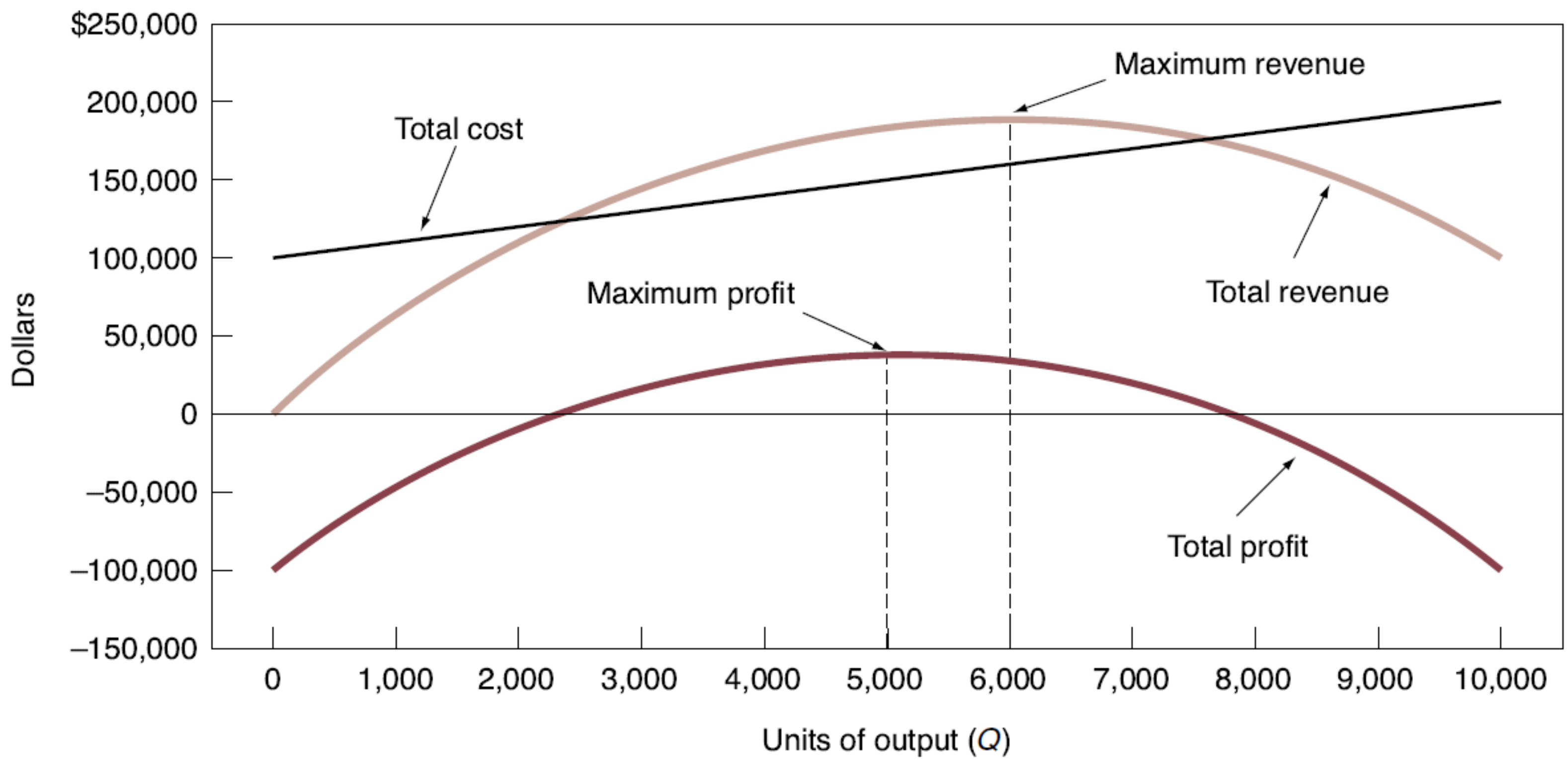
$$P = \$60 - \$0.005Q \qquad TC = \$100{,}000 + \$5Q + \$0.0005Q^2$$
$$MR = \Delta TR/\Delta Q = \$60 - \$0.01Q \qquad MC = \Delta TC/\Delta Q = \$5 + \$0.001Q$$

A. Set up a table or spreadsheet for Presto output (Q), price (P), total revenue (TR), marginal revenue (MR), total cost (TC), marginal cost (MC), total profit (π), and marginal profit ($M\pi$). Establish a range for Q from 0 to 10,000 in increments of 1,000 (i.e., 0, 1,000, 2,000, . . . , 10,000).

B. Using the Presto table or spreadsheet, create a graph with TR, TC, and π as dependent variables, and units of output (Q) as the independent variable. At what price/output combination is total profit maximized? Why? At what price/output combination is total revenue maximized? Why?

C. Determine these profit-maximizing and revenue-maximizing price/output combinations analytically. In other words, use Presto's profit and revenue equations to confirm your answers to part B.

D. Compare the profit-maximizing and revenue-maximizing price/output combinations, and discuss any differences. When will short-run revenue maximization lead to long-run profit maximization?



$250,000
200,000
150,000
100,000
50,000
0
–50,000
–100,000
–150,000
Dollars
Maximum revenue
Total cost
Total revenue
Maximum profit
Total profit
0
1,000
2,000
3,000
4,000
5,000
6,000
7,000
8,000
9,000
10,000
Units of output (Q)

Short-Run Conditions and Long-Run Directions

Minimizing Losses

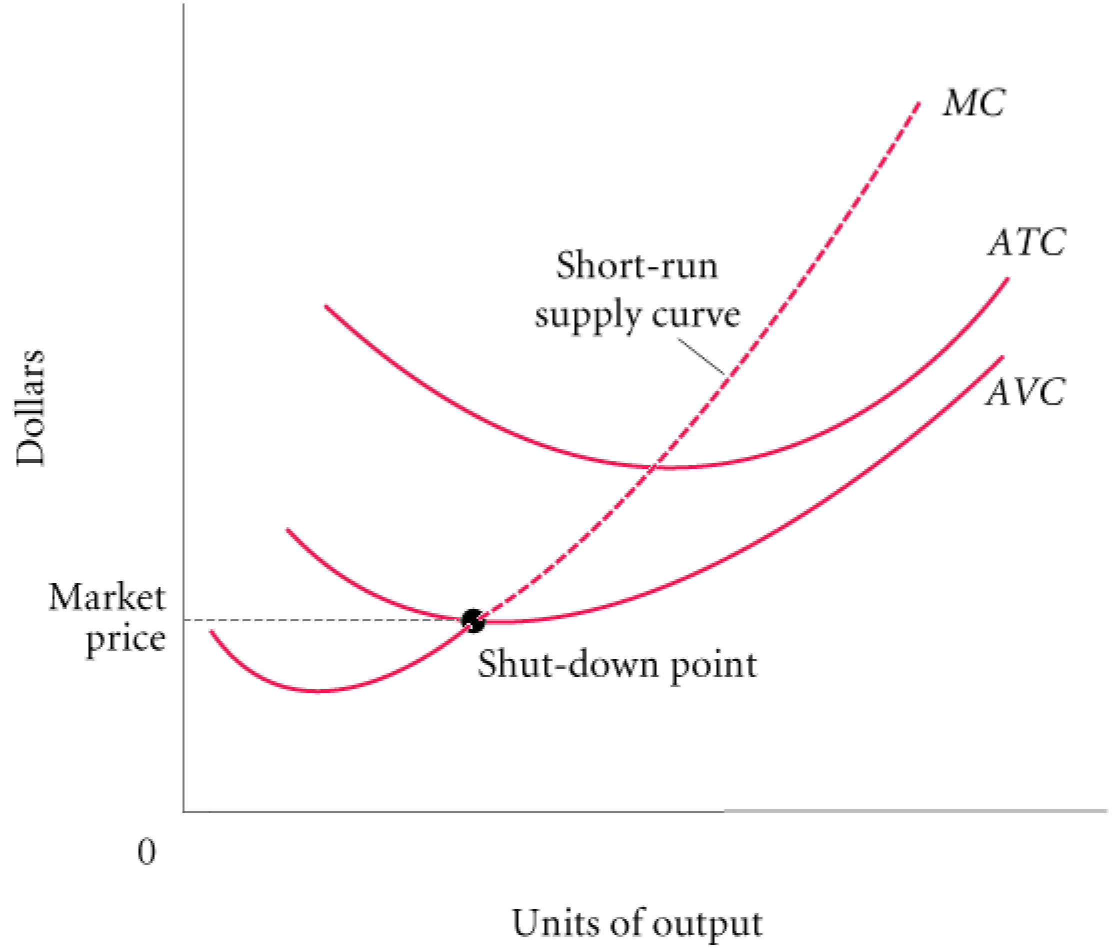
Shutting Down to Minimize Loss

A Firm Will Shut Down If Total Revenue Is Less Than Total Variable Cost

Case 1: Shut Down		**CASE 2: Operate at Price = $1.50**	
Total Revenue (q = 0)	$ 0	Total revenue ($1.50 x 800)	$ 1,200
Fixed costs	$ 2,000	Fixed costs	$ 2,000
Variable costs	+ 0	Variable costs	+ 1,600
Total costs	$ 2,000	Total costs	$ 3,600
Profit/loss (*TR* – *TC*):	– $ 2,000	Operating profit/loss (*TR* – *TVC*)	– $ 400
		Total profit/loss (*TR* – *TC*)	– $ 2,400

Short-Run Conditions and Long-Run Directions

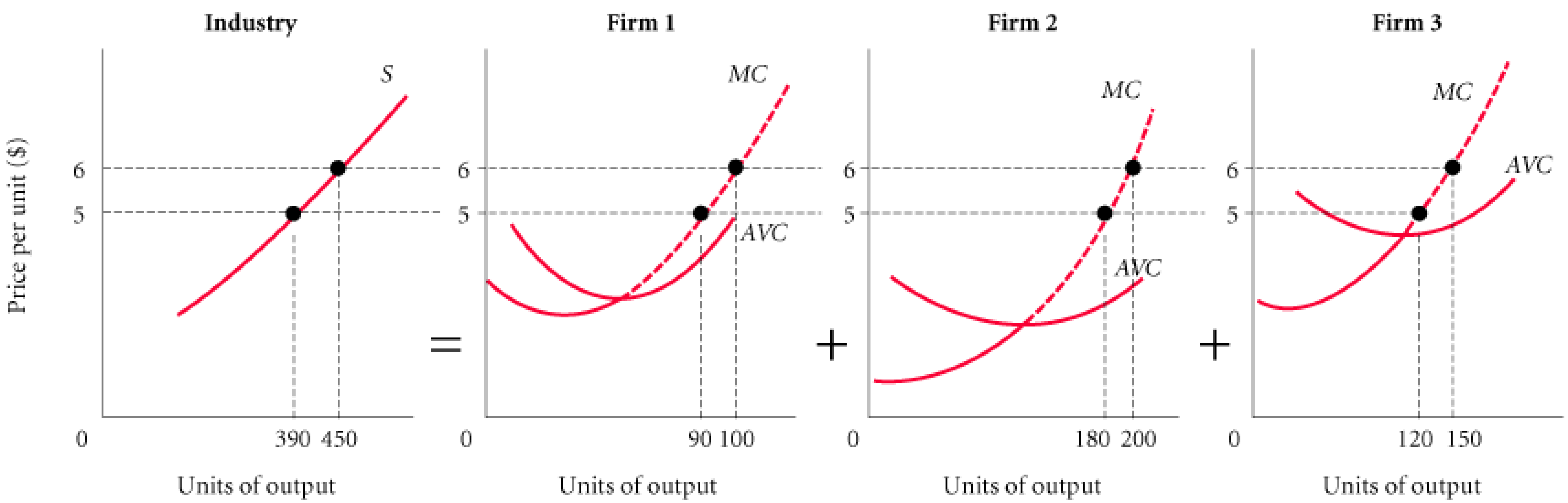
Minimizing Losses



Short-Run Conditions and Long-Run Directions

The Short-Run Industry Supply Curve

short-run industry supply curve The sum of the marginal cost curves (above *AVC*) of all the firms in an industry.



Short-Run Conditions and Long-Run Directions

Long-Run Directions: A Review

Profits, Losses, and Perfectly Competitive Firm Decisions in the Long and Short Run

	Short-Run Condition	Short-Run Decision	Long-Run Decision
Profits	TR > TC	P = MC: operate	Expand: new firms enter
Losses	1. With operating profit	P = MC: operate	Contract: firms exit
	(*TR* ≥ *TVC*)	(losses < fixed costs)	
	2. With operating losses	Shut down:	Contract: firms exit
	(*TR* < *TVC*)	losses = fixed costs	

Long-Run Costs: Economies and Diseconomies of Scale

increasing returns to scale, or economies of scale An increase in a firm’s scale of production leads to lower costs per unit produced.

constant returns to scale An increase in a firm’s scale of production has no effect on costs per unit produced.

decreasing returns to scale, or diseconomies of scale An increase in a firm’s scale of production leads to higher costs per unit produced.

Long-Run Costs: Economies and Diseconomies of Scale

Increasing Returns to Scale

Example: Economies of Scale in Egg Production

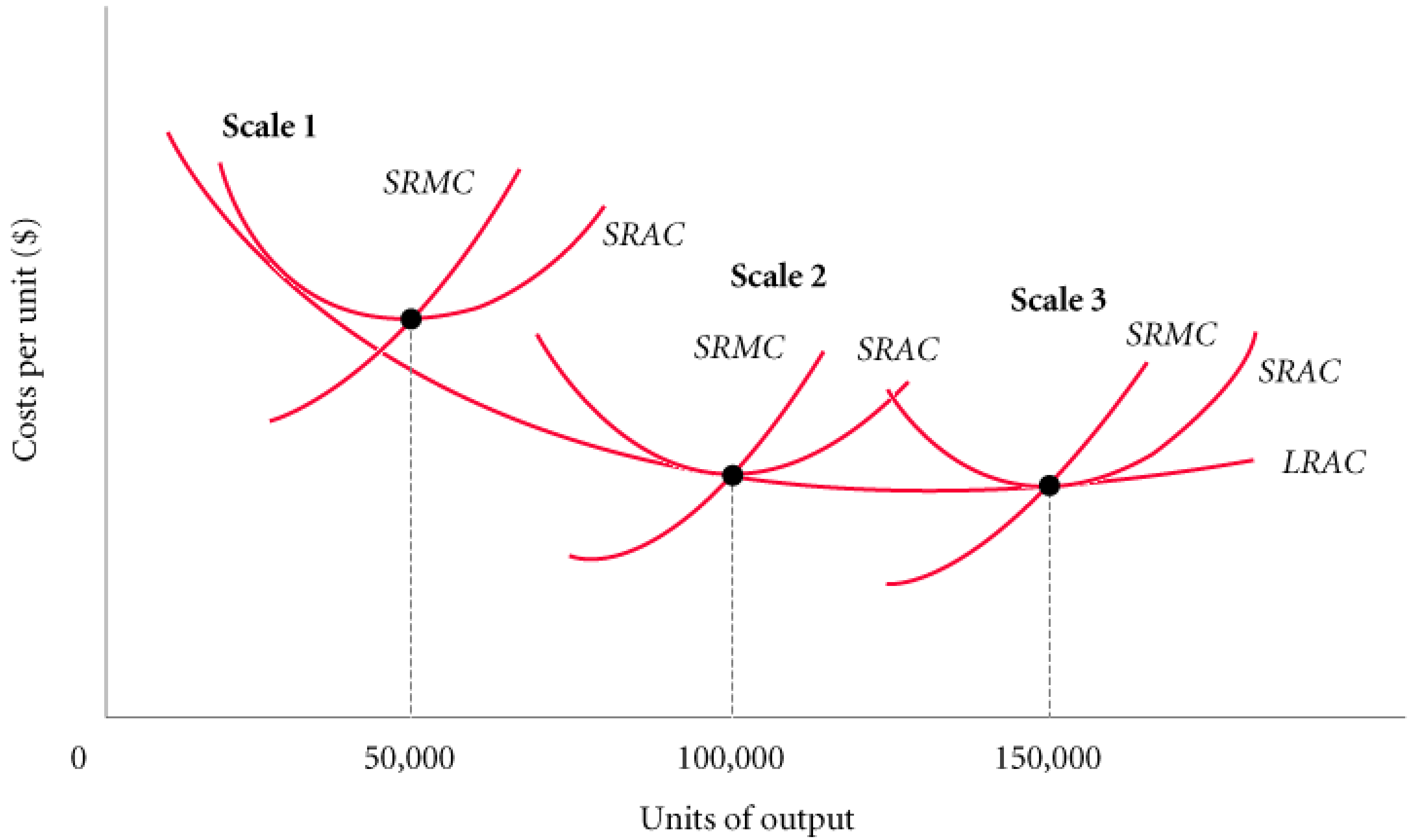
Weekly Costs Showing Economies of Scale in Egg Production

Jones Farm	**Total Weekly Costs**
15 hours of labor (implicit value $8 per hour)	$120
Feed, other variable costs	25
Transport costs	15
Land and capital costs attributable to egg production	17
	$177
Total output	2,400 eggs
Average cost	$0.074 per egg

Chicken Little Egg Farms Inc.	**Total Weekly Costs**
Labor	$ 5,128
Feed, other variable costs	4,115
Transport costs	2,431
Land and capital costs	19,230
	$30,904
Total output	1,600,000 eggs
Average cost	$0.019 per egg

Long-Run Costs: Economies and Diseconomies of Scale

long-run average cost curve (*LRAC*) A graph that shows the different scales on which a firm can choose to operate in the long run.



