

The Scope and Method of Economics

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The Scope and Method of Economics

1



Chapter Outline

Why Study Economics?

- To Learn a Way of Thinking
- To Understand Society
- To Understand Global Affairs
- To Be an Informed Voter

The Scope of Economics

- Microeconomics and
- Macroeconomics
- The Diverse Fields of Economics

The Method of Economics

- Theories and Models
- Economic Policy

An Invitation

Appendix: How to Read and Understand Graphs

THE SCOPE AND METHOD OF ECONOMICS: What is Economics?

economics

The study of how individuals and societies choose to use the scarce resources that nature and previous generations have provided.

WHY STUDY ECONOMICS?

There are four main reasons to study economics:

- to learn a way of thinking,
- to understand society,
- to understand global affairs, and
- to be an informed voter/ citizen.

WHY STUDY ECONOMICS?

TO LEARN A WAY OF THINKING

Three fundamental concepts:

Opportunity cost

Marginalism, and

Efficient markets

To Learn a Way of Thinking (1 of 3)

Opportunity Cost

opportunity cost The best alternative that we forgo, or give up, when we make a choice or decision.

scarce Limited.

- **What happens in an economy is the outcome of thousands of individual decisions.**
 - **HH:**
 - People must decide **how to divide their incomes among all the goods and services available in the marketplace.**
 - They must decide whether to work, whether to go to school, and how much to save.
 - **Firms:**
 - Businesses must decide **what to produce, how much to produce, how much to charge, and where to locate.**

- **Nearly all decisions involve trade-offs.**
- A key concept that recurs in analyzing the decision making process is the notion of opportunity cost.
 - The full “cost” of making a specific choice includes what we give up by not making the alternative choice.
 - The best alternative that we forgo, or give up, when we make a choice or a decision is called the opportunity cost of that decision

- **Opportunity costs example:**

- **Example 1: How much a movie costs**

- To see a movie takes not only a ticket but also time.
 - The opportunity cost of going to a movie is the value of the other things you could have done with the same money and time.
 - If you decide to take time off from work, the opportunity cost of your leisure is the pay that you would have earned had you worked.

- **Example 2: College education**

- Part of the cost of a college education is the income you could have earned by working full-time instead of going to school.

- **Why opportunity costs?**
 - Opportunity costs arise because resources are limited.
 - Consider one of our most important resources —time.
 - There are only 24 hours in a day, and we must live our lives under this constraint.

To Learn a Way of Thinking (2 of 3)

Marginalism

The process of **analyzing the additional or incremental costs or benefits arising from a choice or decision.**

Use of Marginalism:

Economists believe that **sensible choice requires comparing marginal utilities and marginal costs.**

They also think that **people apply the marginalism concept regularly, even if subconsciously, in their private decisions.**

Sunk costs

Sunk costs

Sunk costs **cannot be recovered if a business decides to leave an industry.**

Examples include:

Capital inputs that are specific to an industry and which have little or no resale value.

Money spent on advertising, marketing and research and development projects which cannot be carried forward into another market or industry.

If sunk costs are high:

When sunk costs are high, **a market becomes less contestable.**

High sunk costs act as a barrier to entry of new firms because they risk making huge losses if they decide to leave a market.

If low sunk costs:

In contrast, markets such as fast-food restaurants, sandwich bars, hairdressing salons and local antiques markets have **low sunk costs so the barriers to exit are low.**

Is depreciation part of sunk cost?

To Learn a Way of Thinking (3 of 3)

Efficient Markets— No Free Lunch:

A market in which **profit opportunities are eliminated almost instantaneously.**

- **Example:**
 - Using the term **loosely**, a profit opportunity exists at the checkout lines when one line is shorter than the others.
 - In general, **such profit opportunities are rare.**
 - At any time, many people are searching for them; as a consequence, few exist.
 - **Markets like this, where any profit opportunities are eliminated almost immediately, are said to be efficient markets.**
 - **Thousands of individuals each day are looking for hot tips in the market.**
 - If a particular tip about a stock is valid, there will be an immediate rush to buy the stock, which will quickly drive up its price

Summary:

The study of economics teaches us a way of thinking and helps us make decisions.

WHY STUDY ECONOMICS?: To Understand Society

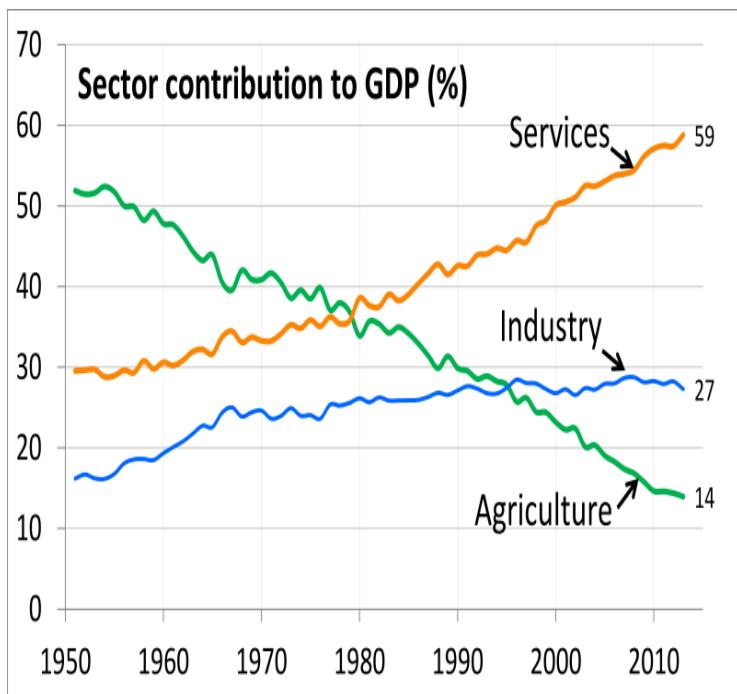
Industrial Revolution:

The period in England during the late eighteenth and early nineteenth centuries in which new manufacturing technologies and improved transportation gave rise to the modern factory system and a massive movement of the population from the countryside to the cities.

The study of economics is an essential part of the study of society.

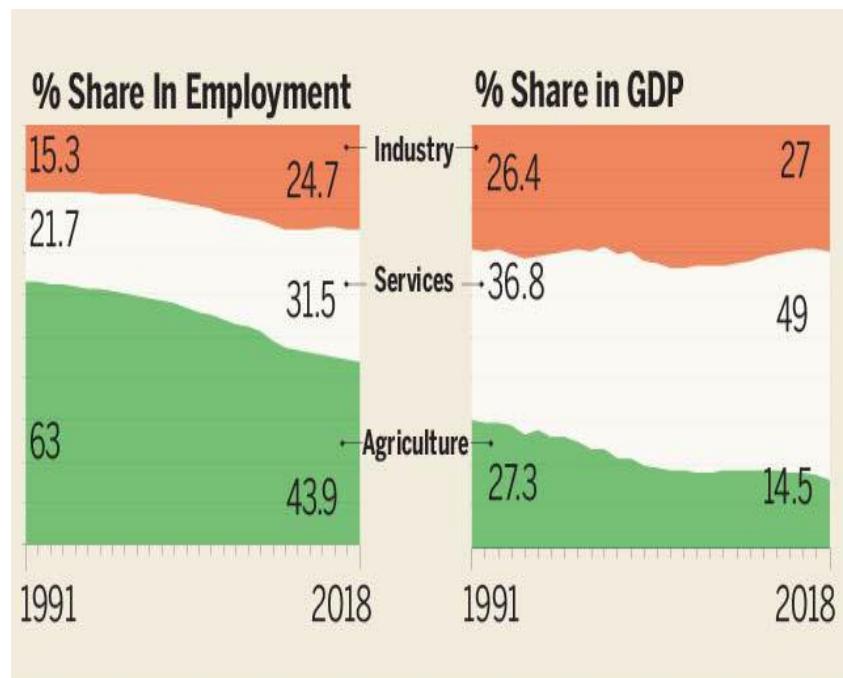
- **Indian Economy (Migration)**
 - **Contribution of various sectors to GDP (2017-18)**
 - Agriculture, forestry & fishing (17.1%)
 - Industry (29.1%)
 - Services (53.9%)
 - Current [16.5% (19-20), 29.6% (18-19) & 55.3% (19-20)]
 - **Population**
 - Census 2011
 - Rural (69%)
 - Urban (31%)
 - In 1950
 - Rural: 82.9%
 - Urban: 17.1%
 - **Employment**
 - Agriculture employed around 50% of the Indian work
- Note: You are not expected to know the exact figures/numbers.

CURRENT FEATURES AND STATUS OF INDIAN ECONOMY



Source:

https://commons.wikimedia.org/wiki/File:1951_to_2013_Trend_Chart_of_Sector_Share_of_Total_GDP_for_each_year,_India.png



Source:

<https://timesofindia.indiatimes.com/business/india-business/why-bad-employment-is-a-bigger-problem-than-unemployment/articleshow/70099901.cms>

WHY STUDY ECONOMICS? TO UNDERSTAND GLOBAL AFFAIRS

TO UNDERSTAND GLOBAL AFFAIRS



The events of September 11, 2001, dealt a blow to the tourism industry and left airlines in deep financial trouble.

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

- **Other Example (India)* –**
 - 1991 Reforms
 - Green Revolution
 - Covid & Economy
 - Farm Bill
- **For this, Newspaper**
 - Mint etc
- * These topics are not part of the syllabus (for Ch-1).



Green Revolution

- Green revolution started in India in the 1960s during the Prime Ministership of Smt.**Indira Gandhi**.
 - Adoption of modern methods and technology such as high yielding variety (HYV) seeds, tractors, irrigation facilities, pesticides, fertilizers etc.
 - It lead to an increase in food grain production, particularly wheat.
 - Dr. NORMAN BORLAUG and Dr. M S **SWAMINATHAN** (Father of Indian Green Revolution).

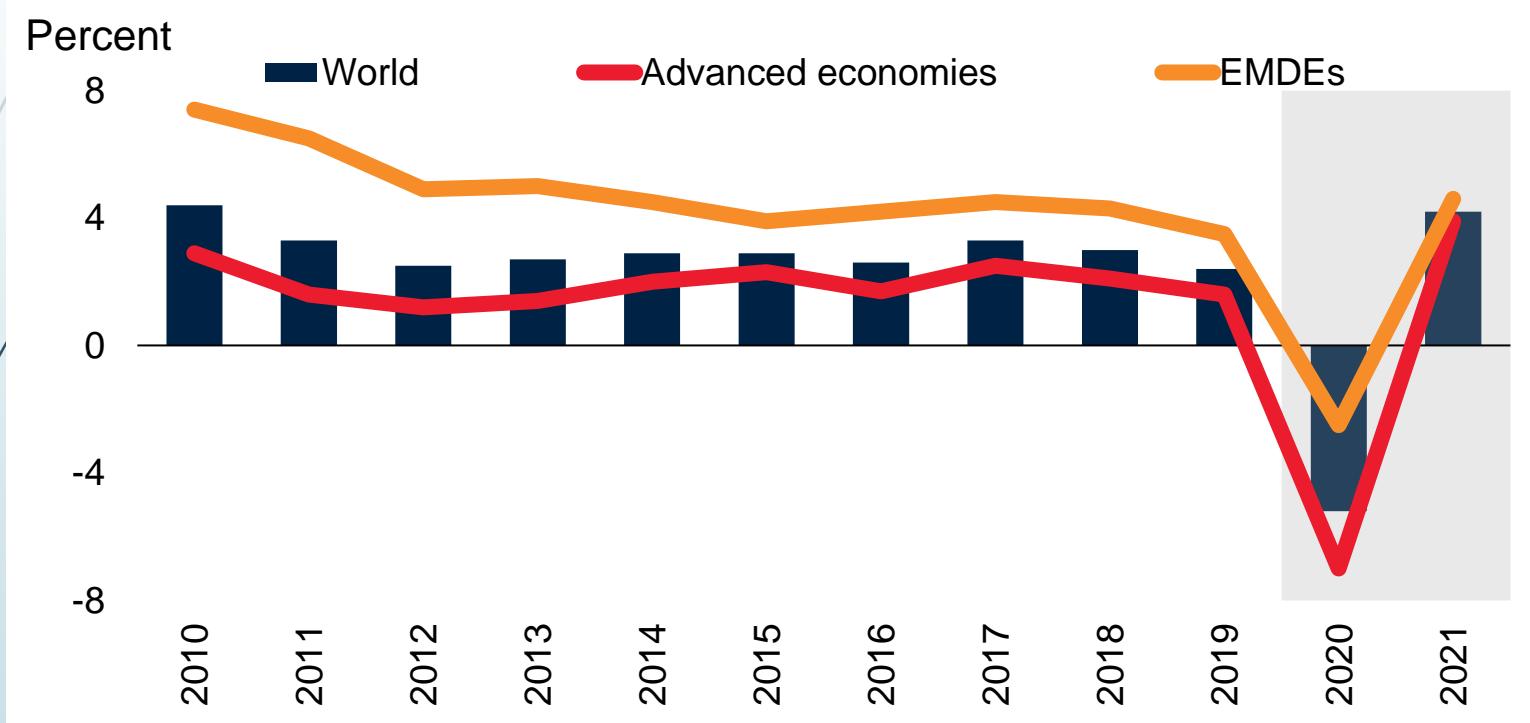
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- For food, however, India relied on supplies from the United States under **Public Law 480 (PL-480)** against rupee payments, as India did not have much foreign exchange to buy large quantities of food in international markets.
 - The folly of this set-up became apparent in the mid-1960s, when the US suspended wheat supplies temporarily (due to some political differences) at a time when India was facing back-to-back droughts



1991 Reforms

- **Economic Liberalisation**
 - economy more market and service-oriented
 - expanding the role of private and foreign investment
 - reduction in import tariffs
 - deregulation of markets
 - reduction of taxes
 - greater foreign investment

Covid and World Economy: Global Growth



Source: World Bank

WHY STUDY ECONOMICS?