Long-Run Costs: Economies and Diseconomies of Scale

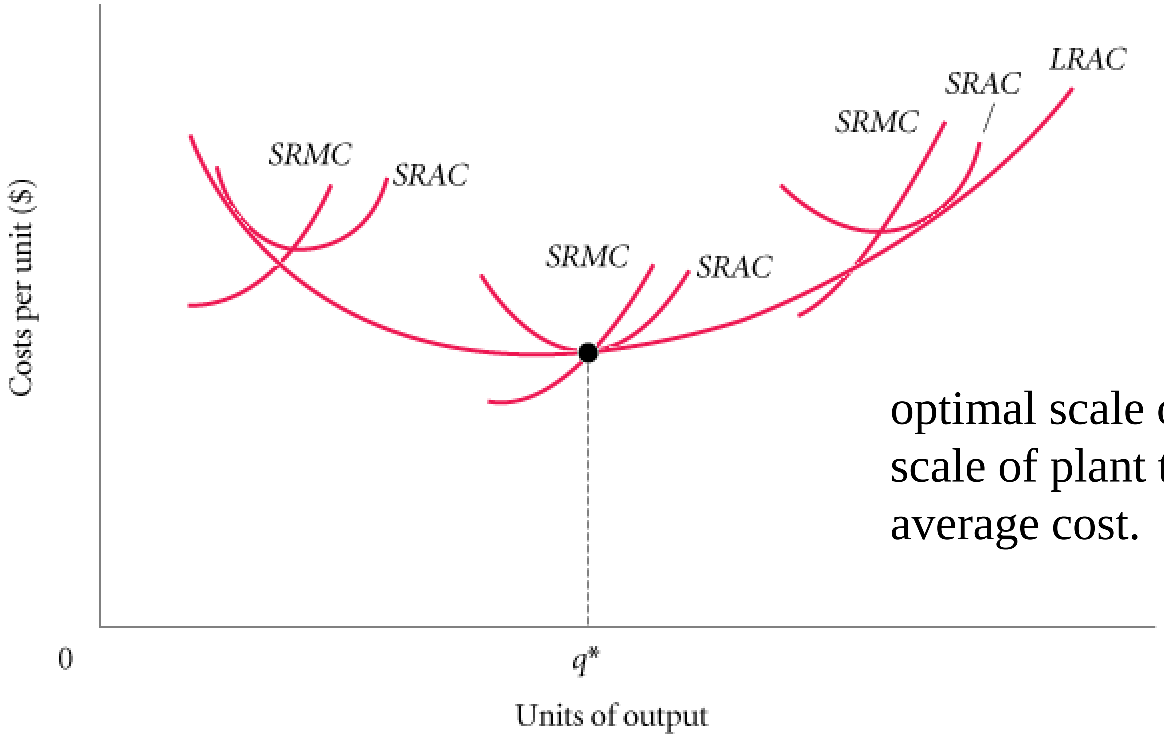
Constant Returns to Scale

Technically, the term *constant returns* means that the quantitative relationship between input and output stays constant, or the same, when output is increased.

Constant returns to scale mean that the firm's long-run average cost curve remains flat.

Long-Run Costs: Economies and Diseconomies of Scale

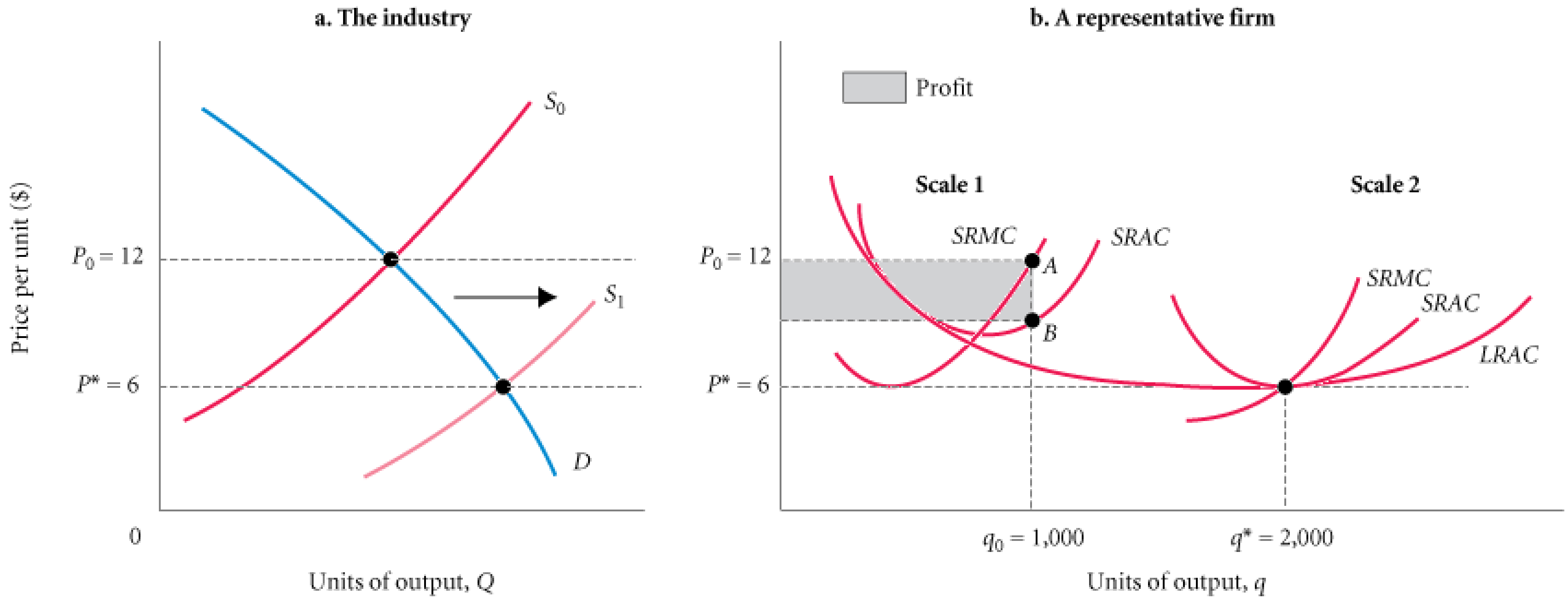
Decreasing Returns to Scale



optimal scale of plant The scale of plant that minimizes average cost.

Long-Run Adjustments to Short-Run Conditions

Short-Run Profits: Expansion to Equilibrium



Long-Run Adjustments to Short-Run Conditions

Short-Run Profits: Expansion to Equilibrium

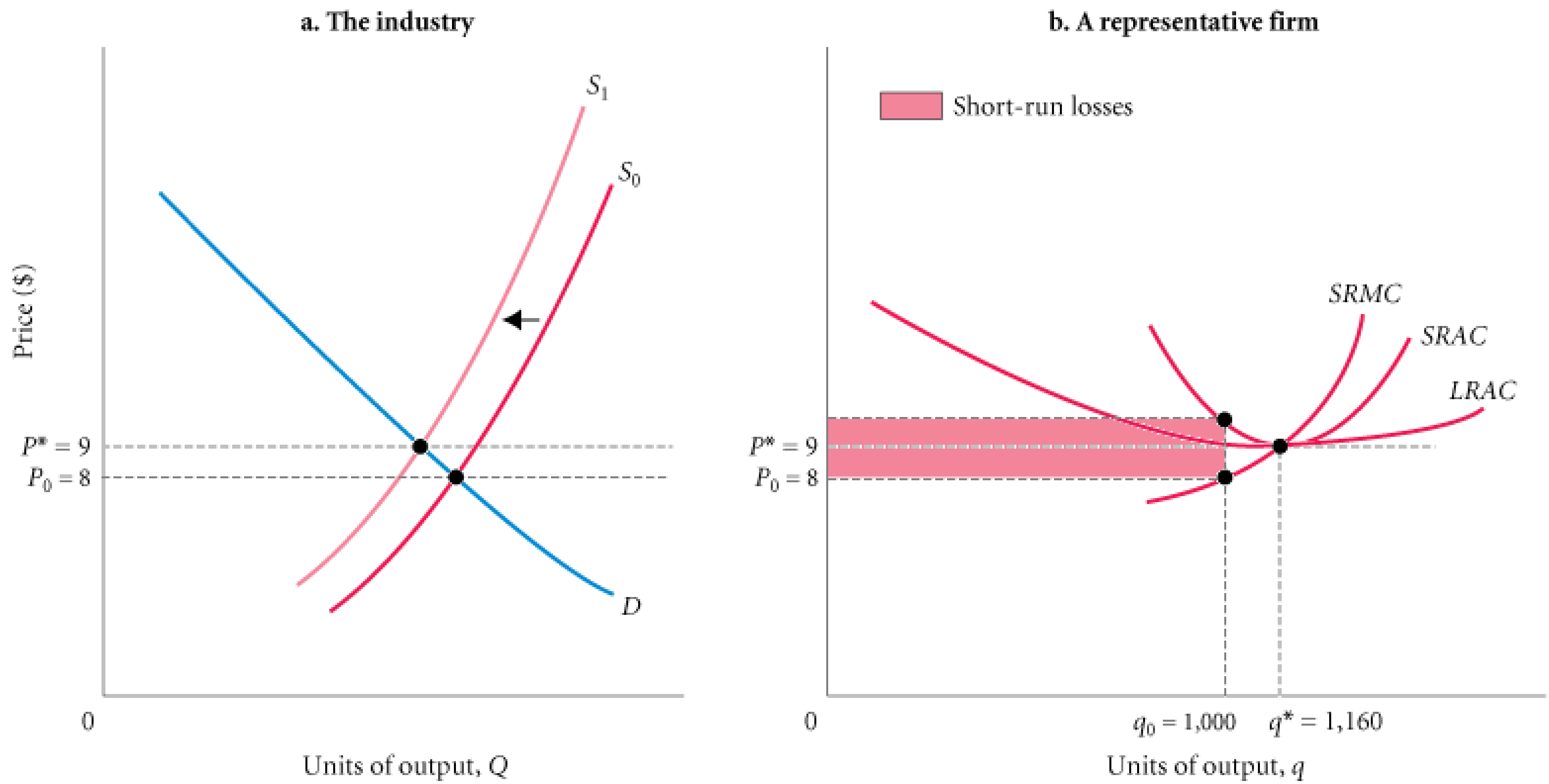
In the long run, equilibrium price (*P**) is equal to long-run average cost, short-run marginal cost, and short-run average cost. Profits are driven to zero:

$$P^* = SRMC = SRAC = LRAC$$

Any price above *P** means that there are profits to be made in the industry, and new firms will continue to enter. Any price below *P** means that firms are suffering losses, and firms will exit the industry. Only at *P** will profits be just equal to zero, and only at *P** will the industry be in equilibrium.

Long-Run Adjustments to Short-Run Conditions

Short-Run Losses: Contraction to Equilibrium



Long-Run Adjustments to Short-Run Conditions

Short-Run Losses: Contraction to Equilibrium

Whether we begin with an industry in which firms are earning profits or suffering losses, the final long-run competitive equilibrium condition is the same:

$$P^* = SRMC = SRAC = LRAC$$

and profits are zero. At this point, individual firms are operating at the most efficient scale of plant—that is, at the minimum point on their *LRAC* curve.

Long-Run Adjustments to Short-Run Conditions

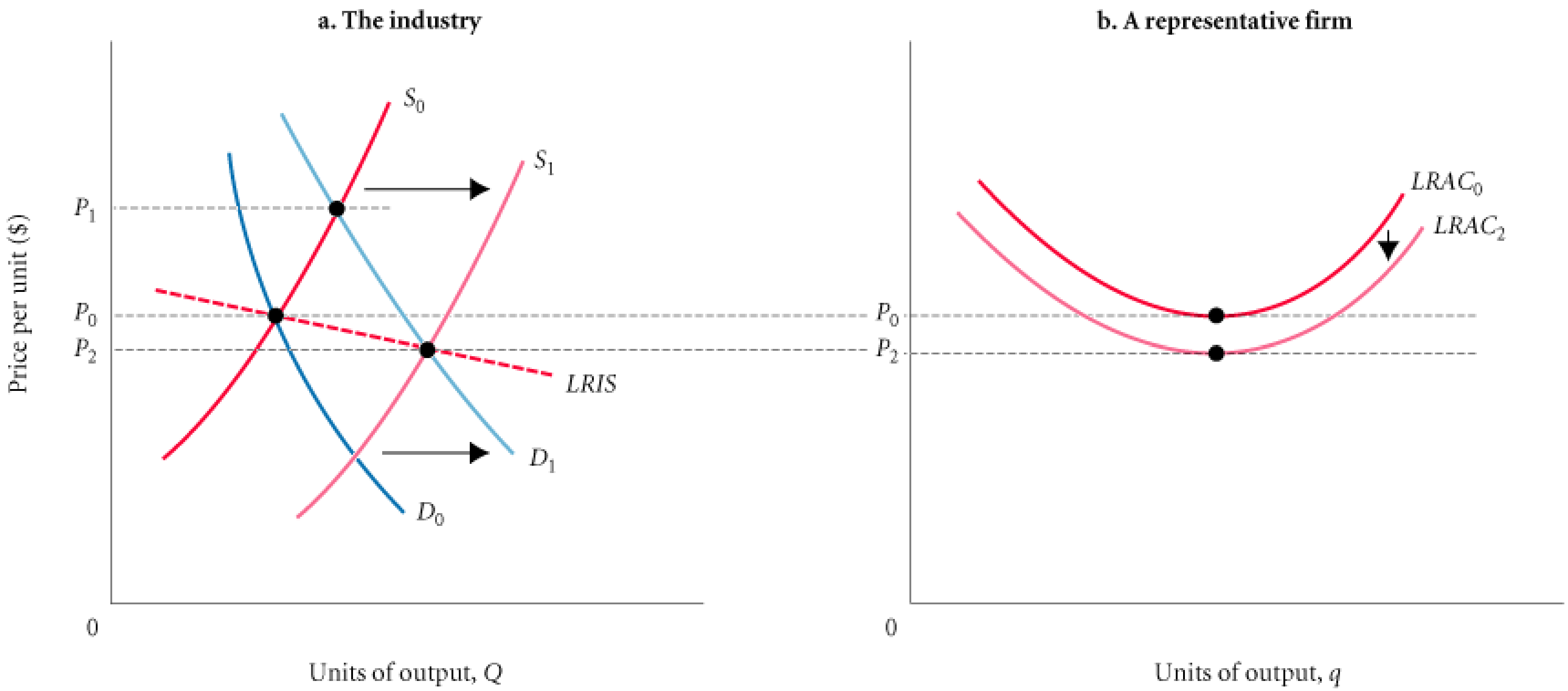
The Long-Run Adjustment Mechanism: Investment Flows Toward Profit Opportunities

The entry and exit of firms in response to profit opportunities usually involve the financial capital market. In capital markets, people are constantly looking for profits.When firms in an industry do well, capital is likely to flow into that industry in a variety of forms.

long-run competitive equilibrium When $P = SRMC = SRAC = LRAC$ and profits are zero.