TO BE AN INFORMED VOTER/ CITIZEN

A knowledge of economics is essential to be an informed voter/ citizen.

- India
 - Right (BJP)
 - Centre (Congress)
 - Left (CPI)

Political Coordinates Test

<https://www.idrlabs.com/political-coordinates/test.php>

36 questions

Left:

Right:

The Scope of Economics (1 of 2)

Microeconomics and Macroeconomics

microeconomics The branch of economics that examines the functioning of individual industries and the behavior of individual decision-making units—that is, firms and households.

macroeconomics The branch of economics that examines the economic behavior of aggregates—income, employment, output, and so on—on a national scale.

The Scope of Economics (2 of 2)

Microeconomics and Macroeconomics

Microeconomics looks at the individual unit—the household, the firm, the industry. **It sees and examines the “trees.”**

Macroeconomics looks at the whole, the aggregate. **It sees and analyzes the “forest.”**

THE SCOPE OF ECONOMICS

THE DIVERSE FIELDS OF ECONOMICS

TABLE 1.1 Examples of Microeconomic and Macroeconomic Concerns

DIVISION OF ECONOMICS	PRODUCTION	PRICES	INCOME	EMPLOYMENT
Microeconomics	<i>Production/output in individual industries and businesses</i> How much steel How much office space How many cars	<i>Price of individual goods and services</i> Price of medical care Price of gasoline Food prices Apartment rents	<i>Distribution of income and wealth</i> Wages in the auto industry Minimum wage Executive salaries Poverty	<i>Employment by individual businesses and industries</i> Jobs in the steel industry Number of employees in a firm Number of accountants
Macroeconomics	<i>National production/output</i> Total industrial output Gross domestic product Growth of output	<i>Aggregate price level</i> Consumer prices Producer prices Rate of inflation	<i>National income</i> Total wages and salaries Total corporate profits	<i>Employment and unemployment in the economy</i> Total number of jobs Unemployment rate

TABLE 1.2 The Fields of Economics (1 of 3)

<i>Behavioral economics</i>	Do aggregate household savings increase when we automatically enroll people in savings programs and let them opt out as opposed to requiring them to sign up?
<i>Comparative economic systems</i>	How does the resource allocation process differ in market versus command and control systems?
<i>Econometrics</i>	What inferences can we make based on conditional moment inequalities?
<i>Economic development</i>	Does increasing employment opportunities for girls in developing nations increase their educational achievements?
<i>Economic history</i>	How did the growth of railroads and improvement in transportation more generally change the U.S. banking systems in the nineteenth century?

TABLE 1.2 The Fields of Economics (*cont'd 2 of 3*)

<i>Environmental economics</i>	What effect would a tax on carbon have on emissions? Is a tax better or worse than rules?
<i>Finance</i>	Is high frequency trading socially beneficial?
<i>Health economics</i>	Do co-pays by patients change the choice and use of medicines by insured patients?
<i>The history of economic thought</i>	How did Aristotle think about just prices?
<i>Industrial organization</i>	How do we explain price wars in the airline industry

TABLE 1.2 The Fields of Economics (*cont'd 3 of 3*)

<i>International economics</i>	What are the benefits and costs of free trade? Does concern about the environment change our views of free trade?
<i>Labor economics</i>	Will increasing the minimum wage decrease employment opportunities?
<i>Law and economics</i>	Does the current U.S. patent law increase or decrease the rate of innovation?
<i>Public economics</i>	Why is corruption more widespread in some countries than in others?
<i>Urban and regional economics</i>	Do enterprise zones improve employment opportunities in central cities?

THE METHOD OF ECONOMICS

Economics asks and attempts to answer two kinds of questions:
positive and normative.

- **Positive economics** attempts to **understand behavior and the operation of economic systems without making judgments about whether the outcomes are good or bad.**
 - It strives **to describe what exists and how it works.**
 - What determines the wage rate for unskilled workers?
 - What would happen if we abolished the corporate income tax?

- In contrast, **normative economics** looks at the outcomes of economic behavior and asks whether they are good or bad and whether they can be made better.
 - Normative economics **involves judgments and prescriptions for courses of action.**
 - Should the government subsidize or regulate the cost of higher education?
 - Should medical benefits to the elderly under Medicare be available only to those with incomes below some threshold?
 - Normative economics is often called **policy economics**.

THE METHOD OF ECONOMICS

positive economics An approach to economics that seeks to understand behavior and the operation of systems without making judgments. It describes what exists and how it works.

normative economics An approach to economics that analyzes outcomes of economic behavior, evaluates them as good or bad, and may prescribe courses of action. Also called policy economics.

Questions (Last year-Q1)

- i. Which of the following statements is normative?
 - a. Large government deficits cause an economy to grow more slowly.
 - b. People work harder if the wage is higher.
 - c. The unemployment rate should be lower.
 - d. Printing too much money causes inflation.
- ii. The government should be providing free prescription drugs to lower-income citizens is an example of a _____ statement.

THE METHOD OF ECONOMICS

Positive Economics:

Descriptive Economics and Economic Theory

Positive economics is often divided into descriptive economics and economic theory.

- **Descriptive economics** is simply **the compilation of data that describe phenomena and facts.**
 - Examples of such data appear in the *RBI Handbook on Indian Economy*
- An **economic theory** is a **statement or set of related statements about cause and effect, action and reaction.**
 - One of the theories is the **law of demand**, which was most clearly stated by Alfred Marshall in 1890:
 - When the price of a product rises, people tend to buy less of it; when the price of a product falls, people tend to buy more

Theories and Models (1 of 5)

model

A formal statement of a theory, usually a mathematical statement of a presumed relationship between two or more variables.

Example - Phillips curve (inverse relationship between the level of unemployment and the rate of inflation)

variable

A measure that can change from time to time or from observation to observation.

Example - Income

Problem faced by decision makers in a central bank

- In India, the RBI and, in particular, the monetary policy committee of the RBI must make decisions about interest rates.
- **When prices are observed to rise**, suggesting an increase in the inflation rate, **the RBI must make a decision about whether to dampen the rate of growth of the economy.**
- **It can do so by raising the interest rate it charges its member banks when they borrow money** (the repo rate).
 - **Increasing these rates sends a ripple effect through the economy**, causing increases in other interest rates, such as those faced by would-be investors, who may be firms seeking funds for capital expansion or individuals who wish to buy consumer durables like automobiles and refrigerators.
 - This has the **economic effect of increasing costs, and consumers react by reducing the quantity of the durable goods demanded.**
 - Overall, **aggregate demand falls, which slows the rate of inflation.**

Ockham's razor

The principle that irrelevant detail should be cut away.

The term **Occam's razor** refers to the philosophical idea or scientific principle **that of any given set of explanations for an event occurring, it is most likely that the simplest one is the correct one.**

Proposition that **assumptions should be reduced to their minimum.** Thus, if two assumptions seem to be equally valid, the simpler one should be preferred

Theories and Models (2 of 5)

All Else Equal

***ceteris paribus*, or all else equal**

A device used to analyze the relationship between two variables while the values of other variables are held unchanged.

Using the device of *ceteris paribus* is one part of the process of abstraction.

In formulating economic theory, the concept helps us simplify reality to focus on the relationships that interest us.

- For example, suppose we want to know **the impact on driving of a higher tax on gasoline.**
 - This change would raise the price of gasoline at the pump but would not (at least in the short run) affect income, workplace location, number of children, and so on

Most, though not all, economists rely on *ceteris paribus* to build and test economic models. In simple language, **it means the economist can hold all variables in the model constant and tinker with them one at a time.**

As another example, **take the laws of supply and demand.**

Economists say the law of demand demonstrates that, *ceteris paribus* (all else being equal), more goods tend to be purchased at lower prices.

Theories and Models (3 of 5)

Expressing Models in Words, Graphs, and Equations

Graphs and equations capture the quantitative side of economic observations and predictions.

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

Example –

$$Q_D = 20 - 2P$$

$$Q_S = -10 + 2P$$

Theories and Models (4 of 5)

Cautions and Pitfalls

Economists are interested in cause and effect, but sorting out causality from correlation is not always easy.

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.**

- Very closely related to the *post hoc* fallacy is the often **erroneous link between correlation and causation.**
- **Two variables are said to be *correlated* if one variable changes when the other variable changes.**
 - However, **correlation does not imply causation.**
- **Cities that have high crime rates also have many automobiles, so there is a very high degree of correlation between number of cars and crime rates.**
 - **Can we argue, then, that cars *cause* crime?**

- **Can we argue, then, that cars *cause* crime?**
 - No. The reason for the correlation may have nothing to do with cause and effect.
 - Big cities have many people, many people have many cars; therefore, big cities have many cars.
 - Big cities also have high crime rates for many reasons—crowding, poverty, anonymity, unequal distribution of wealth, and readily available drugs, to mention only a few.
 - However, the presence of cars is probably not one of them

THE METHOD OF ECONOMICS

The Fallacy of Composition

fallacy of composition

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

- Suppose that **a large group of cattle ranchers graze their cattle on the same range.**
 - To an individual rancher, more cattle and more grazing mean a higher income.
 - However, because its capacity is limited, the land can support only so many cattle.
 - If every cattle rancher increased the number of cattle sent out to graze, the land would become overgrazed and barren; as a result, everyone's income would fall.
- In short, **theories that seem to work well when applied to individuals or households often break down when they are applied to the whole.**

For example, if you stand up at a concert, you can usually see better. You may then directly infer that if everyone stands up, everyone can see better.

But you know it doesn't work that way and will lead to obscured views for the majority of attendees.

Therefore, **what might be true for one individual in the crowd is not true for the whole crowd.**

Theories and Models (5 of 5)

Testing Theories and Models: Empirical Economics

empirical economics

The collection and use of data to test economic theories.

Economic Policy (1 of 3)

Four criteria are important in judging economic outcomes:

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

Economic Policy (2 of 3)

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 (3 of 3)

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.

Pre Year QP

- i. Research conducted in Border States suggests that speaking a second language increases the prospects for employment. Therefore, we should require all citizens to speak a second language. This statement is an example of _____.
- ii. Parth went to see the Black Panther and when he came back, his father gave him a mobile phone. So, we can conclude, that if one watches that movie, their fathers' will give them a mobile phone. What phenomenon in Economics is referred to?

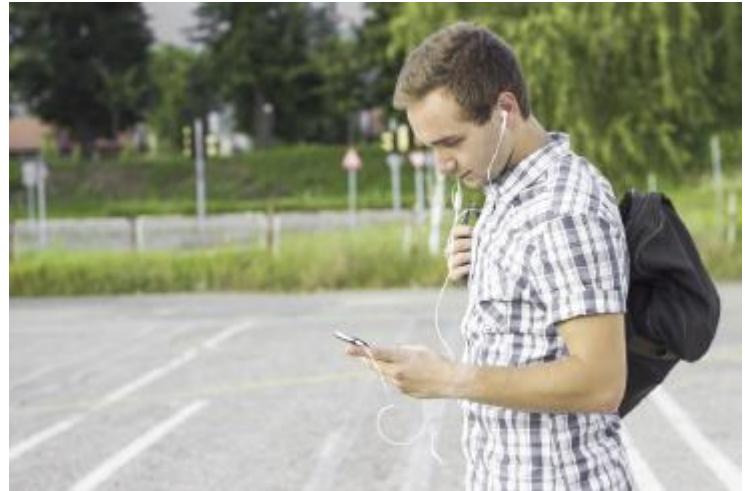
ECONOMICS IN PRACTICE

iPod and the World

A sticker that says “Made in China” can often be misleading.

The iPod is composed of many small parts, and it is almost impossible to accurately tell exactly where each piece was produced without pulling it apart.

From an economics point of view, one often has to dig deep to see what is really going on.



THINKING PRACTICALLY

1. What do you think accounts for where components of the iPod and Barbie are made?

ECONOMICS IN PRACTICE

Does Your Part-time Job Matter for Your Academic Performance?

Several studies of the effect of part-time jobs on college grades help to sort out causality in part-time job effects.

One study used data on final-year journalism students' academic achievements and well-being along with their employment reasons and working hours to test the part-time employment effects.

The overall results revealed strong negative employment effects.



THINKING PRACTICALLY

- 1. Would the academic outcomes of university juniors change as they become university seniors if they continuously pursue similar types of employment?**

The Economic Problem: Scarcity and Choice

Prepared by:

Fernando & Yvonn Quijano

The Economic Problem: Scarcity and Choice

2



Chapter Outline

Scarcity, Choice, and Opportunity Cost

Scarcity and Choice in a One-Person Economy

Scarcity and Choice in an Economy of Two or More

The Production Possibility Frontier
Comparative Advantage and the Gains from Trade

The Economic Problem

Economic Systems

Command Economies

Laissez-Faire Economies:
The Free Market

Mixed Systems, Markets, and Governments

Looking Ahead

Chapter Outline and Learning Objectives

2.1

- Understand why even in a society in which one person is better than a second at all tasks, it is still beneficial for the two to specialize and trade.

2.2

- Understand the central difference in the way command economies and market economies decide what is produced.

Looking Ahead

THE ECONOMIC PROBLEM: SCARCITY AND CHOICE

CHAPTER 2: The Economic Problem: Scarcity and Choice

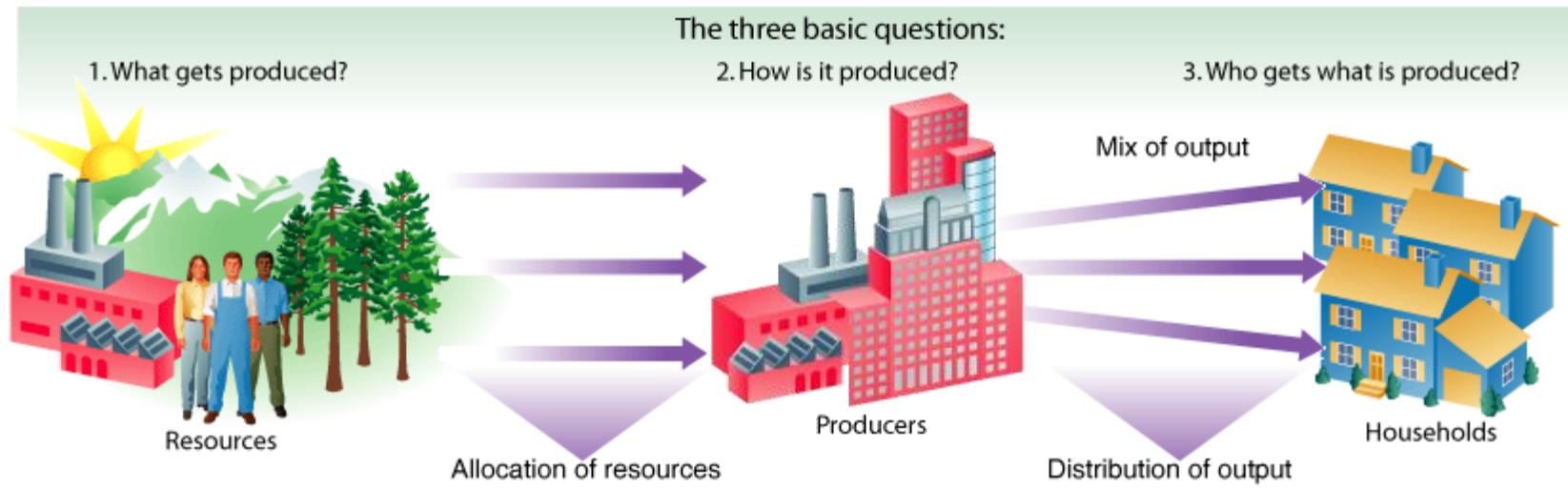


FIGURE 2.1 The Three Basic Questions

Three basic questions must be answered in order to understand an economic system:

- What gets produced?
- How is it produced?
- Who gets what is produced?

Presumption (Imp)

- The starting point is the presumption that *human wants are unlimited but resources are not.*

THE ECONOMIC PROBLEM: SCARCITY AND CHOICE

Capital (capital resources)

Things that are themselves produced and that are then used in the production of other goods and services.

Example- Machinery

factors of production (or factors) The inputs into the process of production.

The basic resources available to a society are often referred to as **factors of production**, or simply **factors**.

The three key factors of production are **land, labor, and capital**

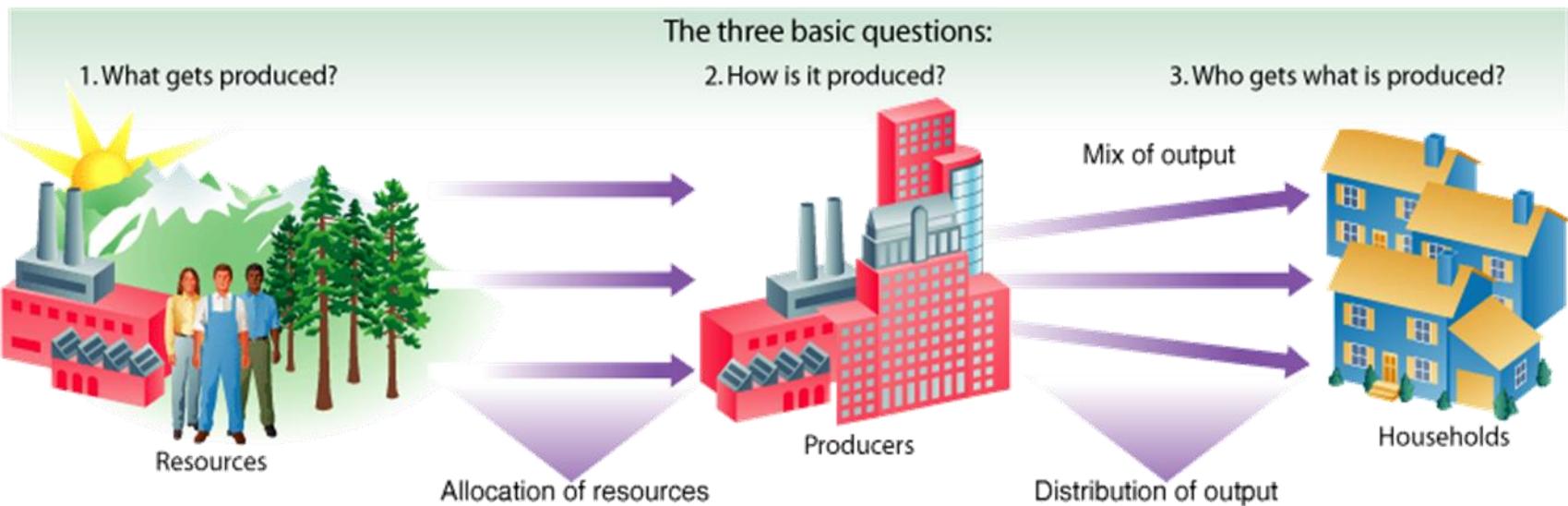
THE ECONOMIC PROBLEM: SCARCITY AND CHOICE

production The process that transforms scarce resources into useful goods and services.

inputs or resources Anything provided by nature or previous generations that can be used directly or indirectly to satisfy human wants.

outputs Usable products.

FIGURE 2.1 The Three Basic Questions



Every society has some system or process that transforms its scarce resources into useful goods and services.

In doing so, **it must decide what gets produced, how it is produced, and to whom it is distributed.**

The primary resources that must be allocated are land, labor, and capital.

Scarcity, Choice, and Opportunity Cost

Scarcity and Choice in a One-Person Economy

Nearly all the same basic decisions that characterize complex economies must also be made in a simple economy.

A person must decide what to produce and how and when to produce it.

One-Person Economy: Bill

- The simplest economy is one in which a single person lives alone on an island.
 - Consider Bill, the survivor of a plane crash, who finds himself cast ashore in such a place.
- Basic questions:
 - Nearly all the same basic decisions that characterize complex economies must also be made in a simple economy.
 - That is, although Bill will get whatever he produces, he still must decide how to allocate the island's resources, what to produce, and how and when to produce it.

Scarcity and Choice in a One-Person Economy

Opportunity Cost

The concepts of **constrained choice and scarcity** are central to the discipline of economics.

opportunity cost : The best alternative that we give up, or forgo, when we make a choice or decision.

Trade-off (One person economy)

- Given the scarcity of time and resources, if Bill decides to hunt, he will have less time to gather fruits and berries.
 - He faces a **trade-off between meat and fruit.**
- There is a **trade-off between food and shelter too.**
 - **If Bill likes to be comfortable, he may work on building a nice place to live, but that may require giving up the food he might have produced**

SCARCITY, CHOICE, AND OPPORTUNITY COST

SCARCITY AND CHOICE IN AN ECONOMY OF TWO OR MORE



Education takes time. Time spent in the classroom has an opportunity cost.

Scarcity and Choice in a Two-Person Economy: Bill & Colleen

- **Two Person:**
 - Now suppose that another survivor of the crash, **Colleen, appears on the island.**
 - Now that Bill is not alone, **things are more complex and some new decisions must be made.**
- **Different preferences & skill sets:**
 - Bill's and Colleen's **preferences about what things to produce are likely to be different.**
 - They will probably not have the same knowledge or skills. Perhaps **Colleen is very good at tracking animals and Bill has a knack for building things.**
- **How to split the work:**
 - How should they split the work that needs to be done?
 - Once things are produced, **the two castaways must decide how to divide them.** **How should their products be distributed?**

Three basic questions for Bill & Colleen

- **When Bill is alone**
 - The mechanism for answering these fundamental questions is clear when Bill is alone on the island.
 - The “central plan” is his; **he simply decides what he wants and what to do about it.**
- **The minute someone else appears, however, a number of decision-making arrangements immediately become possible.**
 - **One or the other may take charge**, in which case that person will decide for both of them.
 - **The two may agree to cooperate**, with each having an equal say, and come up with a joint plan; or they may agree to split the planning as well as the production duties.
 - Finally, **they may go off to live alone at opposite ends of the island.** Even if they live apart, however, they may take advantage of each other’s presence by specializing and trading

Three basic questions for larger economies

- **Modern industrial societies must answer the same questions that Colleen and Bill must answer, but the mechanics of larger economies are more complex.**
 - Instead of two people living together, India has over 1.2 billion people.
 - **Still, decisions must be made about what to produce, how to produce it, and who gets it.**

Scarcity and Choice in an Economy of Two or More (1 of 2)

Specialization, Exchange, and Comparative Advantage

- **theory of comparative advantage** Ricardo's theory that specialization and free trade will benefit all trading parties, even those that may be "absolutely" more efficient producers.
- **absolute advantage** A producer has an absolute advantage over another in the production of a good or service if he or she can produce that product using fewer resources (a lower absolute cost per unit).
- **comparative advantage** A producer has a comparative advantage over another in the production of a good or service if he or she can produce that product at a lower *opportunity cost*.

Ricardo's basic point applies just as much to Colleen & Bill as it does to different nations

- To keep things simple, suppose that Colleen and Bill have only two tasks to accomplish each week: gathering food to eat and cutting logs to burn.
- If Colleen could cut more logs than Bill in 1 day and Bill could gather more nuts and berries than Colleen could, specialization would clearly lead to more total production.
 - Both would benefit if Colleen only cuts logs and Bill only gathers nuts and berries, as long as they can trade.
- Suppose that Bill is slow and somewhat clumsy in his nut gathering and that Colleen is better at cutting logs and gathering food.
 - At first, it might seem that since Colleen is better at everything, she should do everything. But that cannot be right.
 - Colleen's time is limited after all, and even though Bill is clumsy and not very clever, he must be able to contribute something.
- **Notes...**

Ricardo's basic point applies just as much to Colleen & Bill as it does to different nations [Notes]

- Suppose Colleen can cut 10 logs per day and Bill can cut only 4.
 - Also suppose Colleen can gather 10 bushels of food per day and Bill can gather only 8.
- A producer has an **absolute advantage** over another in the production of a good or service if he or she can produce the good or service using fewer resources, including time.
 - Since Colleen can cut more logs per day than Bill, we say that she has an absolute advantage in the production of logs.
 - Similarly, Colleen has an absolute advantage over Bill in the production of food

Ricardo's basic point applies just as much to Colleen & Bill as it does to different nations [Notes]

- Thinking just about productivity and the output of food and logs, you might conclude that it would benefit Colleen to move to the other side of the island and be by herself.
 - **Since she is more productive in cutting logs and gathering food, would she not be better off on her own?**
 - **How could she benefit by hanging out with Bill and sharing what they produce?**
 - To answer that question we must remember that Colleen's time is limited: **This limit creates opportunity cost.**
- A producer has a **comparative advantage** over another in the production of a good or service if he or she can produce the good or service at a lower opportunity cost.

Ricardo's basic point applies just as much to Colleen & Bill as it does to different nations [Notes]

- First, think about Bill.
 - He can produce 8 bushels of food per day, or he can cut 4 logs. To get 8 additional bushels of food, he must give up cutting 4 logs.
 - Thus, *for Bill, the opportunity cost of 8 bushels of food is 4 logs.*
- Think next about Colleen.
 - She can produce 10 bushels of food per day, or she can cut 10 logs.
 - She thus gives up 1 log for each additional bushel; so *for Colleen, the opportunity cost of 8 bushels of food is 8 logs*
- **Bill has a comparative advantage over Colleen in the production of food because he gives up only 4 logs for an additional 8 bushels, whereas Colleen gives up 8 logs**

Ricardo's basic point applies just as much to Colleen & Bill as it does to different nations [Notes]

- Think now about what Colleen must give up in terms of food to get 10 logs.
 - To produce 10 logs she must work a whole day. If she spends a day cutting 10 logs, she gives up a day of gathering 10 bushels of food. Thus, *for Colleen, the opportunity cost of 10 logs is 10 bushels of food.*
- What must Bill give up to get 10 logs?
 - To produce 4 logs, he must work 1 day. For each day he cuts logs, he gives up 8 bushels of food. He thus gives up 2 bushels of food for each log; so *for Bill, the opportunity cost of 10 logs is 20 bushels of food.*
- **Colleen has a comparative advantage over Bill in the production of logs since she gives up only 10 bushels of food for an additional 10 logs, whereas Bill gives up 20 bushels**

Ricardo's basic point applies just as much to Colleen & Bill as it does to different nations [Notes]

- Ricardo argues that two parties can benefit from specialization and trade even if one party has an absolute advantage in the production of both goods.
- **Suppose Colleen and Bill both want equal numbers of logs and bushels of food.**
 - If Colleen goes off on her own, in a 30-day month **she can produce 150 logs and 150 bushels, devoting 15 days to each task.**
 - For Bill to produce equal numbers of logs and bushels on his own requires that **he spend 10 days on food and 20 days on logs. This yields 80 bushels of food (10 days) and 80 logs (20 days).**
 - Between the two, **they produce 230 logs and 230 bushels of food**

Ricardo's basic point applies just as much to Colleen & Bill as it does to different nations [Notes]

- Let's see if specialization and trade can work.
 - If Bill spends all his time on food, he produces 240 bushels in a month (30 days *8 bushels per day).
 - If Colleen spends 3 days on food and 27 days on logs, she produces 30 bushels of food (3 days * 10 bushels per day) and 270 logs (27 days * 10 logs per day).
 - Between the two, they produce 270 logs and 270 bushels of food, which is more than the 230 logs and 230 bushels they produced when not specializing.
- Thus, by specializing in the production of the good in which they enjoyed a comparative advantage, there are more of both goods.