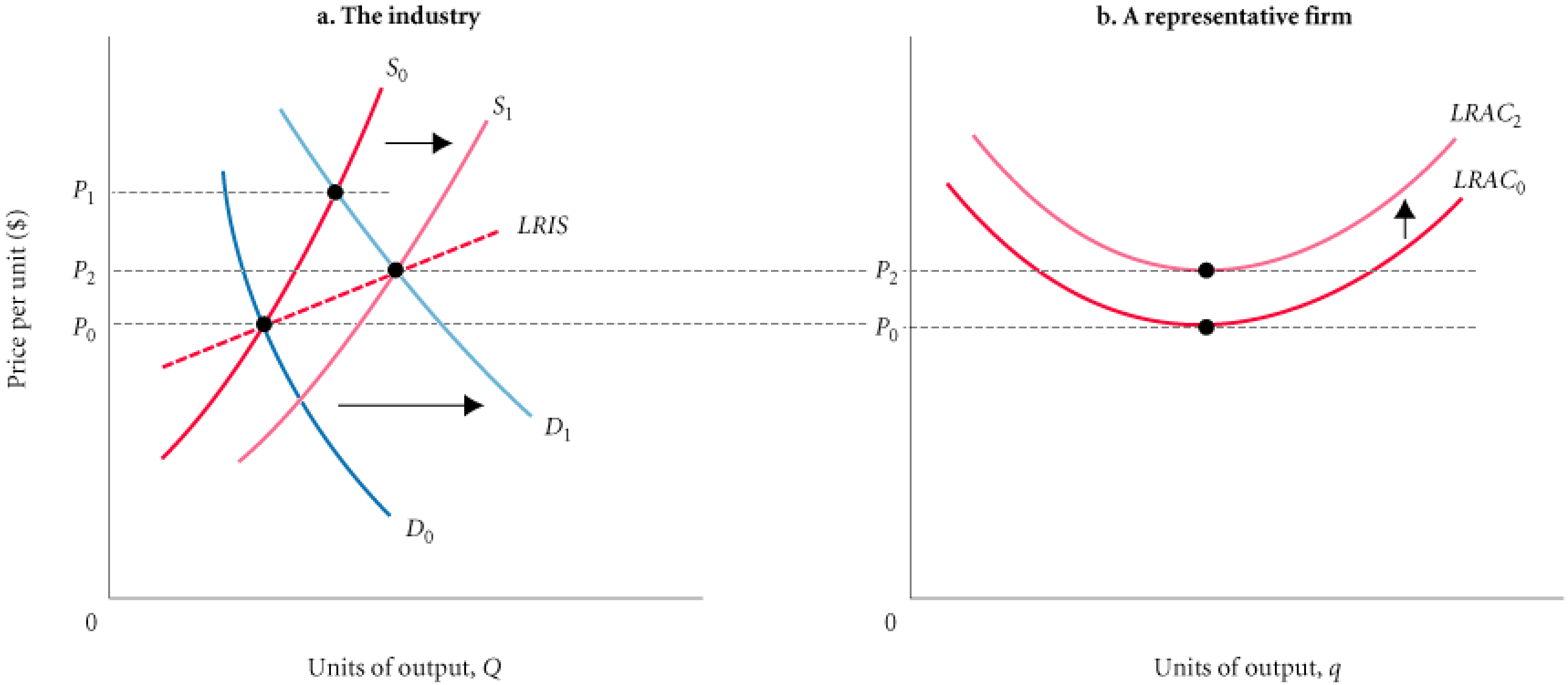
Investment—in the form of new firms and expanding old firms—will over time tend to favor those industries in which profits are being made, and over time industries in which firms are suffering losses will gradually contract from disinvestment.

THE LONG-RUN INDUSTRY SUPPLY CURVE



A Decreasing-Cost Industry: External Economies

THE LONG-RUN INDUSTRY SUPPLY CURVE



An Increasing-Cost Industry: External Diseconomies

Input Markets: Basic Concepts

Demand for Inputs: A *Derived* Demand

derived demand The demand for resources (inputs) that is dependent on the demand for the outputs those resources can be used to produce.

productivity of an input The amount of output produced per unit of that input.

Inputs are demanded by a firm if and only if households demand the good or service produced by that firm.

Input Markets: Basic Concepts

Inputs: Complementary and Substitutable

Inputs can be *complementary* or *substitutable*. Two inputs used together may enhance, or complement, each other.

Diminishing Returns

marginal product of labor (MP_L) The additional output produced by 1 additional unit of labor.

Input Markets: Basic Concepts

Diminishing Returns

Marginal Revenue Product per Hour of Labor in Sandwich Production (One Grill)

(1) Total Labor Units (Employees)	(2) Total Product (Sandwiches per Hour)	(3) Marginal Product Of Labor (MP_L) (Sandwiches per Hour)	(4) Price (P_X) (Value Added per Sandwich)[a]	(5) Marginal Revenue Product (MP_L X P_X) (per Hour)
0	0	–	–	–
1	10	10	$0.50	$5.00
2	25	15	0.50	7.50
3	35	10	0.50	5.00
4	40	5	0.50	2.50
5	42	2	0.50	1.00
6	42	0	0.50	0.00

Wage rate = $4/hr

Input Markets: Basic Concepts

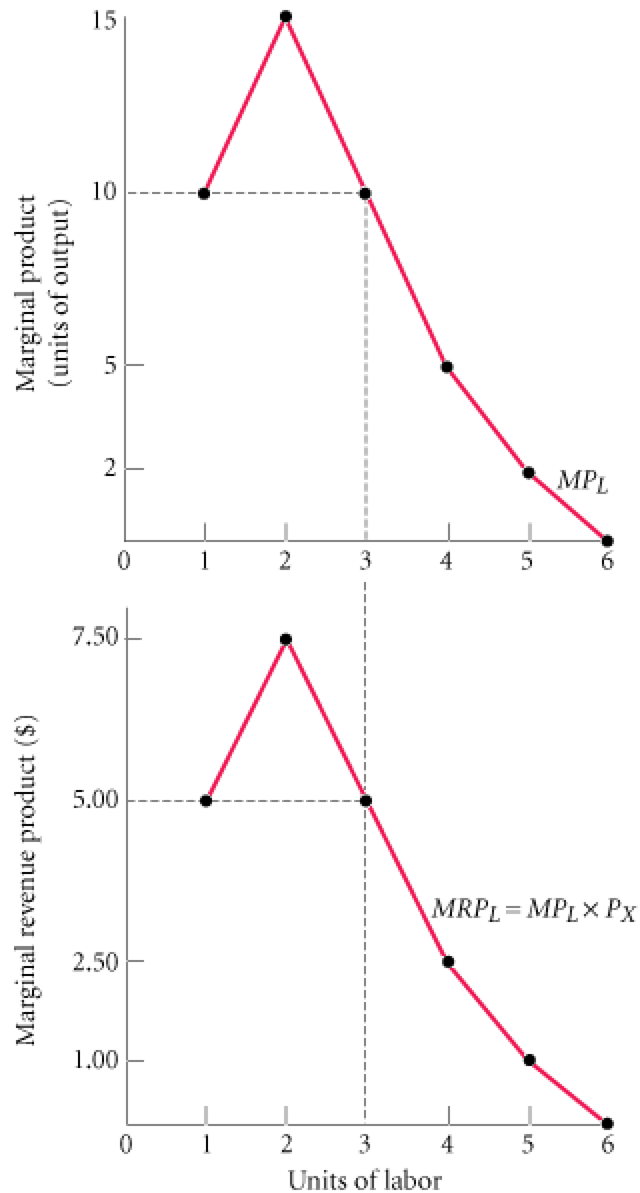
Marginal Revenue Product

marginal revenue product (*MRP*) The additional revenue a firm earns by employing 1 additional unit of input, *ceteris paribus*.

$$MRP_L = MP_L \text{ x } P_X$$

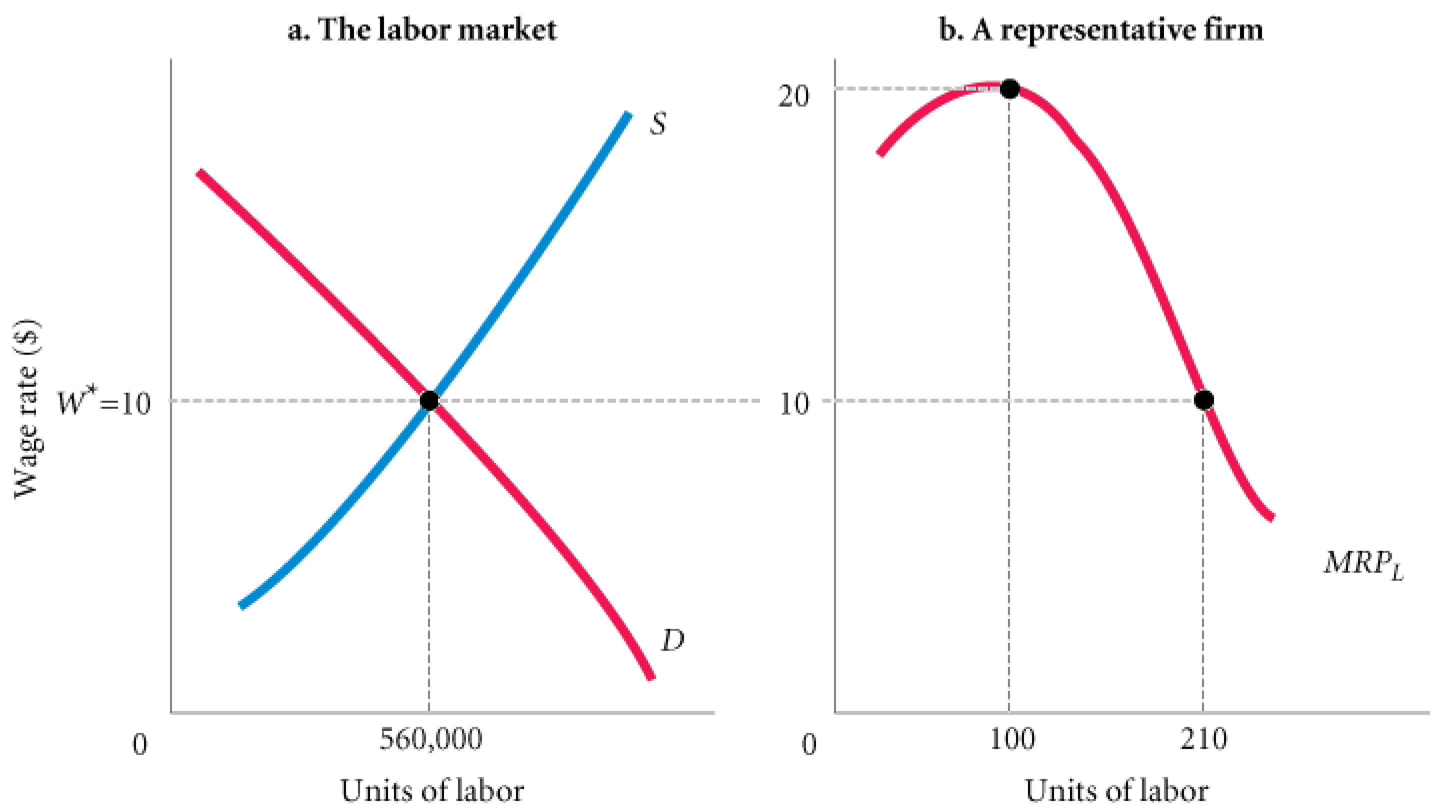
Input Markets: Basic Concepts

Marginal Revenue Product



Labor Markets

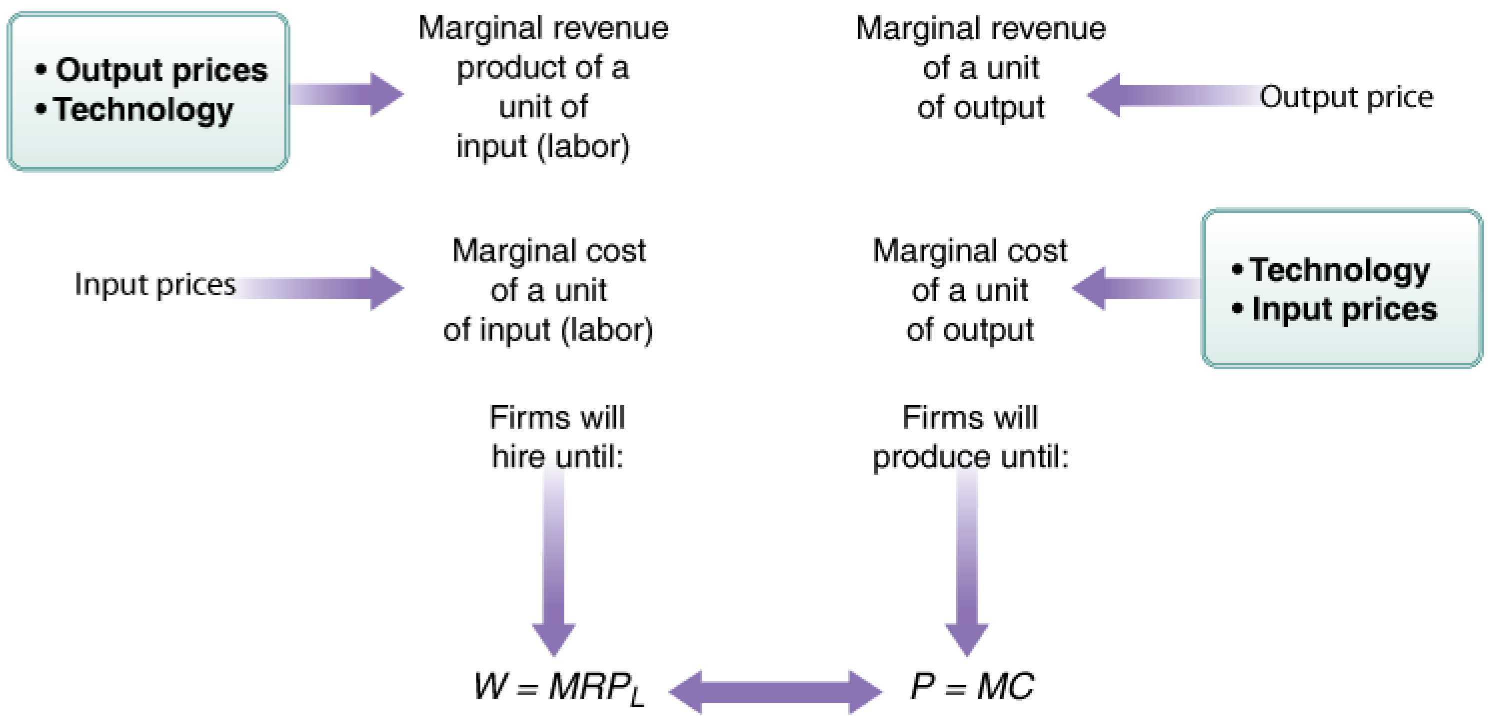
A Firm Using Only One Variable Factor of Production: Labor