Ricardo's basic point applies just as much to Colleen & Bill as it does to different nations [Notes]

- Even if Colleen were to live at another place on the island, **she could specialize, producing 30 bushels of food and 270 logs, then trading 100 of her logs to Bill for 140 bushels of food.**
 - This would leave her with 170 logs and 170 bushels of food, which is more than the 150 of each she could produce on her own.
- Bill would specialize completely in food, **producing 240 bushels.**
 - Trading 140 bushels of food to Colleen for 100 logs leaves him with 100 of each, which is more than the 80 of each he could produce on his own

CHAPTER 2: The Economic Problem: Scarcity and Choice

Comparative Advantage and the Gains from Trade

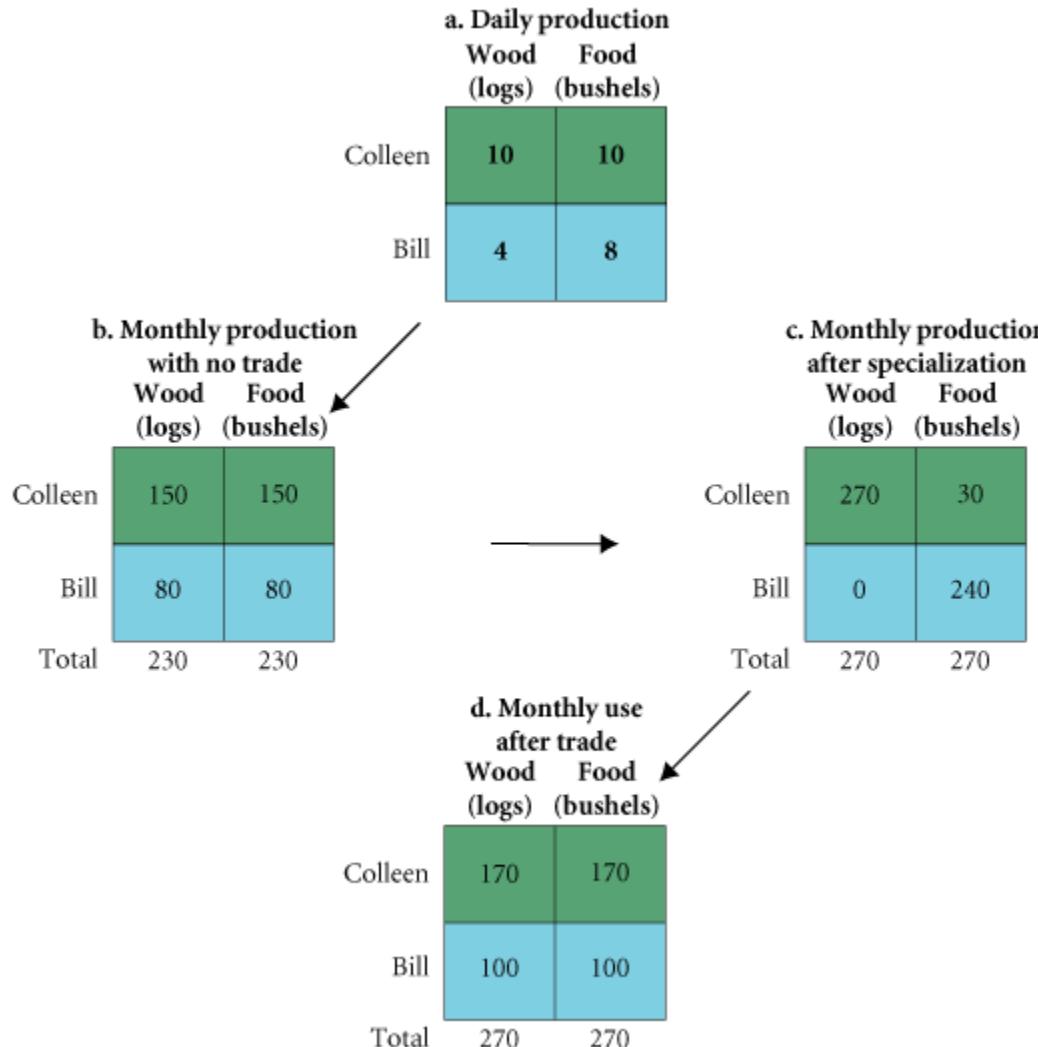
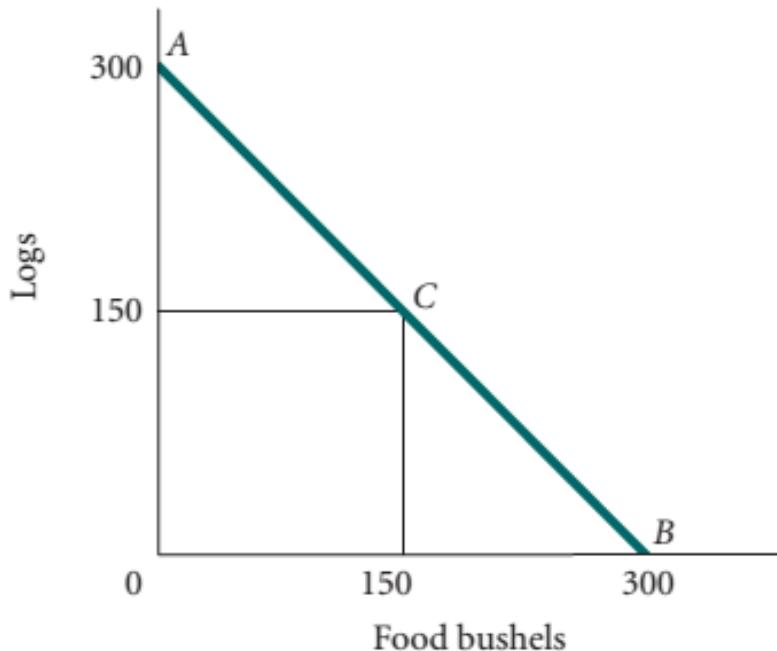


FIGURE 2.2 Comparative Advantage and the Gains from Trade

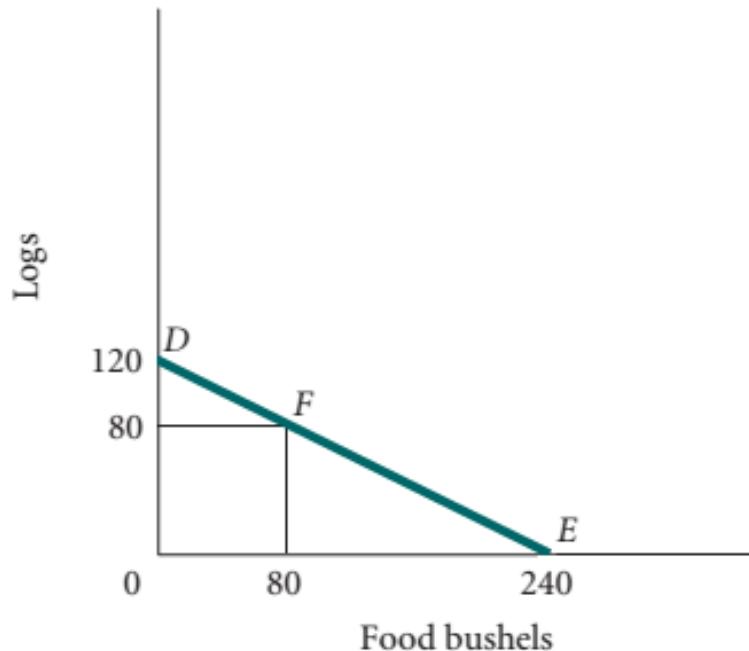
A Graphical Presentation of Comparative Advantage and Gains from Trade

Production Possibilities with No Trade

a. Colleen's production possibilities (monthly output)



b. Bill's production possibilities (monthly output)

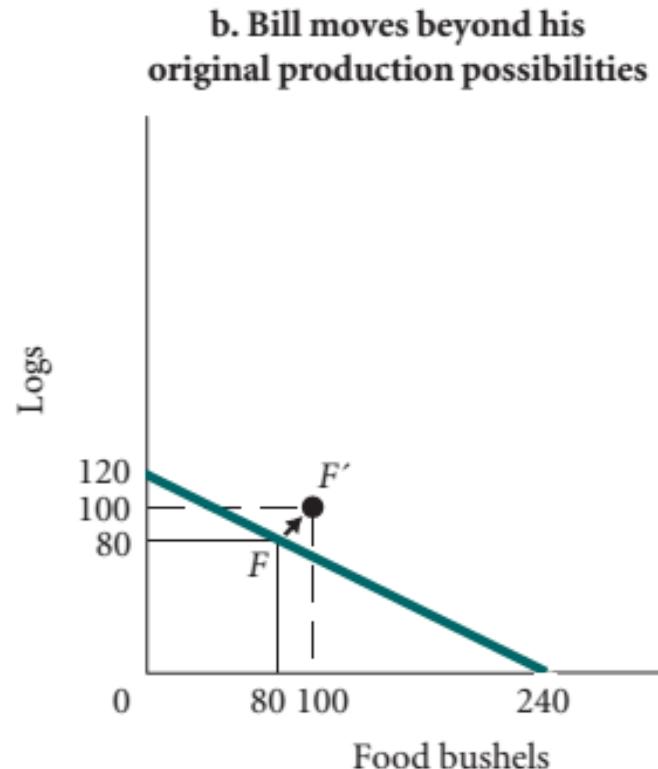
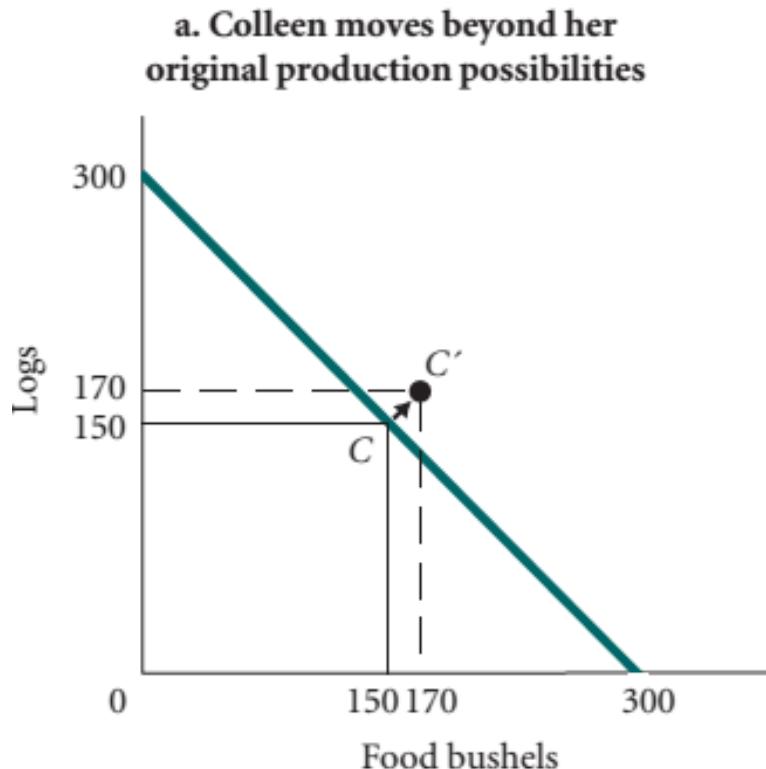


- **Colleen and Bill Gain from Trade**

- **By specializing and engaging in trade, Colleen and Bill can move beyond their own production possibilities.**
 - Colleen ends up with 170 logs and 170 bushels, again 20 more of each than she would have had before the specialization and trade.
- **Both are better off. Both move beyond their individual production possibilities.**

CHAPTER 2: The Economic Problem: Scarcity and Choice

- **Colleen and Bill Gain from Trade**



Although it exists only as an abstraction, **the ppf illustrates** a number of very important concepts that we shall use throughout the rest of this book: **scarcity, unemployment, inefficiency, opportunity cost, the law of increasing opportunity cost, economic growth, and the gains from trade.**

Weighing Present & Expected Future Costs & Benefits

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

Weighing Present and Expected Future Costs and Benefits: **ONE-PERSON ECONOMY**

- While alone on the island, **Bill had to choose between cultivating a field and just gathering wild nuts and berries.**
 - Gathering nuts and berries provides food now; gathering seeds and clearing a field for planting will yield food tomorrow if all goes well.
 - Imp:
 - Using today's time to farm may well be worth the effort if doing so will yield more food than Bill would otherwise have in the future.
- By planting, Bill is trading present value for future value.

Example of trading present for future benefits

- The simplest example of trading present for future benefits is the act of saving.
 - When you put income aside today for use in the future, you give up some things that you could have had today in exchange for something tomorrow.

Capital Goods and Consumer Goods

consumer goods

Goods produced for present consumption.

investment

The process of using resources to produce new capital.

capital goods

Goods that has already been produced that will be used to produce other valuable goods or services over time.

Imp:

Because resources are scarce, the opportunity cost of every investment in capital is forgone present consumption.

Other Examples of trading present for future benefits

- **Society:**
 - A society trades present for expected future benefits when it **devotes a portion of its resources to research and development or to investment in capital.**
 - Building capital means trading present benefits for future ones.
- **Bill & Colleen:**
 - Bill and Colleen might **trade gathering berries or lying in the sun for cutting logs to build a nicer house in the future**

Capital goods in place of Consumer goods

- In a modern society, resources used to produce capital goods could have been used to produce consumer goods—that is, **goods for present consumption.**
 - Heavy industrial machinery does not directly satisfy the wants of anyone, but producing it requires resources that could instead have gone into producing things that do satisfy wants directly—for example, food, clothing, toys, or golf clubs.