Labor Markets

A Firm Using Only One Variable Factor of Production: Labor

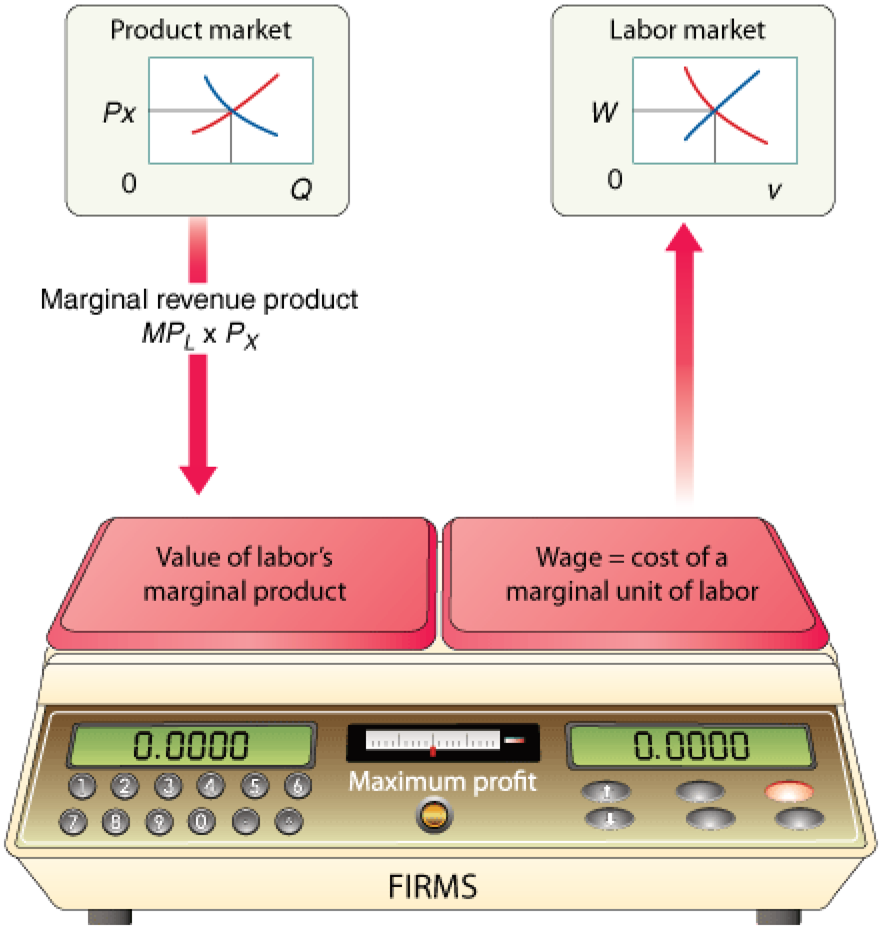
Comparing Marginal Revenue and Marginal Cost to Maximize Profits



Labor Markets

A Firm Using Only One Variable Factor of Production: Labor

Comparing Marginal Revenue and Marginal Cost to Maximize Profits



Labor Markets

A Firm Using Only One Variable Factor of Production: Labor

Deriving Input Demands

Calculating the marginal product of a variable input (labor) and marginal revenue product is essentially the same for both big corporations and small proprietorships.

Workers are hired because the entrepreneur expects that their current efforts will produce future revenues greater than their wage costs.

Labor Markets

A Firm Employing Two Variable Factors of Production in the Short and Long Run

In firms employing just one variable factor of production, a change in the price of that factor affects only the demand for the factor itself. When more than one factor can vary, however, we must consider the impact of a change in one factor price on the demand for other factors as well.

A Firm Employing Two Variable Factors of Production in the Short and Long Run

Substitution and Output Effects of a Change in Factor Price

Response of a Firm to an Increasing Wage Rate

Technology	**Input Requirements Per Unit Of Output** *K*	*L*	**Unit Cost if** P_L **= \$1** P_K **= \$1** $(P_L \times L) + (P_K \times K)$	**Unit Cost if** P_L **= \$2** P_K **= \$1** $(P_L \times L) + (P_K \times K)$
A (capital intensive)	10	5	\$15	\$20
B (labor intensive)	3	10	\$13	\$23

Labor Markets

A Firm Employing Two Variable Factors of Production in the Short and Long Run

Substitution and Output Effects of a Change in Factor Price

The Substitution Effect of an Increase in Wages on a Firm Producing 100 Units of Output

	To Produce 100 Units of Output		
	Total Capital Demanded	**Total Labor Demanded**	**Total Variable Cost**
When P_L = \$1, P_K = \$1, firm uses technology *B*	300	1,000	\$1,300
When P_L = \$2, P_K = \$1, firm uses technology *A*	1,000	500	\$2,000

Labor Markets

A Firm Employing Two Variable Factors of Production in the Short and Long Run

Substitution and Output Effects of a Change in Factor Price

factor substitution effect The tendency of firms to substitute away from a factor whose price has risen and toward a factor whose price has fallen.

output effect of a factor price increase (decrease) When a firm decreases (increases) its output in response to a factor price increase (decrease), this decreases (increases) its demand for all factors.

Labor Markets

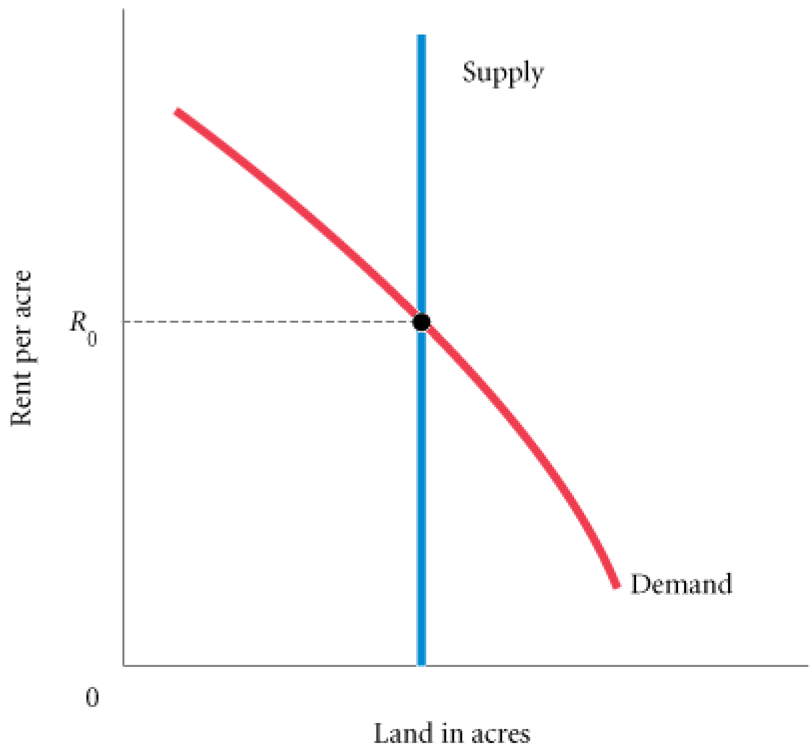
Many Labor Markets

If labor markets are competitive, the wages in those markets are determined by the interaction of supply and demand. As we have seen, firms will hire workers only as long as the value of their product exceeds the relevant market wage. This is true in all competitive labor markets.

Land Markets

demand-determined price The price of a good that is in fixed supply; it is determined exclusively by what firms and households are willing to pay for the good.

pure rent The return to any factor of production that is in fixed supply.



Land Markets

Rent and the Value of Output Produced on Land

A firm will pay for and use land as long as the revenue earned from selling the product
produced on that land is sufficient to cover the price of the land. Stated in equation form, the firm will use land up to the point at which $MRP_A = P_A$, where A is land (acres).

ECONOMICS IN PRACTICE

Time Is Money

High-Speed Rail Give Short-Haul Air a Run for the Money in Europe, with More Flexible Travel, Greater Comfort, Lower Environmental Impact

Travel Industry News

The Firm’s Profit-Maximizing Condition in Input Markets

Profit-maximizing condition for the perfectly competitive firm is

$$P_L = \mathrm{MRP}_L = (MP_L \text{ x } P_X)$$

$$P_K = MRP_K = (MP_K \text{ x } P_X)$$

$$P_A = MRP_A = (MP_A \text{ x } P_X)$$

where L is labor, K is capital, A is land (acres), X is output, and P_X is the price of that output.

Input Demand Curves

Shifts in Factor Demand Curves

The Demand for Outputs

If product demand increases, product price will rise and marginal revenue product (factor demand) will increase—the *MRP* curve will shift to the right. If product demand declines, product price will fall and marginal revenue product (factor demand) will decrease—the *MRP* curve will shift to the left.

The Quantity of Complementary and Substitutable Inputs

The production and use of capital enhances the productivity of labor and normally increases the demand for labor and drives up wages.

Input Demand Curves

Shifts in Factor Demand Curves

The Prices of Other Inputs

When a firm has a choice among alternative technologies, the choice it makes depends to some extent on relative input prices.

Technological Change

technological change The introduction of new methods of production or new products intended to increase the productivity of existing inputs or to raise marginal products.

Resource Allocation and the Mix of Output in Competitive Markets

The Distribution of Income

marginal productivity theory of income distribution At equilibrium, all factors of production end up receiving rewards determined by their productivity as measured by marginal revenue product.

Imperfect Competition and Market Power: Core Concepts

imperfectly competitive industry An industry in which individual firms have some control over the price of their output.

market power An imperfectly competitive firm's ability to raise price without losing all of the quantity demanded for its product.

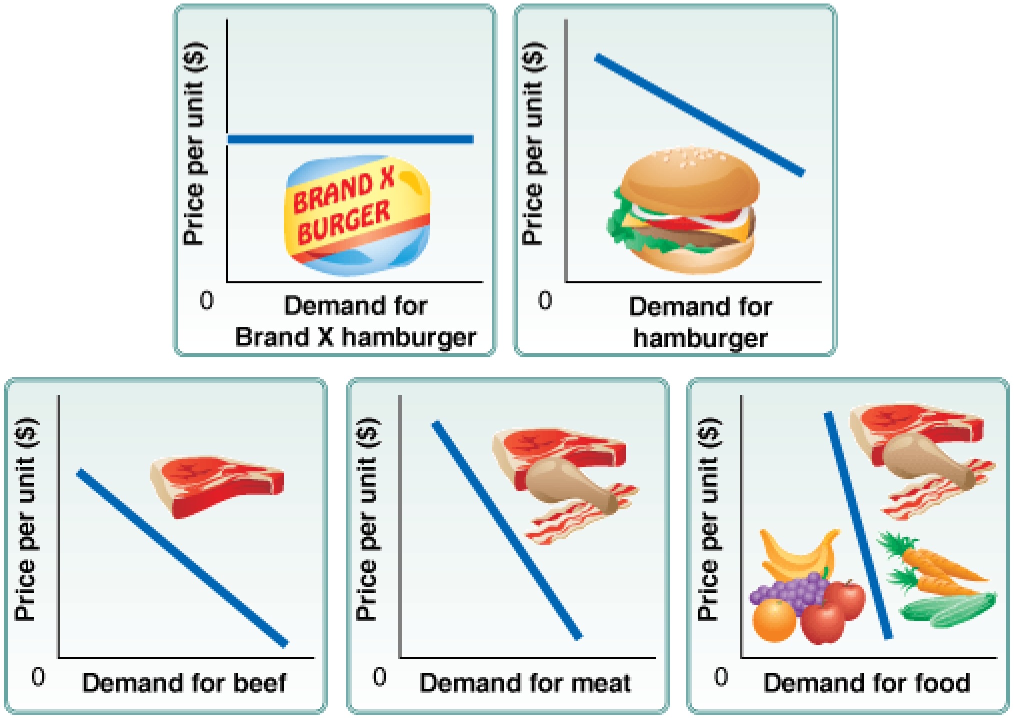
Imperfect Competition and Market Power: Core Concepts

Forms of Imperfect Competition and Market Boundaries

pure monopoly An industry with a single firm that produces a product for which there are no close substitutes and in which significant barriers to entry prevent other firms from entering the industry to compete for profits.

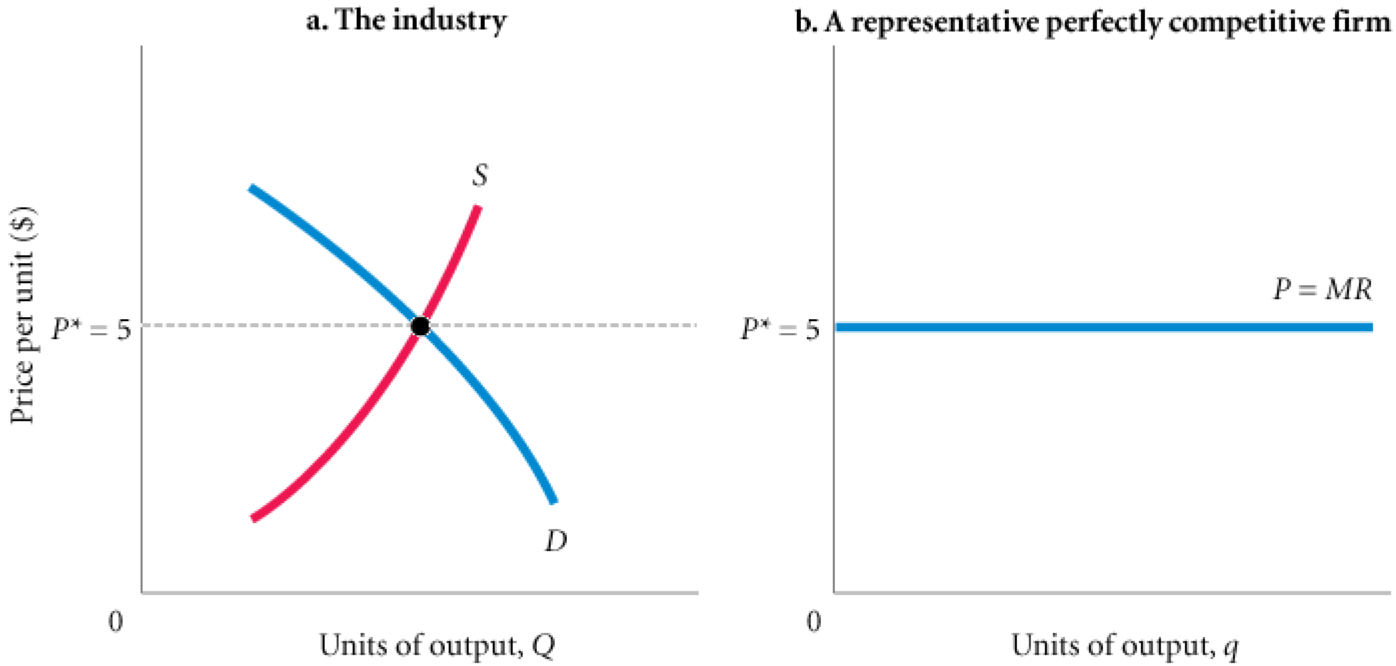
Imperfect Competition and Market Power: Core Concepts

Forms of Imperfect Competition and Market Boundaries



Price and Output Decisions in Pure Monopoly Markets

Demand in Monopoly Markets



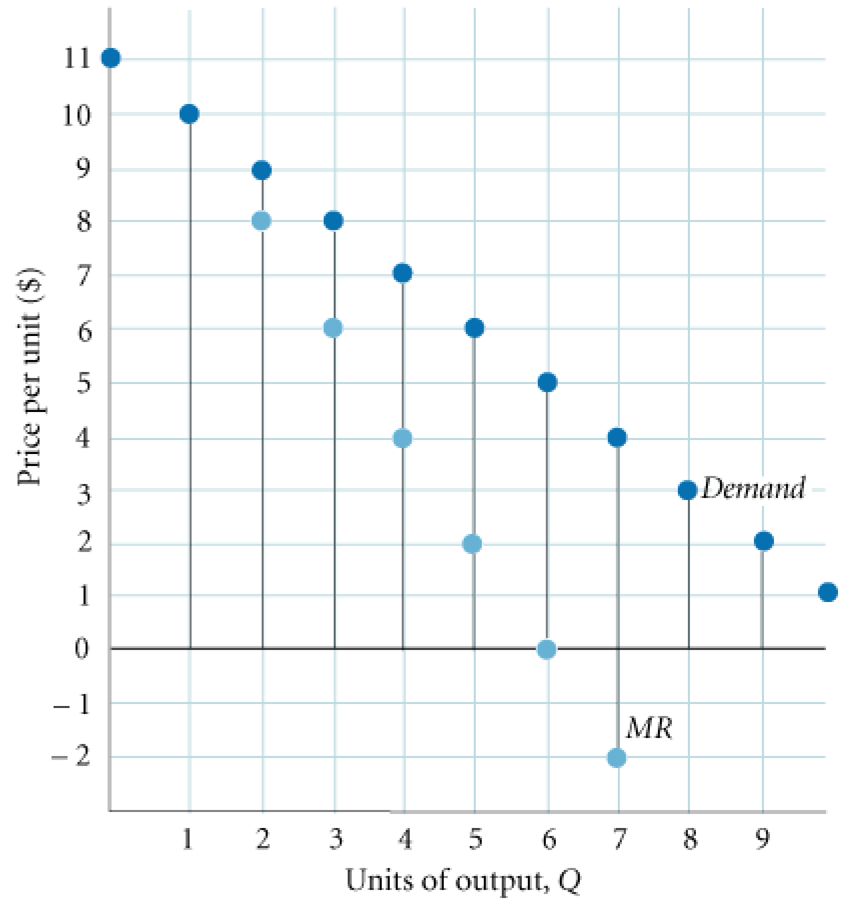
Price and Output Decisions in Pure Monopoly Markets