Current Capital – Provided by previous generations (by forgoing their consumptions)

- **Much of that capital was put in place by previous generations, yet it continues to provide valuable services today; it is part of this generation's endowment of resources.**
 - To build every building, every road, every factory, every house, and every car or truck, society must forgo using resources to produce consumer goods today.
- **Example:**
 - To get an education, you pay tuition and put off joining the workforce for a while.

Other type of Capital (Human Capital)

- **Capital does not need to be tangible (material, physical).**
 - **When you spend time and resources developing skills or getting an education, you are investing in human capital — your own human capital.**

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.

CHAPTER 2: The Economic Problem: Scarcity and Choice

Production Possibility Frontier

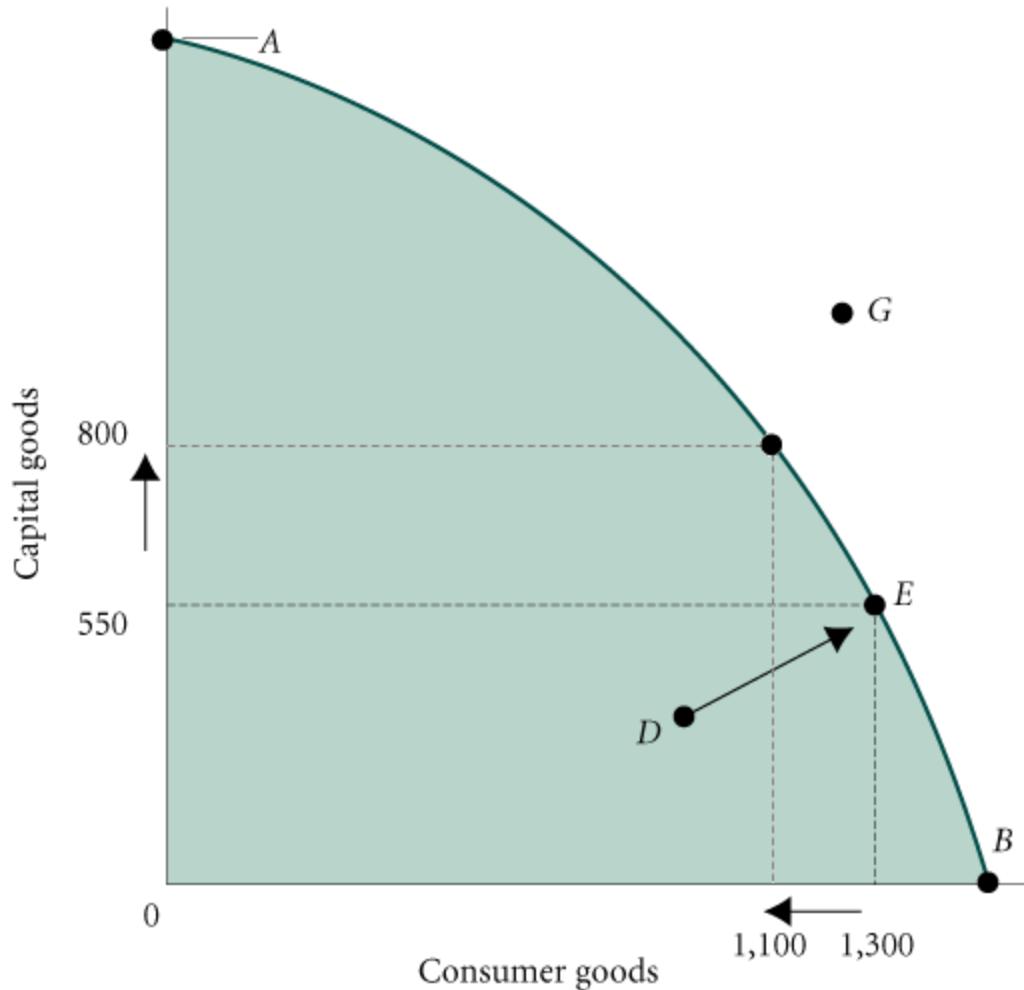


FIGURE 2.3 Production Possibility Frontier

PPF - Characteristics

- **PPF**
 - **On the Y-axis**, we measure the quantity of capital goods produced.
 - **On the X-axis**, we measure the quantity of consumer goods.
 - **All points below and to the left of the curve represent** combinations of capital and consumer goods that are possible for the society **given the resources available and existing technology**.
 - **Points above and to the right of the curve**, such as point G, **represent combinations that cannot be reached**.

Point A & B on PPF

- If an economy were to end up at point A on the graph, it would be **producing no consumer goods at all**; all resources would be used for the production of capital.
- If an economy were to end up at point B, it would be **devoting all its resources to the production of consumer goods** and **none of its resources to the formation of capital**.

CHAPTER 2: The Economic Problem: Scarcity and Choice

Point A & B on PPF

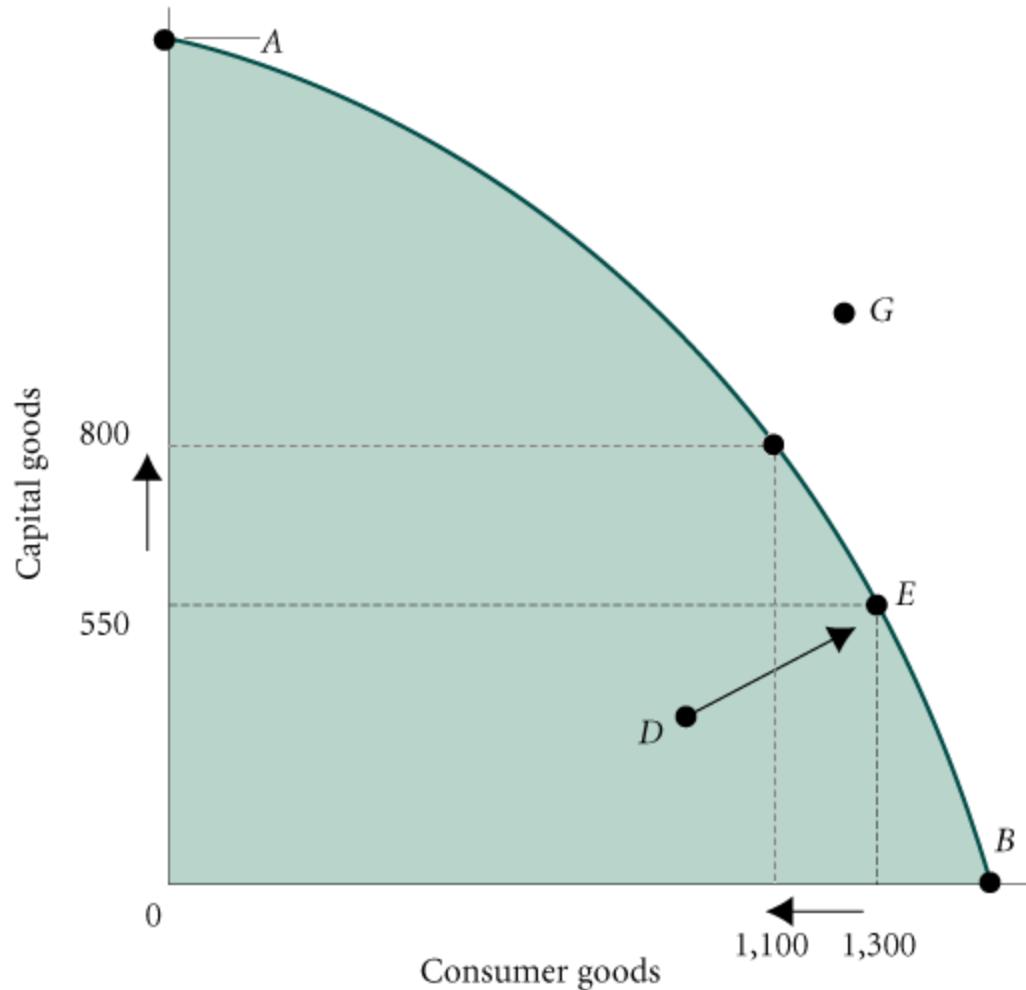


FIGURE 2.3 Production Possibility Frontier

Production Efficiency

- **Points that are actually on the ppf are points of both full resource employment and production efficiency.**
 - **Resources are not going unused, and there is no waste.**
- **Points that lie within the shaded area but that are not on the frontier represent either unemployment of resources or production inefficiency.**
- **Production Inefficiency: Unemployment**
 - During economic downturns or recessions, industrial plants run at less than their total capacity. When there is unemployment of labor and capital, we are not producing all that we can.

Production Inefficiency Example

- **Great Depression**
 - During the Great Depression of the 1930s, the U.S. economy experienced prolonged unemployment. Millions of workers found themselves without jobs. In 1933, 25 percent of the civilian labor force was unemployed. This figure stayed above 14 percent until 1940.
- **India (2015-16)**
 - All India - 5%
 - Men – 4.3%
 - Women - 8.7%

Production Inefficiency: Unemployment of labor means unemployment of capital

- In addition to the hardship that falls on the unemployed, **unemployment of labor means unemployment of capital.**
 - During economic downturns or recessions, industrial plants run at less than their total capacity.
- When there is unemployment of labor and capital, we are not producing all that we can.

Inefficiency: Also from mismanagement of Economy

Waste and mismanagement are the results of a firm's operating below its potential.

Sometimes, inefficiency results from mismanagement of the economy instead of mismanagement of individual private firms.

- India
 - UPA-II (Policy Paralysis)
 - Western UP
 - Manufacturing unit & SEZs
 - Bundelkhand
 - Wheat
 - Amravati

Output Efficiency (vs Production Efficiency)

The Efficient Mix of Output

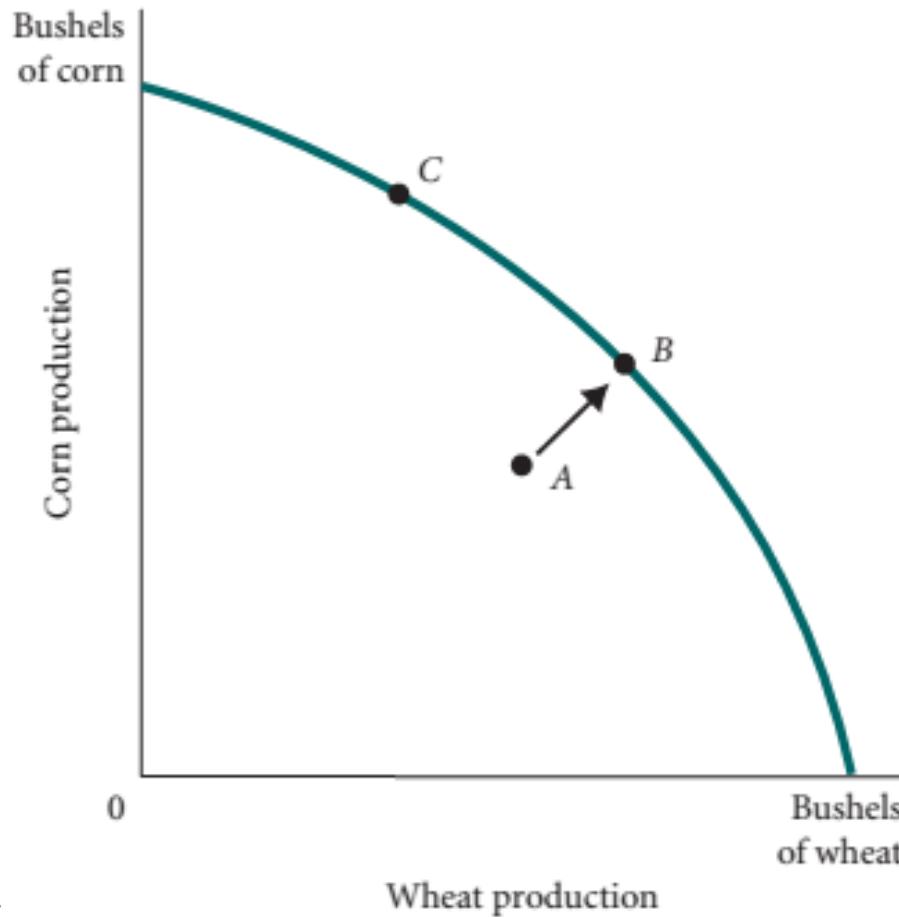
- **To be efficient, an economy must produce what people want.**
 - This means that in addition to operating on the ppf, the economy must be operating at the *right point* on the ppf.
- **This is referred to as output efficiency, in contrast to production efficiency.**

Output Efficiency: Example

- Suppose that an economy devotes 100 percent of its resources to beef production and that the beef industry runs efficiently using the most modern techniques.
 - **Also suppose that everyone in the society is a vegetarian.**
- **The result is a total waste of resources** (assuming that the society cannot trade its beef for vegetables produced in another country).

Output Efficiency (Point B & C): Depends on Preferences

- Points *B* and *C* in Figure 2.6 are points of production efficiency and full employment.
 - Whether *B* is more or less efficient than *C*, however, depends on the preferences of members of society*



PPF: Negative Slope and Opportunity Cost

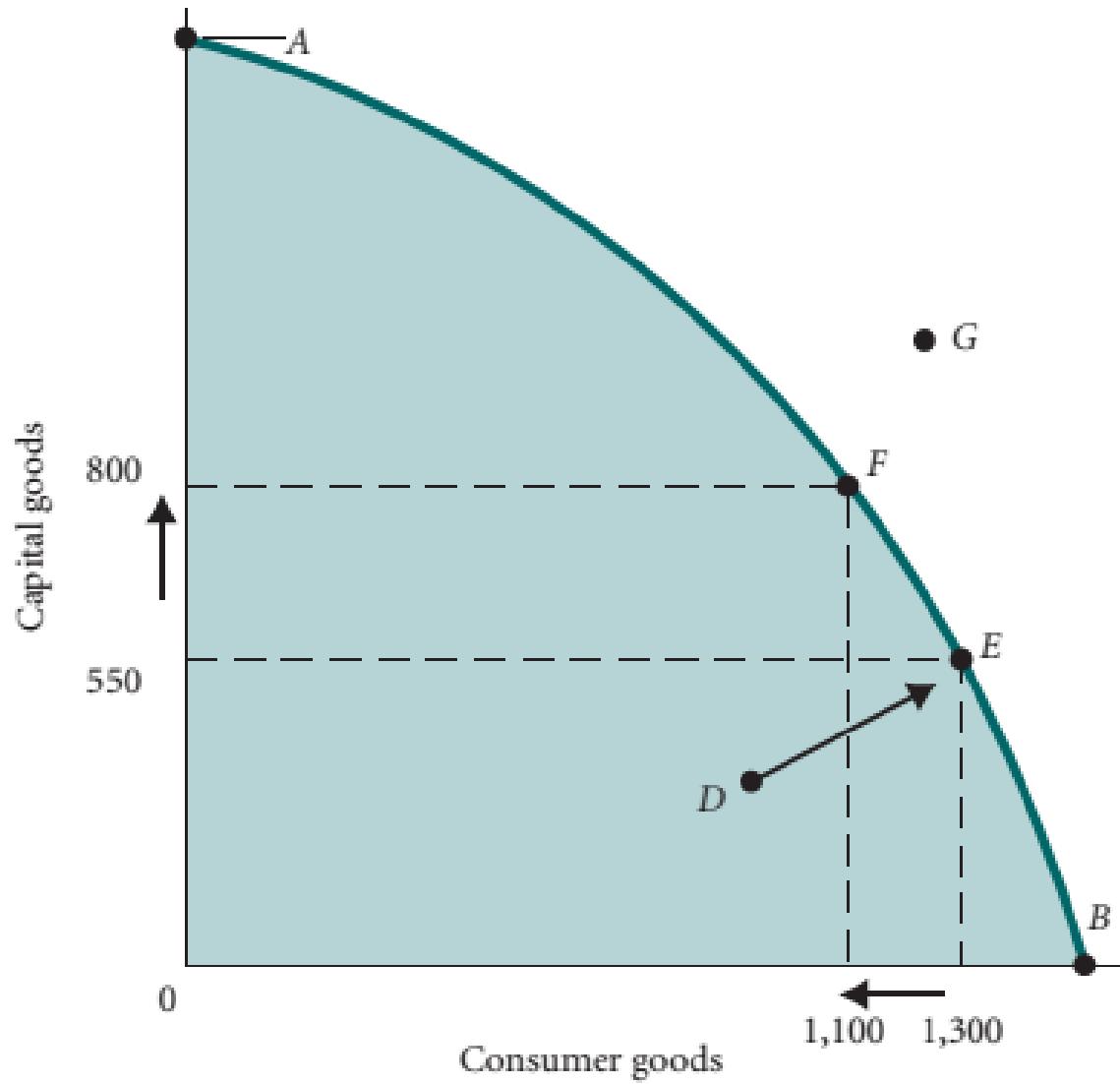
- Society can choose only one point on the curve.
 - Because a society's choices are constrained by available resources and existing technology, **when those resources are fully and efficiently employed, it can produce more capital goods only by reducing production of consumer goods.**
- **The opportunity cost of the additional capital is the forgone production of consumer goods.**

Opportunity cost of the additional capital (Point E to F)

- In moving from point *E* to point *F* in Figure 2.5, **capital production increases by $800 - 550 = 250$ units** (a positive change), **but that increase in capital can be achieved only by shifting resources out of the production of consumer goods.**
 - Thus, in moving from point *E* to point *F* in Figure 2.5, **consumer goods production decreases by $1,300 - 1,100 = 200$ units** (a negative change).
- **The slope of the curve, the ratio of the change in capital goods to the change in consumer goods, is negative**

CHAPTER 2: The Economic Problem: Scarcity and Choice

Opportunity cost of the additional capital (Point E to F)

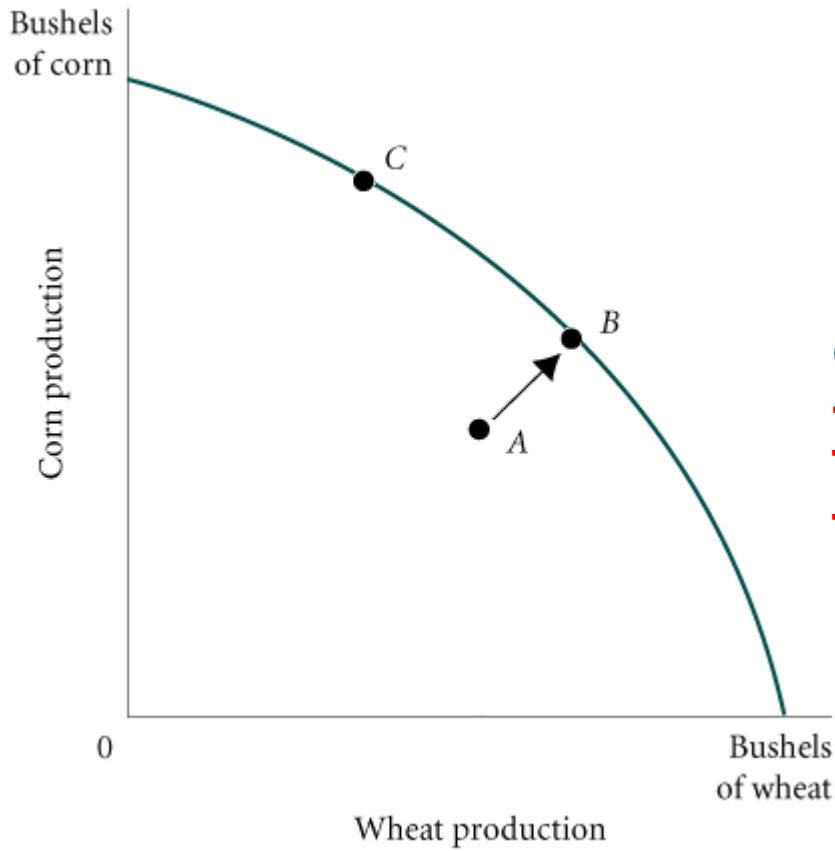


Marginal rate of transformation (MRT)

- The **marginal rate of transformation** is the **rate at which one good must be sacrificed in order to produce a single extra unit of another good**

CHAPTER 2: The Economic Problem: Scarcity and Choice

Negative Slope and Opportunity Cost: MRT



**marginal rate of transformation
(MRT)**

The slope of the production
possibility frontier (ppf).

The law of increasing opportunity cost

- The negative slope of the ppf indicates the trade-off that a society faces between two goods.
- Let's look at the **trade-off between corn and wheat production in Ohio and Kansas.**
 - In a recent year, **Ohio and Kansas together produced 510 million bushels of corn and 380 million bushels of wheat (Point C).**

The law of increasing opportunity cost: Corn and Wheat Production in Ohio and Kansas

The Law of Increasing Opportunity Cost

TABLE 2.1 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

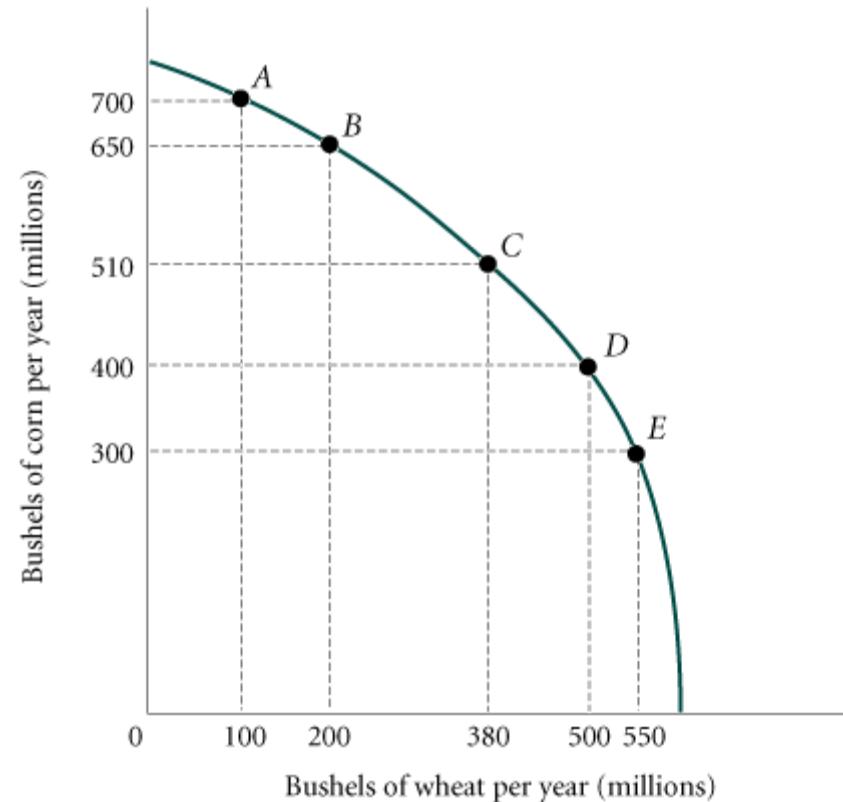


FIGURE 2.5 Corn and Wheat Production in
Ohio and Kansas

If demand for Corn increases

- Suppose that society's demand for corn dramatically increases.
- If this happens, farmers would probably shift some of their acreage from wheat production to corn production.
 - Such a shift is represented by a move from point C (where corn = 510 and wheat = 380) up and to the left along the ppf toward points A and B in Figure 2.7.

The law of increasing opportunity cost: Corn and Wheat Production in Ohio and Kansas

The Law of Increasing Opportunity Cost

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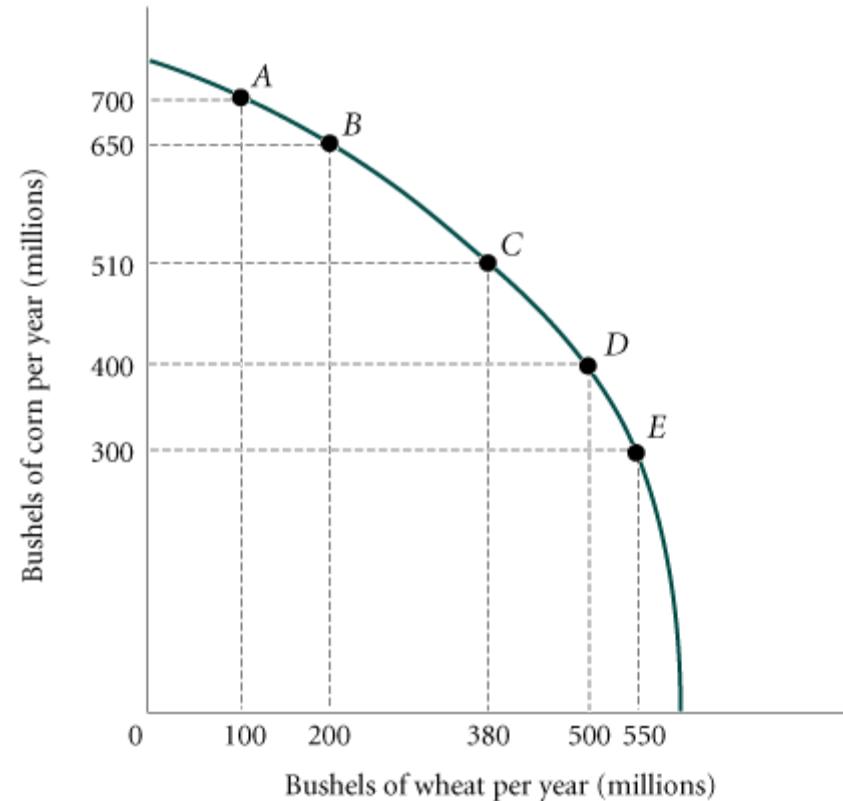


FIGURE 2.5 Corn and Wheat Production in
Ohio and Kansas

Why Increasing Opportunity Cost?

- As this happens, it becomes more difficult to produce additional corn.
 - The best land for corn production was presumably already in corn, and the best land for wheat production was already in wheat.
 - As we try to produce more corn, the land is less well suited to that crop.
 - As we take more land out of wheat production, we are taking increasingly better wheat-producing land.
- In other words, the opportunity cost of more corn, measured in terms of wheat, increases

Increasing Opportunity Cost Example

- **Point E to D: [1C = 1/2W]**
 - Moving from point *E* to *D*, Table 2.1 shows that we can get 100 million bushels of corn (400 - 300) by sacrificing only 50 million bushels of wheat (550 - 500)—that is, we get 2 bushels of corn for every bushel of wheat.
- **However, when we are already stretching the ability of the land to produce corn, it becomes harder to produce more and the opportunity cost increases.**
- **Point B to A: [1C = 2W]**
 - Moving from point *B* to *A*, we can get only 50 million bushels of corn (700 - 650) by sacrificing 100 million bushels of wheat (200 - 100).