Demand in Monopoly Markets

Marginal Revenue and Market Demand

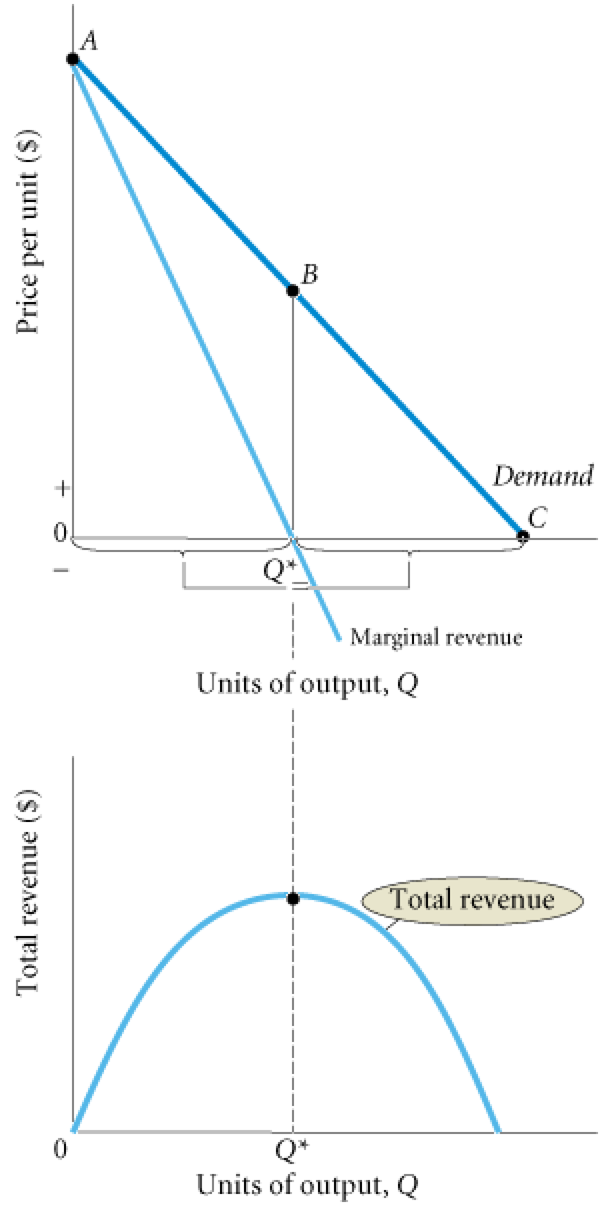
Marginal Revenue Facing a Monopolist

(1) Quantity	(2) Price	(3) Total Revenue	(4) Marginal Revenue
0	$11	0	-
1	10	$10	$10
2	9	18	8
3	8	24	6
4	7	28	4
5	6	30	2
6	5	30	0
7	4	28	-2
8	3	24	-4
9	2	18	-6
10	1	10	-8



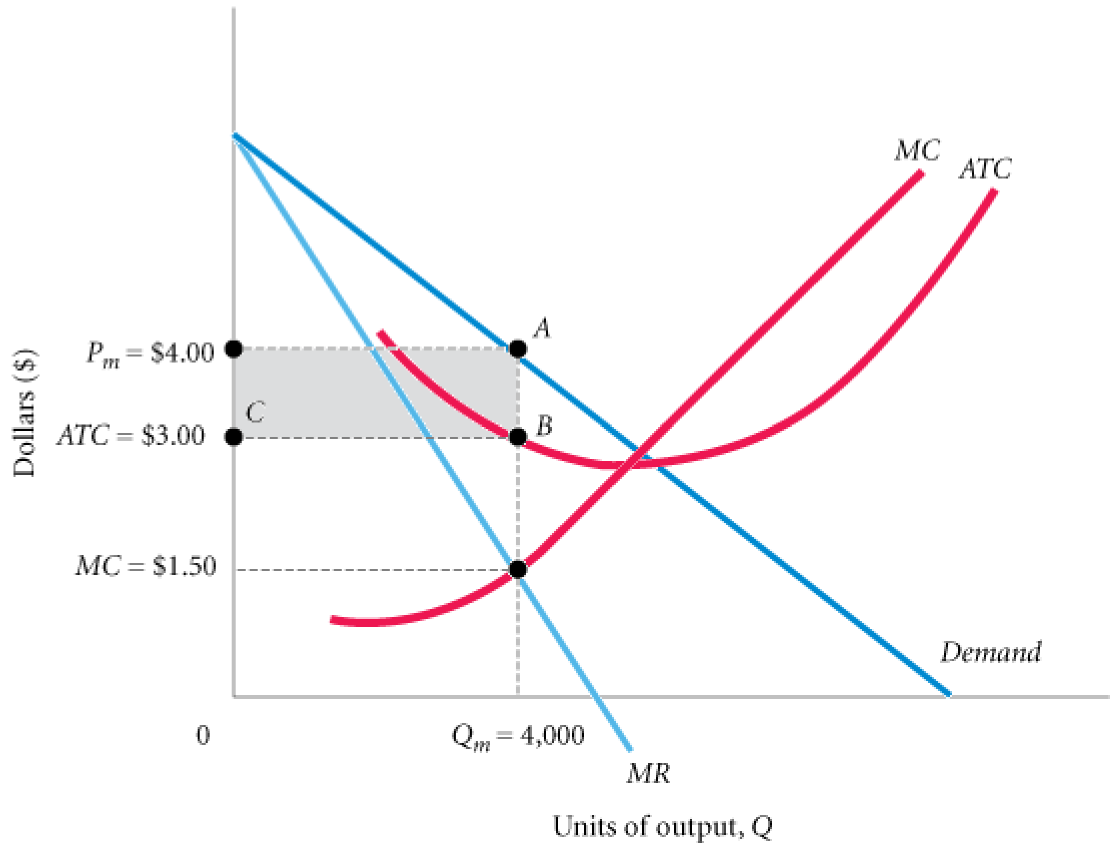
Price and Output Decisions in Pure Monopoly Markets

Demand in Monopoly Markets



Price and Output Decisions in Pure Monopoly Markets

The Monopolist's Profit-Maximizing Price and Output



Price and Output Decisions in Pure Monopoly Markets

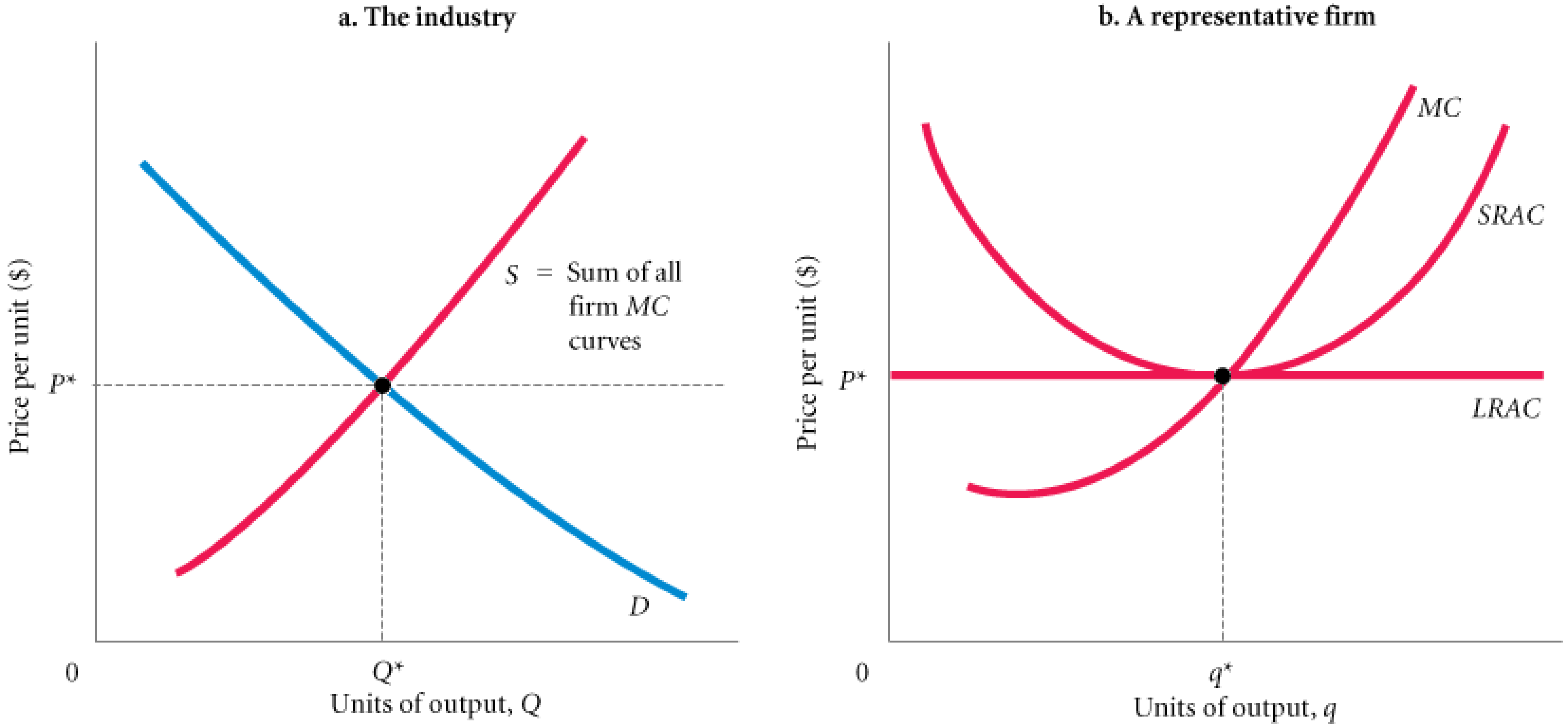
The Absence of a Supply Curve in Monopoly

A monopoly firm has no supply curve that is independent of the demand curve for its product.

A monopolist sets both price and quantity, and the amount of output that it supplies depends on both its marginal cost curve and the demand curve that it faces.

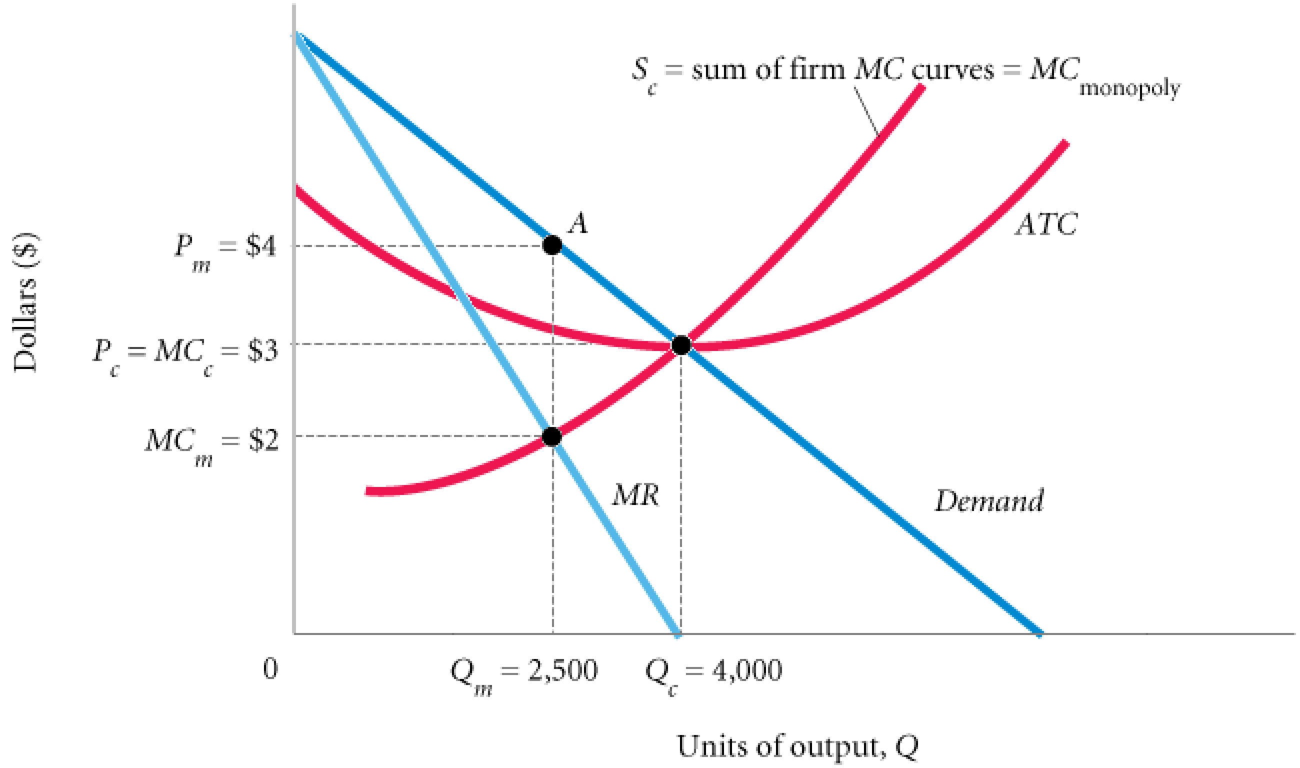
Price and Output Decisions in Pure Monopoly Markets

Perfect Competition And Monopoly Compared



Price and Output Decisions in Pure Monopoly Markets

Perfect Competition And Monopoly Compared



Price and Output Decisions in Pure Monopoly Markets

Monopoly in the Long Run: Barriers to Entry

barriers to entry Factors that prevent new firms from entering and competing in imperfectly competitive industries.