The law of increasing opportunity cost: Corn and Wheat Production in Ohio and Kansas

The Law of Increasing Opportunity Cost

TABLE 2.1 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)
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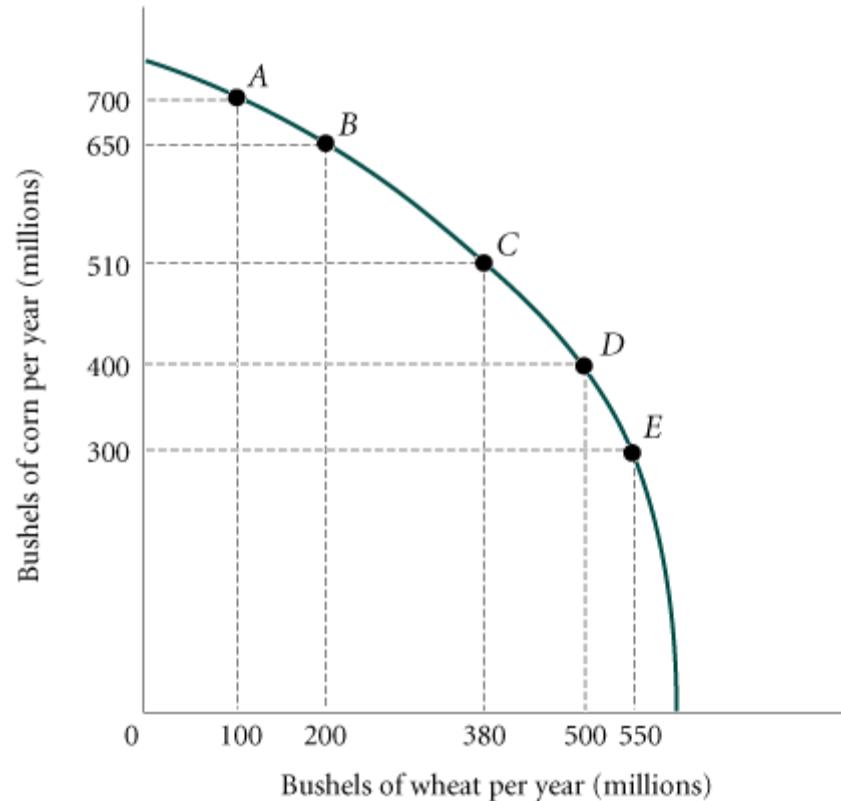


FIGURE 2.5 Corn and Wheat Production in
Ohio and Kansas

Law of increasing opportunity cost: If DD for Wheat Increases

- However, if the demand for wheat were to increase substantially and we were to move down and to the right along the ppf, it would become increasingly difficult to produce wheat and the opportunity cost of wheat, in terms of corn, would increase.
- *This is the law of increasing opportunity cost.*

SCARCITY, CHOICE, AND OPPORTUNITY COST

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.

Sources of Economic Growth

- **Increase in Resources:**
 - New resources may mean a larger labor force or an increased capital stock.
- **Increase in Productivity:**
 - The **production and use of new machinery and equipment (capital)** increase workers' productivity.
 - Improved productivity also comes from **technological change and innovation**, the discovery and application of new, more efficient production techniques.

Sources of Growth and the Dilemma of the Poor Countries

- **Economic growth** arises from many **sources**, the **two most important** over the years having been the **accumulation of capital and technological advances.**

1. Accumulation of Capital

- **Accumulation of Capital:**
- **For poor countries, capital is essential**
 - They must **build the communication networks and transportation systems** necessary **to develop industries** that function efficiently.
 - They also need capital goods **to develop their agricultural sectors**

Increasing Productivity in Corn and Wheat Production in the United States, 1935–2006

TABLE 2.2 Increasing Productivity in Corn and Wheat Production in the United States, 1935–2006

	CORN		WHEAT	
	Yield Per Acre (Bushels)	Labor Hours Per 100 Bushels	Yield Per Acre (Bushels)	Labor Hours Per 100 Bushels
1935–1939	26.1	108	13.2	67
1945–1949	36.1	53	16.9	34
1955–1959	48.7	20	22.3	17
1965–1969	78.5	7	27.5	11
1975–1979	96.3	4	31.3	9
1981–1985	107.2	3	36.9	7
1985–1990	112.8	NA ^a	38.0	NA ^a
1990–1995	120.6	NA ^a	38.1	NA ^a
1998	134.4	NA ^a	43.2	NA ^a
2001	138.2	NA ^a	43.5	NA ^a
2006	145.6	NA ^a	42.3	NA ^a

CHAPTER 2: The Economic Problem: Scarcity and Choice

Economic Growth Shifts the ppf Up and to the Right

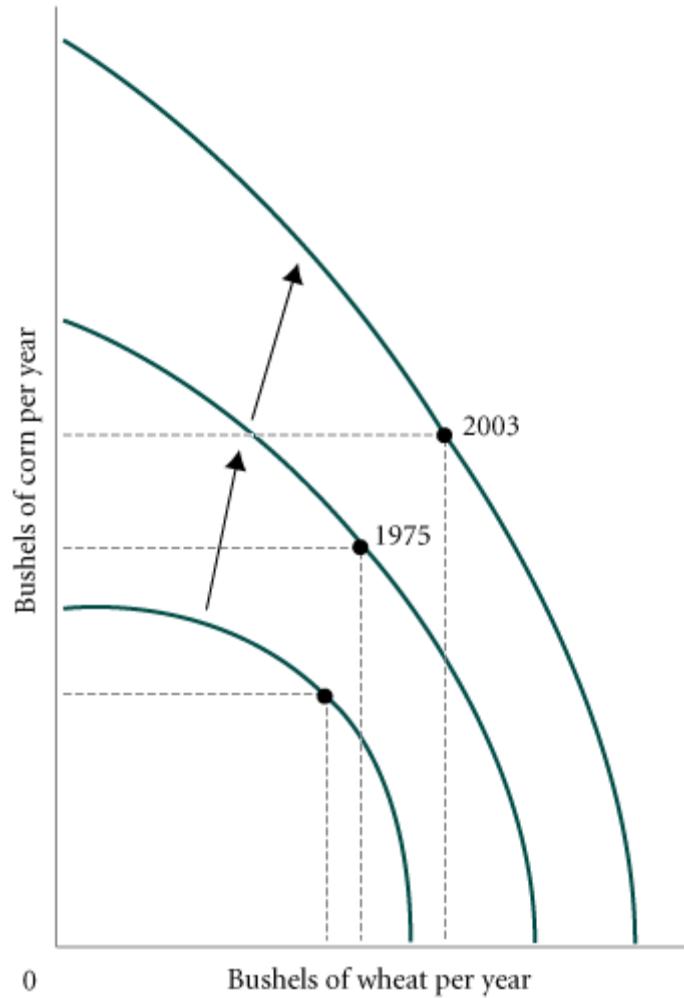


FIGURE 2.6 Economic Growth Shifts the ppf Up and to the Right

Shift in PPF: Example from India

Show the PPF for Wheat & Pulses for three years (1950-51, 1980-81 & 1998-99) [X-Axis: Wheat]

Table 2. Yield for various crops (kg/ha)

	1950/51	1960/61	1970/71	1980/81	1990/91	1995/96	1998/99
Rice	668	1 013	1 123	1 336	1 740	1 855	1 905
Wheat	663	851	1 307	1 630	2 281	2 483	2 596
Coarse cereals	408	528	665	695	900	941	1 035
Pulses	441	539	524	473	578	552	661
Food grains	522	710	872	1 023	1 380	1 499	1 611
Oil seeds	481	507	579	532	771	851	948
Cotton	88	125	106	152	225	246	240
Sugarcane	33 422	45 549	48 322	57 844	65 395	68 369	69 288

2. Technological Advances

- **Technological advances** come from research and development that use resources; thus, **they too must be paid for.**

Imp:

- The resources used to produce capital goods—to build a road, a tractor, or a manufacturing plant—and to develop new technologies **could have been used to produce consumer goods**

Dilemma of the Poor Countries

- **When a large part of a country's population is very poor, taking resources out of the production of consumer goods (such as food and clothing) is very difficult.**
- In addition, in some countries, **people wealthy enough to invest in domestic industries choose instead to invest abroad because of political turmoil at home.**
 - As a result, it often falls to the **governments of poor countries to generate revenues for capital production and research out of tax collections.**
- **All these factors have contributed to the growing gap between some poor and rich nations.**

Growing gap between some poor and rich nations.

- Figure 2.9 shows the result using ppf 's.
 - **On the left, the rich country devotes a larger portion of its production to capital while the poor country produces mostly consumer goods.**
 - On the right, you see the results: **The ppf of the rich country shifts up and out farther and faster.**

Sources of Growth and the Dilemma of the Poor Countries

Sources of Growth and the Dilemma of the Poor Countries: **The ppf of the rich country shifts up and out farther and faster.**

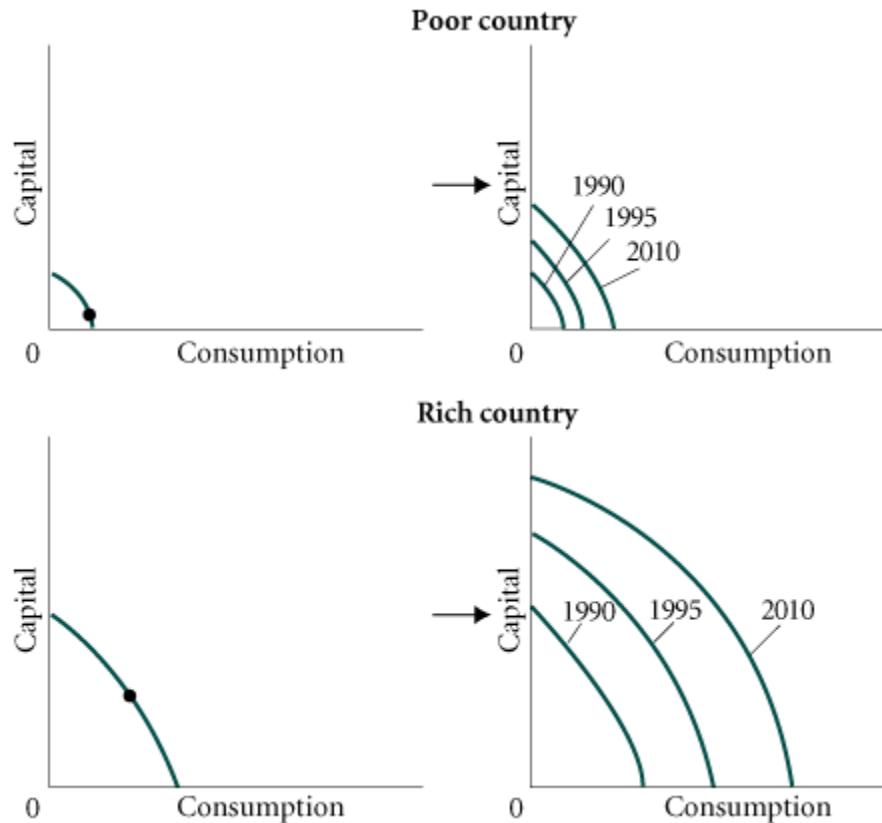


FIGURE 2.7 Capital Goods and Growth in Poor and Rich Countries

Example from India

- The importance of capital goods and technological developments to the position of workers in less developed countries is well illustrated by Robert Jensen's **study of South India's industry**.
- Conventional telephones require huge investments in wires and towers and, as a result, many less developed areas are without landlines.
 - Mobile phones, on the other hand, require a less expensive investment; thus, in many areas, people upgraded from no phones directly to cell phones.
 - Jensen found that in **small fishing villages**, the advent of **cell phones allowed fishermen to determine on any given day where to take their catch to sell**, resulting in a large decrease in fish wasted and an increase in fishing profits.

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 exactly do large, complex societies go about answering the three basic economic questions?

Economic Systems and the Role of Govt.

- Thus far we have described the questions that the economic system must answer. Now we turn to the mechanics of the system.
- Here the basic debate concerns the role of government.
 - On the one hand, many favor leaving the economy alone and keeping the government at bay (laissez-faire economy)
 - while others believe that there are many circumstances in which the government may be able to improve the functioning of the market (command economy)

ECONOMIC SYSTEMS: COMMAND ECONOMIES

command economy

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

Command Economy: USSR

- During the **long struggle between the United States and the Soviet Union it was an all or nothing proposition.**
 - The Soviet Union had a planned economy run by the government.
- In a pure command economy, the basic economic questions are answered by a central government

Extent and the character of a limited government role

- While the extremes of central planning have been rejected, so too has the idea that “markets solve all problems.”
- The real debate is not about whether we have government at all, it is about the extent and the character of a limited government role in the economy.
 - Government involvement, in theory, may improve the efficiency and fairness of the allocation of a nation’s resources.
 - At the same time, a poorly functioning government can destroy incentives, lead to corruption, and result in the waste of a society’s resources.

Basic Economic Questions: Command Economy

What-How-Who: All decided by Govt. only

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-interests 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 economy

WHAT:

- **In a free, unregulated market, goods and services are produced and sold only if the supplier can make a profit.**
 - You cannot make a profit unless someone wants the product that you are selling.
 - This logic leads to the notion of 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 economy

HOW:

Free Enterprise:

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

- Whether the firms are large or small, however, **production decisions in a market economy are made by separate private organizations acting in what they perceive to be their own interests**

Individual Production Decisions: Free Enterprise (they leads to more efficient production)

- Proponents of free market systems argue that free enterprise leads to more efficient production and better response to diverse and changing consumer preferences.
 - If a producer produces inefficiently, competitors will come along, fight for the business, and eventually take it away.
- Thus, in a free market economy, competition forces producers to use efficient techniques of production.
- IMP:
 - It is competition, then, that ultimately dictates how output is produced

ECONOMIC SYSTEMS: laissez-faire economy

WHO: Distribution of Output

- In a free market system, **the distribution of output**— who gets what— is also determined in a decentralized way.
 - **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

WHO: Distribution of Output (Decided by Individuals only)

- **Income: Determined by individual choice**
 - **To the extent that income comes from working for a wage, it is at least in part determined by individual choice.**
 - You will work for the wages available in the market only if these **wages** (and the products and services they can buy) **are sufficient to compensate you for what you give up by working.**
 - Your leisure certainly has a value also.
 - You may discover that you can increase your income by getting more education or training.