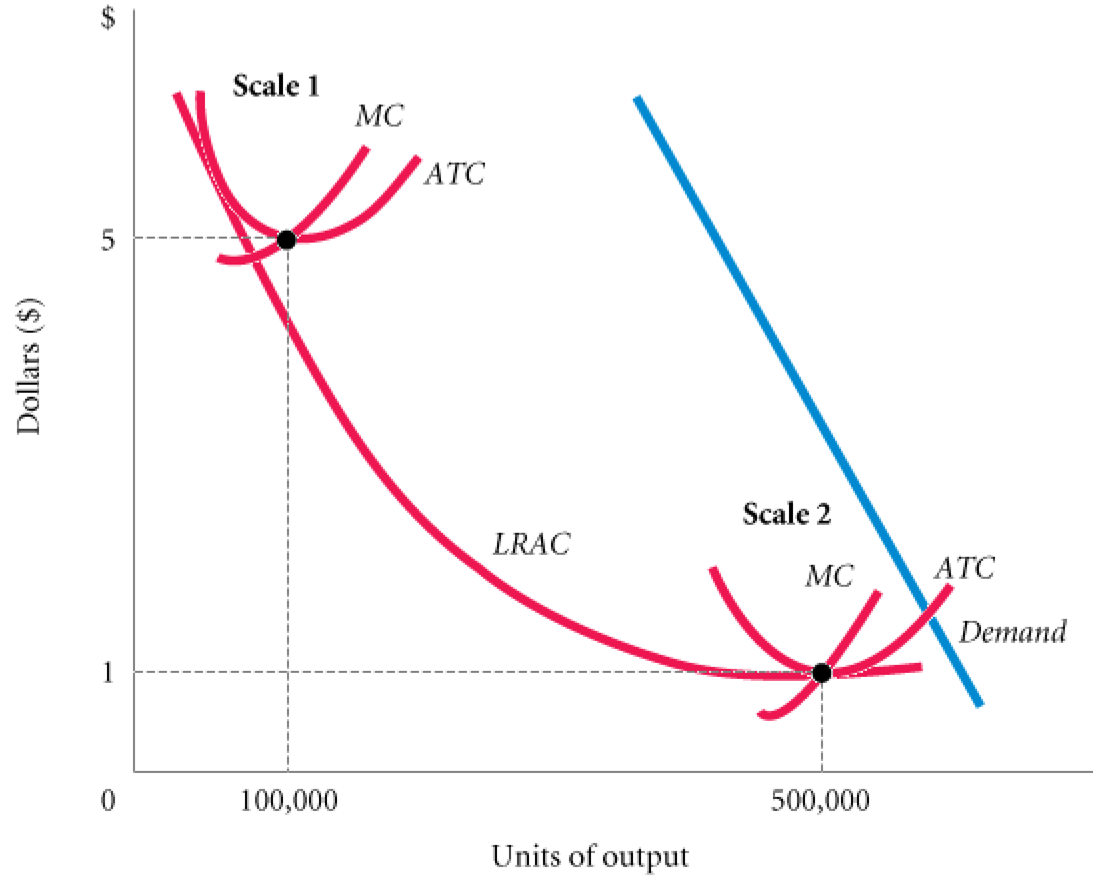
natural monopoly An industry that realizes such large economies of scale in producing its product that single-firm production of that good or service is most efficient.

Price and Output Decisions in Pure Monopoly Markets

Monopoly in the Long Run: Barriers to Entry

Economies of Scale

A natural monopoly



Price and Output Decisions in Pure Monopoly Markets

Monopoly in the Long Run: Barriers to Entry

Patents

patent A barrier to entry that grants exclusive use of the patented product or process to the inventor.

Government Rules

Ownership of a Scarce Factor of Production

Price and Output Decisions in Pure Monopoly Markets

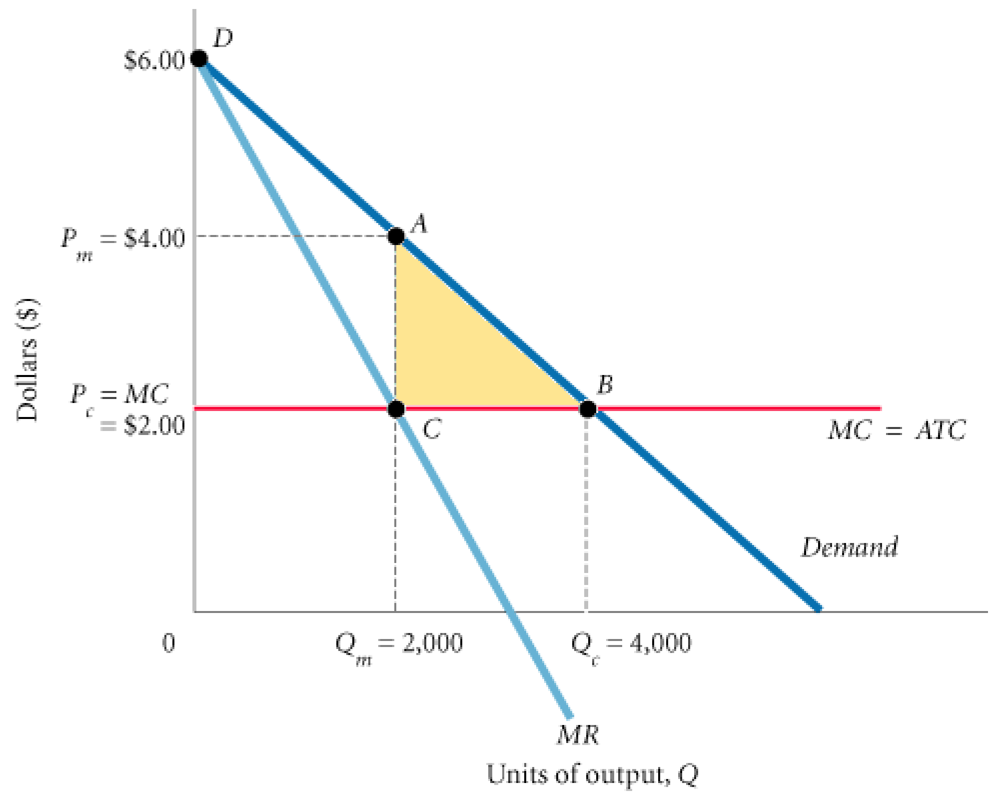
Monopoly in the Long Run: Barriers to Entry

Network Effects

network externalities The value of a product to a consumer increases with the number of that product being sold or used in the market.

The Social Costs of Monopoly

Inefficiency And Consumer Loss



The Social Costs of Monopoly

Rent-Seeking Behavior

rent-seeking behavior Actions taken by households or firms to preserve positive profits.

government failure Occurs when the government becomes the tool of the rent seeker and the allocation of resources is made even less efficient by the intervention of government.

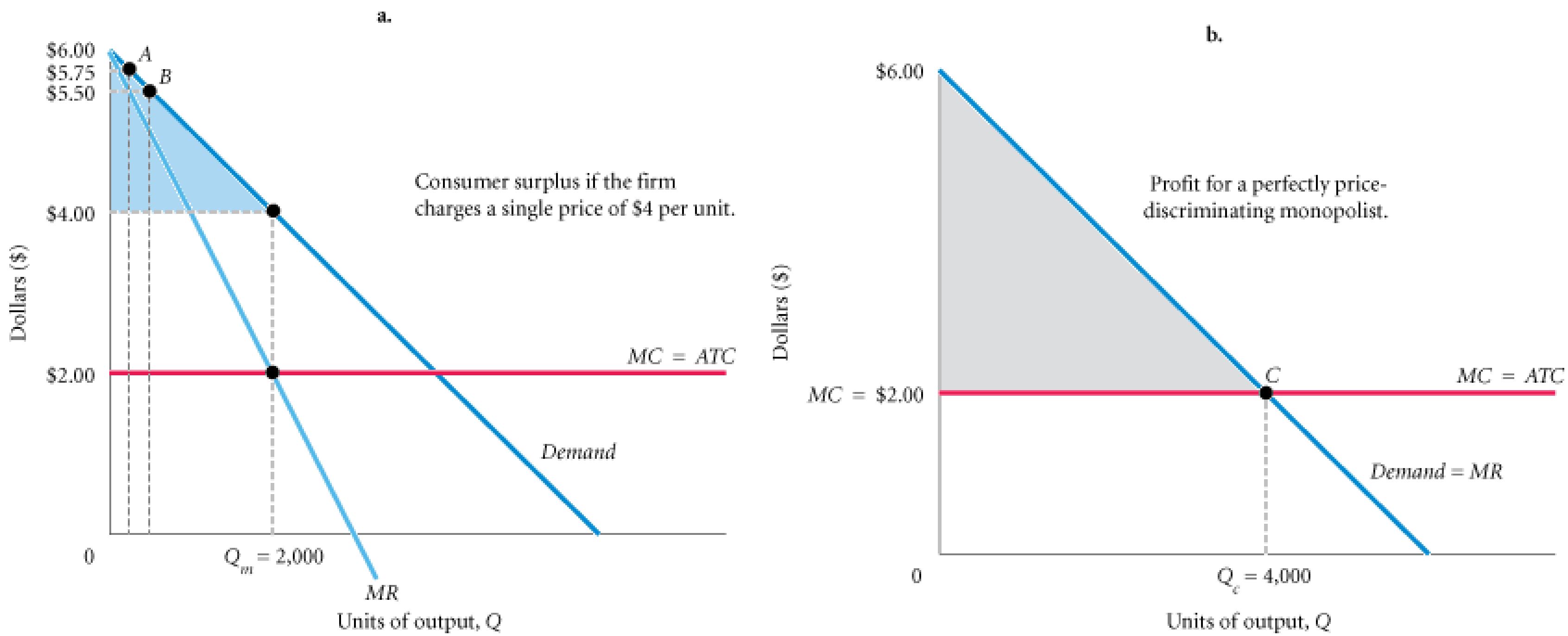
public choice theory An economic theory that the public officials who set economic policies and regulate the players act in their own self-interest, just as firms do.

Price Discrimination

price discrimination Charging different prices to different buyers.

perfect price discrimination Occurs when a firm charges the maximum amount that buyers are willing to pay for each unit.

Price Discrimination



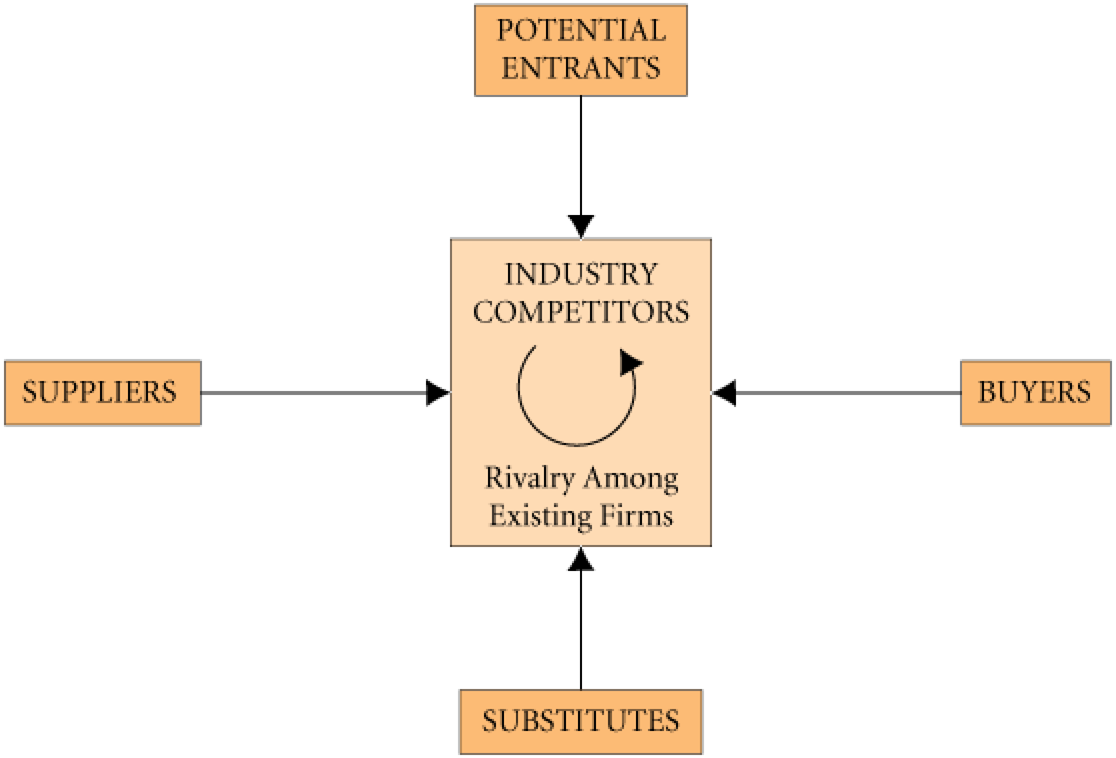
Oligopoly

oligopoly A form of industry (market) structure characterized by a few dominant firms. Products may be homogenous or differentiated.

Market Structure in an Oligopoly

Five Forces model A model developed by Michael Porter that helps us understand the five competitive forces that determine the level of competition and profitability in an industry.

Market Structure in an Oligopoly



Market Structure in an Oligopoly

Percentage of Value of Shipments Accounted for by the Largest Firms in High-Concentration Industries, 2002

Industry Designation	Four Largest Firms	Eight Largest Firms	Number Of Firms
Primary copper	99	100	10
Cigarettes	95	99	15
Household laundry equipment	93	100	13
Cellulosic man-made fiber	93	100	8
Breweries	90	94	344
Electric lamp bulbs	89	94	57
Household refrigerators and freezers	85	95	18
Small arms ammunition	83	89	109
Cereal breakfast foods	82	93	45
Motor vehicles	81	91	308

Source: U.S. Department of Commerce, Bureau of the Census, 2002 Economic Census, *Concentration Ratios: 2002* ECO2-315R-1, May 2006.

Market Structure in an Oligopoly

concentration ratio The share of industry output in sales or employment accounted for by the top firms.

contestable markets Markets in which entry and exit are easy.

Oligopoly Models

The Collusion Model

cartel A group of firms that gets together and makes joint price and output decisions to maximize joint profits.

tacit collusion Collusion occurs when price- and quantity-fixing agreements among producers are explicit. Tacit collusion occurs when such agreements are implicit.

Oligopoly Models

The Price-Leadership Model

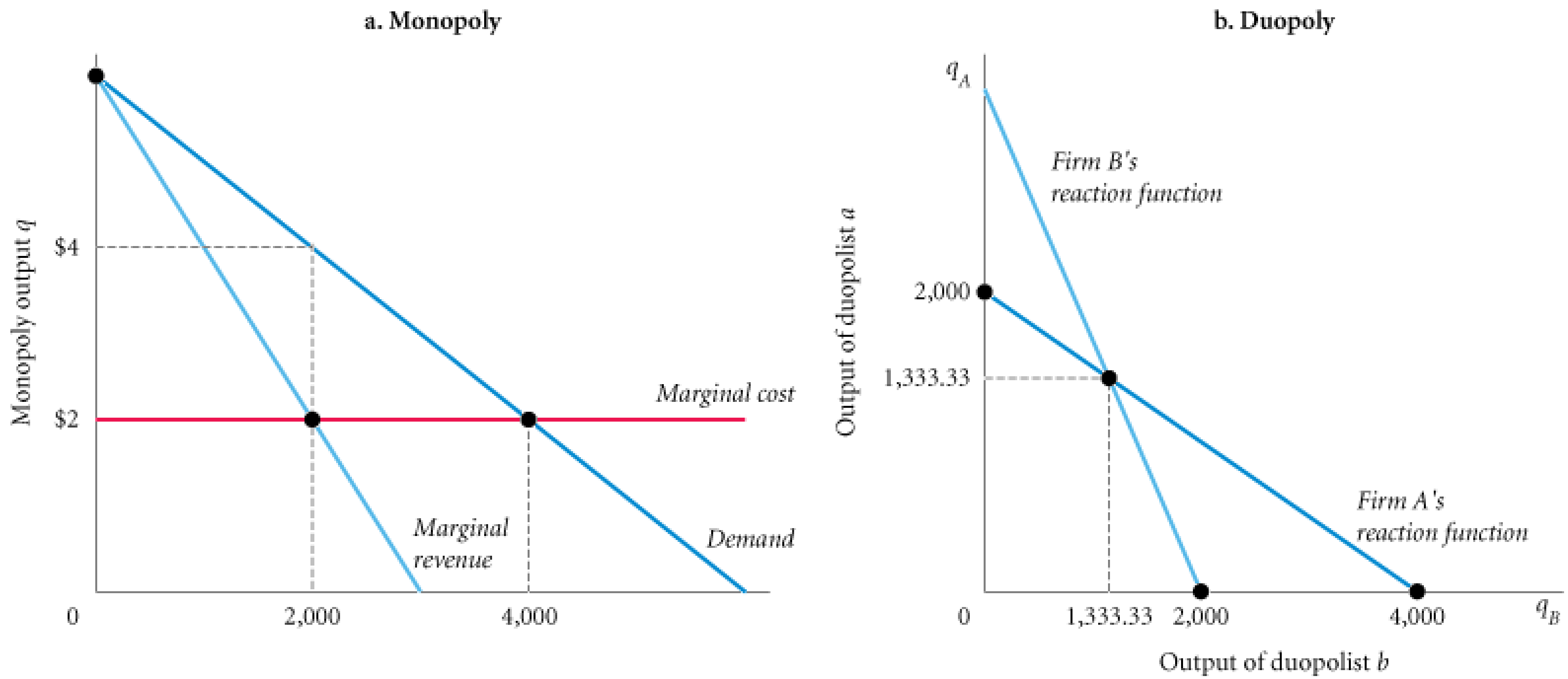
price leadership A form of oligopoly in which one dominant firm sets prices and all the smaller firms in the industry follow its pricing policy.

The Cournot Model

duopoly A two-firm oligopoly.

Oligopoly Models

The Cournot Model

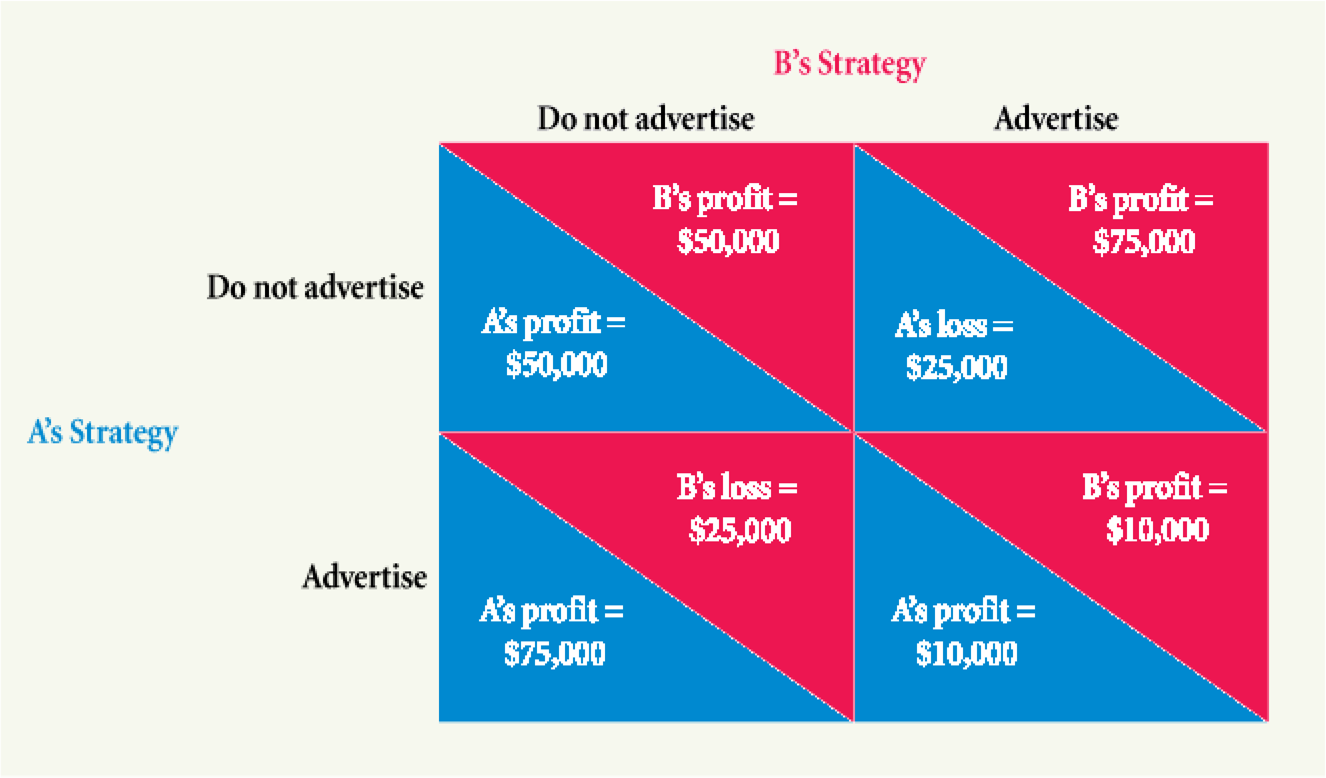


Game Theory

game theory Analyzes the choices made by rival firms, people, and even governments when they are trying to maximize their own well-being while anticipating and reacting to the actions of others in their environment.

dominant strategy In game theory, a strategy that is best no matter what the opposition does.

Game Theory

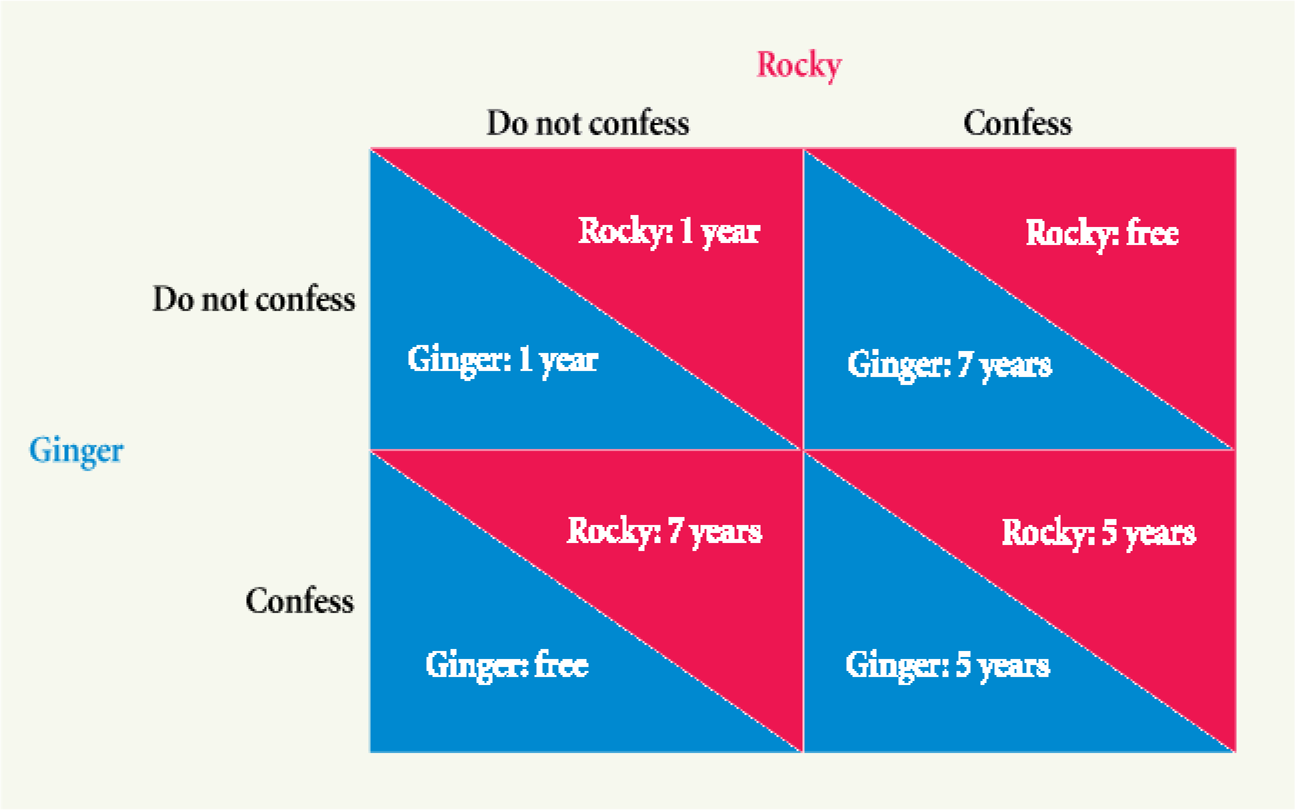


B's Strategy
Do not advertise
Advertise
A's Strategy
Do not advertise
Advertise
B's profit = $50,000
A's profit = $50,000
B's profit = $75,000
A's loss = $25,000
B's loss = $25,000
A's profit = $75,000
B's profit = $10,000
A's profit = $10,000

Game Theory

prisoners' dilemma A game in which the players are prevented from cooperating and in which each has a dominant strategy that leaves them both worse off than if they could cooperate.

Game Theory

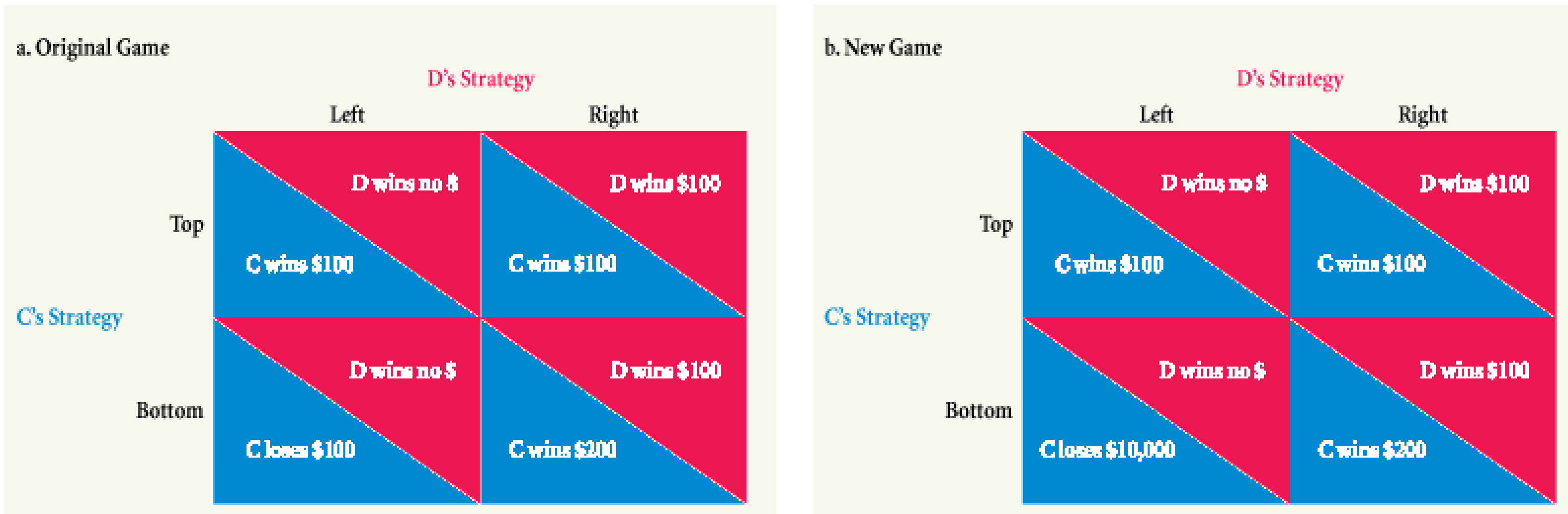

Rocky
Do not confess
Confess
Ginger
Do not confess
Confess
Rocky: 1 year
Ginger: 1 year
Rocky: free
Ginger: 7 years
Rocky: 7 years
Ginger: free
Rocky: 5 years
Ginger: 5 years

Game Theory

Nash equilibrium In game theory, the result of all players' playing their best strategy given what their competitors are doing.

maximin strategy In game theory, a strategy chosen to maximize the minimum gain that can be earned.

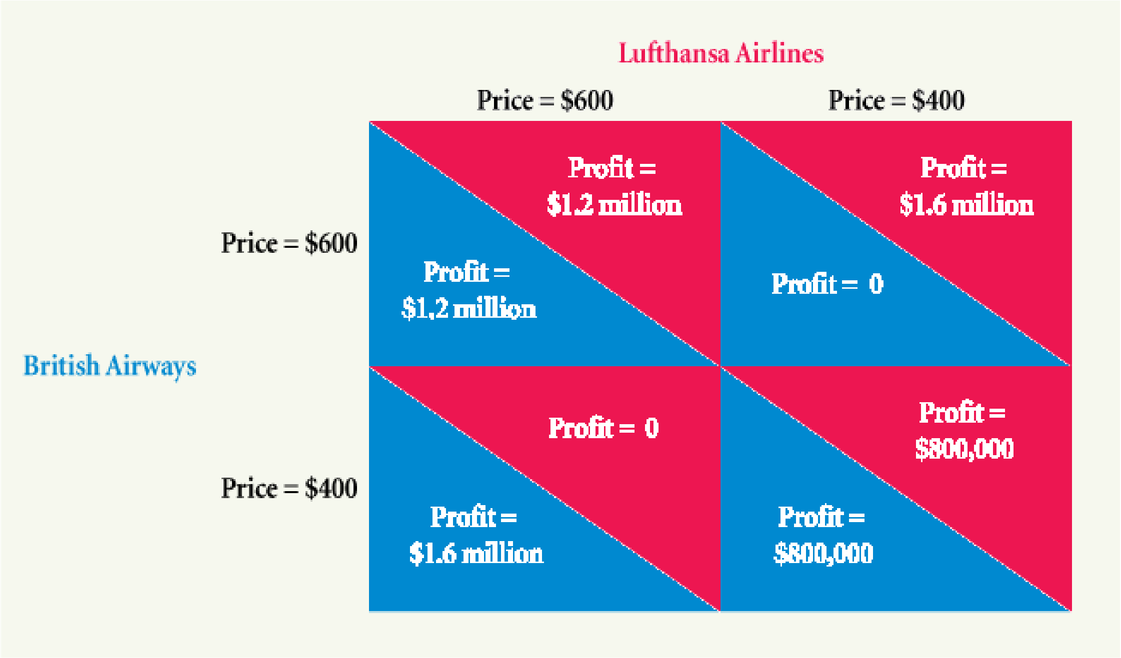
Game Theory


a. Original Game
D's Strategy
Left
Right
Top
Bottom
C's Strategy
D wins no $
C wins $100
D wins $100
C wins $100
D wins no $
C loses $100
D wins $100
C wins $200
b. New Game
D's Strategy
Left
Right
Top
Bottom
C's Strategy
D wins no $
C wins $100
D wins $100
C wins $100
D wins no $
C loses $10,000
D wins $100
C wins $200

Game Theory

Repeated Games

tit-for-tat strategy A repeated game strategy in which a player responds in kind to an opponent's play.



The Role of Government

Regulation of Mergers

Celler-Kefauver Act Extended the government's authority to control mergers.

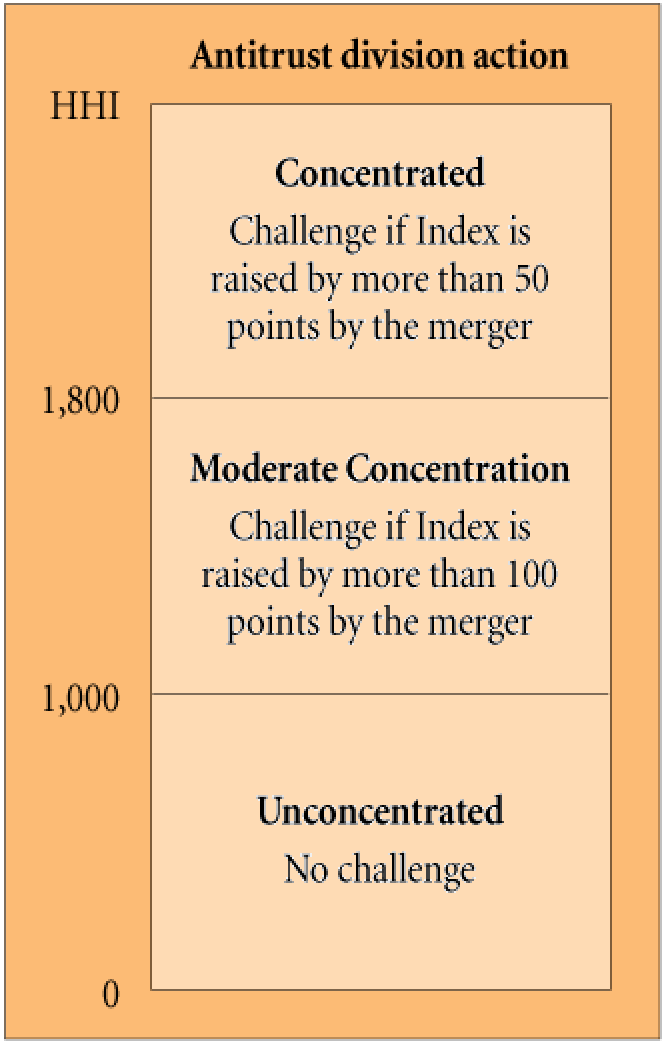
Herfindahl-Hirschman Index (HHI) An index of market concentration found by summing the square of percentage shares of firms in the market.

Calculation of a Simple Herfindahl-Hirschman Index for Four Hypothetical Industries, Each with No More Than Four Firms

	Percentage Share Of:				
	Firm 1	Firm 2	Firm 3	Firm 4	Herfindahl- Hirschman Index
Industry A	50	50	–	–	$50^2 + 50^2 = 5{,}000$
Industry B	80	10	10	–	$80^2 + 10^2 + 10^2 = 6{,}600$
Industry C	25	25	25	25	$25^2 + 25^2 + 25^2 + 25^2 = 2{,}500$
Industry D	40	20	20	20	$40^2 + 20^2 + 20^2 + 20^2 = 2{,}800$

The Role of Government

Regulation of Mergers



Monopolistic Competition

	Number of firms	Products differentiated or homogeneous	Price a decision variable	Easy entry	Distinguished by	Examples
Perfect competition	Many	Homogeneous	No	Yes	No price competition	Wheat farmer Textile firm
Monopoly	One	One version or many versions of a product	Yes	No	Still constrained by market demand	Public utility Patented drug
Monopolistic competition	Many	Differentiated	Yes, but limited	Yes	Price and quality competition	Restaurants Hand soap
Oligopoly	Few	Either	Yes	Limited	Strategic behavior	Automobiles Aluminum

	Monopolistic Competition	Oligopoly
Number of actual or potential competitors	Many sellers	Few sellers whose decisions are directly related to those of competitors
Product differentiation	Consumers perceive differences among the products of various competitors	High or low, depending on entry and exit conditions
Information	Low-cost information on price and product quality	Restricted access to price and product-quality information; cost and other data are often proprietary
Conditions of entry and exit	Easy entry and exit	High entry or exit barriers because of economies of scale, capital requirements, advertising, research and development costs, or other factors
Profit potential	Economic (above-normal) profits in short run only; normal profit in long run	Potential for economic (above-normal) profits in both short and long run
Examples	Clothing, consumer financial services, professional services, restaurants	Automobiles, aluminum, soft drinks, investment banking, long-distance telephone service, pharmaceuticals

Industry Characteristics

monopolistic competition A common form of industry (market) structure in the United States, characterized by a large number of firms, no barriers to entry, and product differentiation.

Percentage of Value of Shipments Accounted for by the Largest Firms in Selected Industries, 2002

Industry Designation	Four Largest Firms	Eight Largest Firms	Twenty Largest Firms	Number of Firms
Travel trailers and campers	38	45	58	733
Games, toys	39	48	63	732
Wood office furniture	34	43	56	546
Book printing	33	54	68	560
Curtains and draperies	17	25	38	1,778
Fresh or frozen seafood	14	24	48	529
Women's dresses	18	23	48	528
Miscellaneous plastic products	6	10	18	6,775

Source: U.S. Department of Commerce, Bureau of the Census, 1997 Census of Manufacturers, *Concentration Ratios in Manufacturing*. Subject Series EC92m315, June, 2001.

Product Differentiation and Advertising

How Many Varieties?

product differentiation A strategy that firms use to achieve market power. Accomplished by producing products that have distinct positive identities in consumers' minds.

Product Differentiation and Advertising

How Do Firms Differentiate Products?

horizontal differentiation Products differ in ways that make them better for some people and worse for others.

behavioral economics A branch of economics that uses the insights of psychology and economics to investigate decision making.

Product Differentiation and Advertising

How Do Firms Differentiate Products?

commitment device Actions that individuals take in one period to try to control their behavior in a future period.

vertical differentiation A product difference that, from everyone's perspective, makes a product better than rival products.

Product Differentiation and Advertising

Advertising

Total Advertising Expenditures in 2006	
	Billions of Dollars
Newspapers	$49.0
Television	66.8
Direct mail	59.6
Yellow pages	14.4
Internet	15.0
Radio	19.1
Magazines	24.0
Total	247.9

Product Differentiation and Advertising

Advertising

Domestic Advertising Spending by Category in 2006 in Billions of Dollars

Rank	Category	2006
1	Automotive	$19.8
2	Retail	19.1
3	Telecommunications	11.0
4	Medicine & remedies	9.2
5	General services	8.7
6	Financial services	8.7
7	Food, beverages, & candy	7.2
8	Personal care	5.7
9	Airlines, hotels, car rental, travel	5.4
10	Movies, recorded video, & music	5.4
11	Restaurants	5.3
12	Media	5.1
13	Government, politics, religion	3.5
14	Insurance	3.5
15	Real estate	3.1
16	Apparel	2.9
17	Computers, software	2.5
18	Home furnishings	2.2
19	Beer, wine, & liquor	2.1
20	Education	1.9

Product Differentiation and Advertising

Advertising

The Case for Advertising

The advocates of spirited competition believe that differentiated products and advertising give the market system its vitality and are the basis of its power. They are the only ways to begin to satisfy the enormous range of tastes and preferences in a modern economy. Product differentiation also helps to ensure high quality and efficient production, and advertising provides consumers with the valuable information on product availability, quality, and price that they need to make efficient choices in the marketplace.

Product Differentiation and Advertising

Advertising

The Case Against Product Differentiation and Advertising

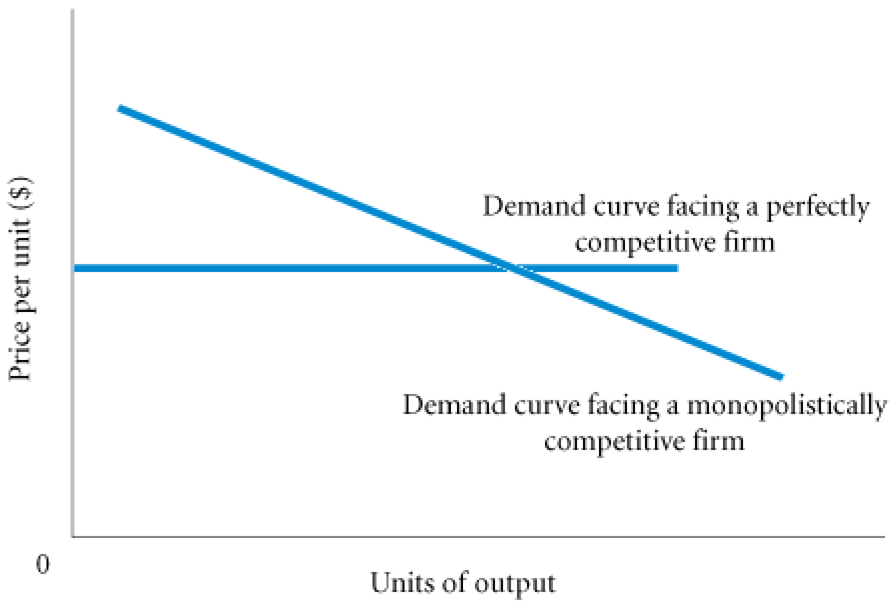
The bottom line, critics of product differentiation and advertising argue, is waste and inefficiency. Enormous sums are spent to create minute, meaningless, and possibly nonexistent differences among products. Advertising raises the cost of products and frequently contains very little information. Often, it is merely an annoyance. Product differentiation and advertising have turned the system upside down: People exist to satisfy the needs of the economy, not vice versa. Advertising can lead to unproductive warfare and may serve as a barrier to entry, thus reducing real competition.

Open Questions

There are strong arguments on both sides of the advertising debate, and even the empirical evidence yields to conflicting conclusions.

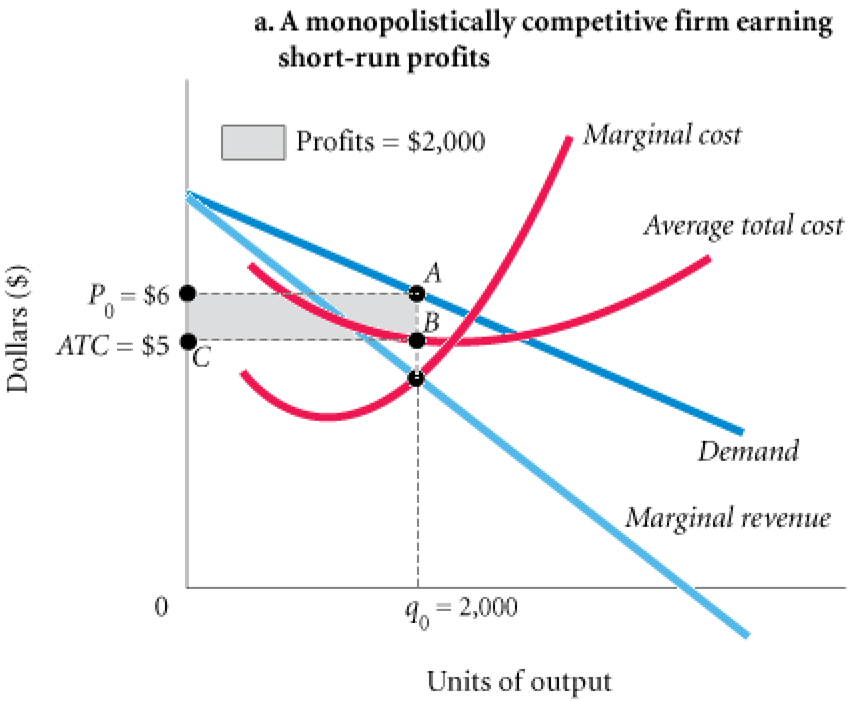
Price and Output Determination in Monopolistic Competition

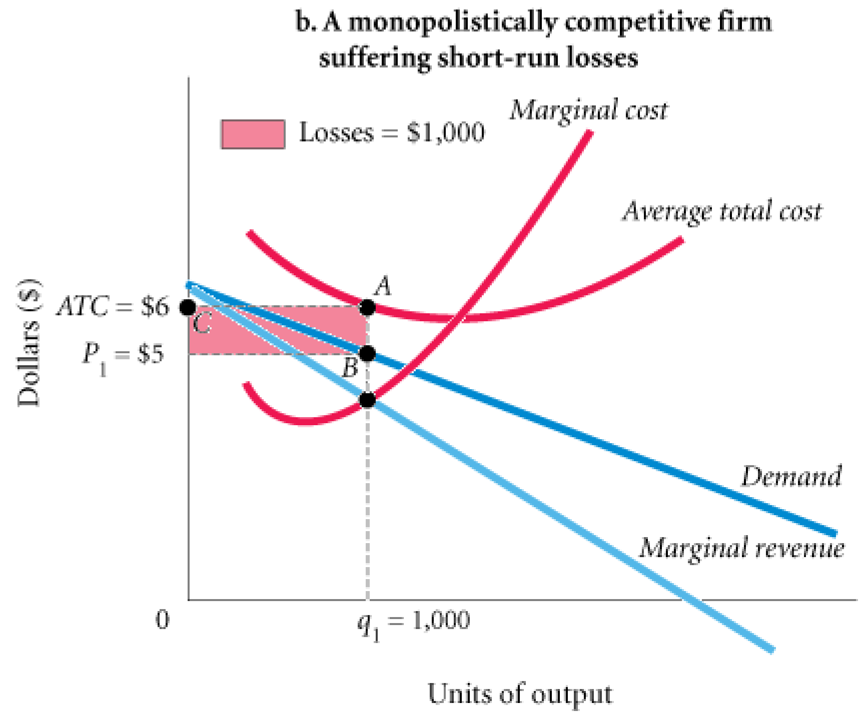
Product Differentiation and Demand Elasticity



Price and Output Determination in Monopolistic Competition

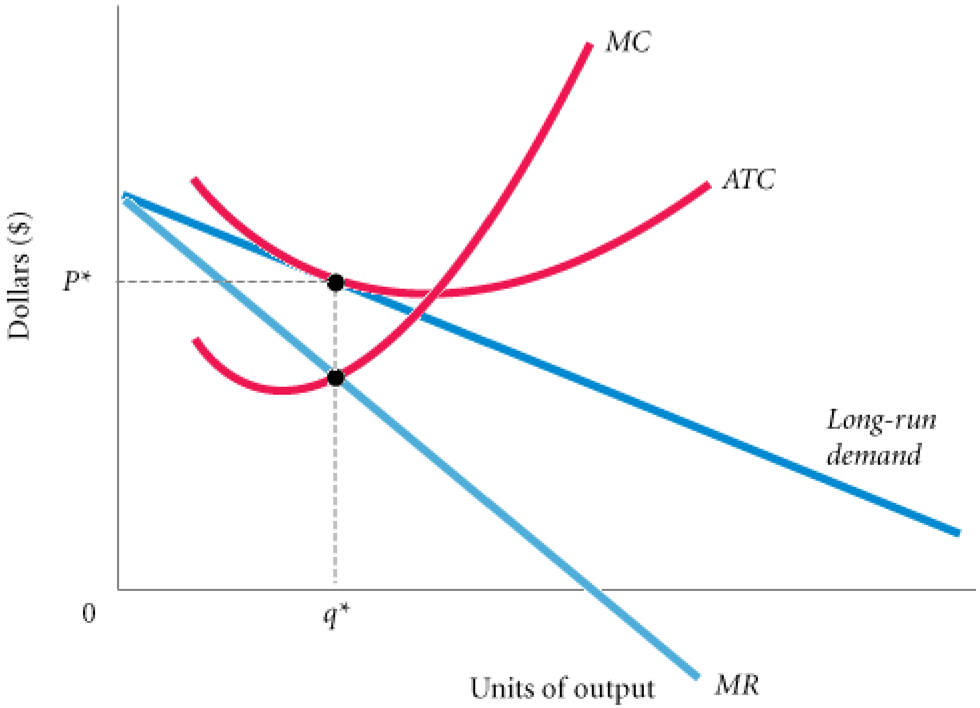
Price/Output Determination in the Short Run





Price and Output Determination in Monopolistic Competition

Price/Output Determination in the Long Run



Economic Efficiency and Resource Allocation

Because entry is easy and economic profits are eliminated in the long run, we might conclude that the result of monopolistic competition is efficient. There are two problems, however.

First, once a firm achieves any degree of market power by differentiating its product (as is the case in monopolistic competition), its profit-maximizing strategy is to hold down production and charge a price above marginal cost.

Second, the final equilibrium in a monopolistically competitive firm is necessarily to the left of the low point on its average total cost curve.

The marketing and accounting departments have provided you with the following monthly total revenue and total cost information:

$$TR = \$900Q - \$0.1Q^2 \qquad TC = \$36{,}000 + \$200Q + \$0.4Q^2$$
$$MR = \Delta TR/\Delta Q = \$900 - \$0.2Q \qquad MC = \Delta TC/\Delta Q = \$200 + \$0.8Q$$

A. Set up a table or spreadsheet for Pharmed Caplets output (Q), price (P), total revenue (TR), marginal revenue (MR), total cost (TC), marginal cost (MC), average cost (AC), total profit (π), and marginal profit ($M\pi$). Establish a range for Q from 0 to 1,000 in increments of 100 (i.e., 0, 100, 200, . . . , 1,000).

B. Using the Pharmed Caplets table or spreadsheet, create a graph with AC and MC as dependent variables and units of output (Q) as the independent variable. At what price/output combination is total profit maximized? Why? At what price/output combination is average cost minimized? Why?

C. Determine these profit-maximizing and average-cost minimizing price/output combinations analytically. In other words, use Pharmed Caplets' revenue and cost equations to confirm your answers to part B.

D. Compare the profit-maximizing and average-cost minimizing price/output combinations, and discuss any differences. When will average-cost minimization lead to long-run profit maximization?