Political Coordinate Test Results [Not part of the syllabus]

Left:

Right:

[Not part of the syllabus]

Documentry: Commanding Heights

- **Episode One: The Battle of Ideas**
- **Episode Two: The Agony of Reform**
- **Episode Three: The New Rules of the Game**

[Not part of the syllabus]

Episode One: The Battle of Ideas

- A global economy, energized by technological change and unprecedented flows of people and money, collapses in the wake world war.... The year is 1914.
 - Worldwide war results, exhausting the resources of the great powers and convincing many that the economic system itself is to blame.
 - From the ashes of the catastrophe, an intellectual and political struggle ignites between the powers of government and the forces of the marketplace, each determined to reinvent the world's economic order.

[Not part of the syllabus]

- Two individuals emerge whose ideas, shaped by very different experiences, will inform this debate and carry it forward.
 - One is a brilliant, unconventional Englishman named John Maynard Keynes.
 - The other is an outspoken émigré from ravaged Austria, Friedrich von Hayek.
- But a worldwide depression holds the capitalist nations in its grip.

[Not part of the syllabus]

- For more than half a century the battle of ideas will rage.
 - From the totalitarian socialist systems to the fascist states, from the independent nations of the developing world to the mixed economies of Europe, and the regulated capitalism of the United States, **government planning will gradually take over the commanding heights.**

[Not part of the syllabus]

- **What is 'Stagflation'**

- A condition of slow economic growth and relatively high unemployment or economic stagnation – accompanied by rising prices, or inflation
- Stagflation can prove to be a particularly tough problem for governments to deal with due to the fact that most policies designed to lower inflation tend to make it tougher for the unemployed, and policies designed to ease unemployment raise inflation.
- This happened in the United States during the 1970s when world oil prices rose dramatically, increasing the costs of goods and contributing to a increase in unemployment.

[Not part of the syllabus]

- But in the 1970s, with Keynesian theory at its height and communism fully entrenched, economic stagnation sets in on all sides.
 - When a British grocer's daughter and a former Hollywood actor become heads of state, they join forces around the ideas of Hayek, and new political and economic policies begin to transform the world
 - Margaret Hilda Thatcher was the Prime Minister of the United Kingdom from 1979 to 1990
 - Ronald Wilson Reagan was the 40th President of the United States, from 1981 to 1989

ECONOMIC SYSTEMS: 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.

Others will decide whether to acquire skills; whether to work; and whether to buy, sell, invest, or save the income that they earn.

Imp: The basic coordinating mechanism is price.

Role played by Price?

- **A price is the amount that a product sells for per unit, and it reflects what society is willing to pay.**
 - **Prices of inputs —labor, land, and capital— determine how much it costs to produce a product.**
 - Prices of various kinds of labor, or *wage rates*, **determine the rewards for working in different jobs and professions.**
- **Price vs Cost**
 - Many of the **independent decisions made in a market economy involve the weighing of prices and costs**, so it is not surprising that **much of economic theory focuses on the factors that influence and determine prices.**
 - **This is why microeconomic theory is often simply called *price theory*.**

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.”**

Market economies can't exist without government intervention

- Conversely, no market economies exist without government involvement and government regulation.
 - Production
 - Employment
 - They also redistribute income by means of taxation and social welfare expenditures, and they regulate many economic activities.

Advantages of free market...

- One of the major themes in economics, is the tension between the advantages of free, unregulated markets and the desire for government involvement.
- Advocates of free markets argue that such markets work best when left to themselves.
 - They produce only what people want; without buyers, sellers go out of business.
 - Competition forces firms to adopt efficient production techniques.
 - Wage differentials lead people to acquire needed skills.
 - Competition also leads to innovation in both production techniques and products.
- The result is quality and variety, but market systems have problems too.

Criticism of free market...

- Even staunch defenders of the free enterprise system recognize that market systems are not perfect.
 - First, they do not always produce what people want at the lowest cost—there are inefficiencies.
 - Second, rewards (income) may be unfairly distributed and some groups may be left out.
 - Third, periods of unemployment and inflation recur with some regularity.

But government intervention can also fail

- Many people point to these problems as reasons for government involvement.
 - Indeed, for some problems, government involvement may be the only solution.
 - However, government decisions are made by people who presumably, like the rest of us, act in their own self-interest.
 - While governments may be called on to improve the functioning of the economy, there is no guarantee that they will do so.
 - Just as markets may fail to produce an allocation of resources that is perfectly efficient and fair, governments may fail to improve matters.

Revision

- **Production vs Output Efficiency**
 - In addition to operating on the PPF, the economy must be operating at the right point on PPF i.e. produce what people want
- **Trade (Comparative advantage => Opportunity Cost)**
 - If one country has absolute adv. in both commodities then still the other country will have comparative adv. in one of the commodity
- **PPF**
 - If increasing opp cost, then concave
 - If constant opp cost, then straight
- **Command vs Laissez-Faire (What, How & Who)**
 - In command, all decisions by govt.
 - In market, what by consumer, how by producer and who based on income & wealth.

THANK YOU

Numericals- Supply and Demand Analysis

Principles of Economics

- Equation of a straight line:

$$Y = a + bX$$

- Equation of demand curve:

$$Q^d = a + bP \quad (P = \text{price})$$

- So, $\Delta Q^d = b \Delta P$

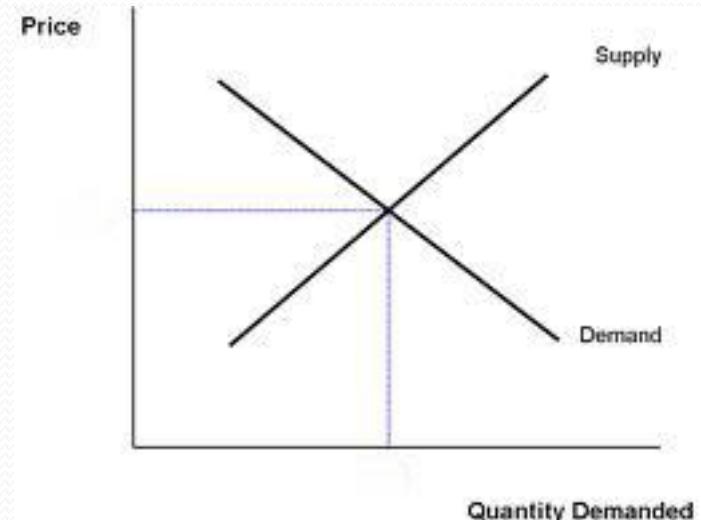
Thus, $b = \Delta Q^d / \Delta P$

- Equation of supply curve:

$$Q^s = c + dP$$

- So, $\Delta Q^s = d \Delta P$

Thus, $d = \Delta Q^s / \Delta P$



1. The weekly demand schedule for milk in Hyderabad:

Price (Rs/Ltr)	Demand
9	18
10	16
11	14
12	12
13	10
14	8

Calculate the weekly demand function.

- Let equation of the demand curve be:

$$Q^d = a + bP$$

- So, $\Delta Q^d = b \Delta P$

Thus, $b = \Delta Q^d / \Delta P$

- Consider price increase from 9 to 10:

$$\Delta P = 1; \Delta Q^d = -2$$

- So, $b = -2/1 = -2$

Therefore, $Q^d = a - 2P$

- Putting any combination of price and quantity we get:

$$18 = a - (2 \times 9)$$

$$\Rightarrow a = 36$$

- The demand function is therefore:

$$Q^d = 36 - 2P$$

2. Demand function: $Q = 34 - 2P$

Find the theoretical maximum quantity of good demanded and theoretical maximum price of the good.

- The maximum quantity that can be demanded is when the price is zero
- $$\begin{aligned} Q &= 34 - 2P \\ &= 34 - (2 \times 0) \\ &= 34 \end{aligned}$$
- The theoretical maximum price is the price at which quantity demanded is zero
- $$\begin{aligned} Q &= 34 - 2P \\ 0 &= 34 - 2P \\ \Rightarrow 2P &= 34 \\ \Rightarrow P &= 17 \end{aligned}$$

3. The weekly demand schedule for a good in Delhi:

Price (Rs)	Quantity demanded
9	36
10	32
11	28
12	24
13	20
14	16

Calculate the weekly demand function.

Answer:

$$Q = 72 - 4P$$

4. The weekly supply schedule for milk in Hyderabad:

Price	Quantity Supplied
9	9
10	10
11	11
12	12
13	13
14	14

Calculate the weekly supply function.

- Answer
- $Q=P$

5. Supply Function: $Q^s = 2P - 100$

- Find the price below which no milk will be supplied.
- Answer
- Means Quantity supplied should be zero.
- Therefore, $0 = 2P - 100$
- $P = 50$

6. Demand function: $Q^d = 100 - 3P$

Supply Function: $Q^s = 2P - 20$

Find the equilibrium output.

If price is 20, would there be surplus or deficit?

- At equilibrium $Q^d = Q^s$

Therefore: $100 - 3P = 2P - 20$

$$\Rightarrow 5P = 120$$

$$\Rightarrow P = 24$$

When $P=24$, $Q = 100 - (3 \times 24)$

$$\Rightarrow Q = 100 - 72 = 28$$

If price = 20,

$$Q^d = 100 - (3 \times 20) = 40$$

$$Q^s = (2 \times 20) - 20 = 20$$

Therefore, shortage = $40 - 20 = 20$

Calculation of Elasticity

- For calculation of elasticities:
 - If the direction of price and quantity change is given, use the initial quantity and price as base
Elasticity (e_p): %change in quantity/ %change in price
$$\Rightarrow e_p = (\Delta Q/Q_1) \times 100 / (\Delta P/P_1) \times 100$$
$$\Rightarrow e_p = (\Delta Q / \Delta P) \times (P_1 / Q_1)$$
 - When the direction of change is not given, use the mid point formula.

Elasticity (e_p): %change in quantity/ %change in price

$$\Rightarrow e_p = [\Delta Q/(Q_1+Q_2/2)] \times 100 / [\Delta P/(P_1+P_2/2)] \times 100$$
$$\Rightarrow e_p = (\Delta Q / \Delta P) \times (P_1+P_2/Q_1+Q_2)$$

7. The demand schedule for a product:

Price	Quantity demanded
3	20
4	16
5	12
6	8
7	4

Find the price elasticity of demand for an increase in the price from 5 to 6.

- $P_1 = 5, P_2 = 6; \Delta P = 1$
 - $Q_1 = 12, Q_2 = 8; \Delta Q = -4$
 - $e_p = (\Delta Q / \Delta P) \times (P_1 / Q_1)$
- $\Rightarrow e_p = (-4/1) \times (5/12) = -1.67$
- 1.67 or in absolute terms 1.67 - represents elastic demand

8. The following demand schedule is given:

Price	Quantity Demanded
3	20
4	16
5	12
6	8
7	4

Calculate the price elasticity of demand for a decrease in price from 6 to 5.

Answer: -3

-3 or in absolute terms 3- represents elastic demand

9. The monthly schedule for rice for a family is given below:

Price (Rs./kg)	Quantity demanded
12	21
13	18

Find the price elasticity of demand for rice.

- Since direction of change is not given:
 - $e_p = (\Delta Q / \Delta P) \times (P_1 + P_2 / Q_1 + Q_2)$
 - Now, $P_1 = 12$, $P_2 = 13$, $Q_1 = 21$, $Q_2 = 18$
 - $\Delta P = 1$, $\Delta Q = -3$
- $e_p = (-3/1) \times (25/39)$
= $-75/39 = -1.92$
- 1.92 or in absolute terms 1.92- represents perfect elasticity

10. Demand function for ball point pens is

$$Q^d = 100 - 0.5P$$

Find the price elasticity of the good at price Rs. 10.

N.B. When we need to compute price elasticity of demand at a particular point (price), we use point price elasticity of demand.

$$e_p = (\partial Q / \partial P) \times (P/Q)$$

- We have
- $Q^d = 100 - 0.5P$
- $\partial Q / \partial P = -0.5$
- If $P=10$, $Q_d = 100 - 0.5 \times 10 = 95$
- $e_p = (\partial Q / \partial P) \times (P/Q)$
 $= -0.5 \times 10 / 95 = -0.052$
- -0.052 or in absolute terms 0.052 - represents inelastic demand

Numericals- Supply and Demand Analysis SET 2

Principles of Economics

Calculation

- When you calculate:
 - Price elasticity- quantity should change due to change in price of the good only- income and prices of other goods should be constant
 - Cross price elasticity- quantity should change due to change in price of another good only- income, price of the good and price of any other good considered should be constant
 - Income elasticity- quantity should change due to change in income only- price of the good and prices of other goods should be constant

Calculation

- When we say- find the **arc elasticity** (even if direction of price or quantity change has been given)- we need to use the mid point formula.

1. The supply schedule for oranges is given below:

Price (Rs./dozen)	Quantity Supplied (1000 dozen)
6	10
7	20
8	30
9	40
10	50

What is the arc price elasticity of supply for oranges when the price increases from Rs. 7 to Rs. 8?

- Solution:
- $P_1 = 7, P_2 = 8, Q_1 = 20, Q_2 = 30$
- $\Delta Q = 10, \Delta P = 1$
- $e_{ps} = (10/1) \times [(7+8)/(20+30)]$
 $= 10 \times (15/50) = 3$ (elastic)

2. Supply Function: $Q_s = 500P - 1000$

Calculate price elasticity of supply at a price of Rs. 10.

Answer: 1.25 (elastic)

3. Given the demand schedule, what is the cross price elasticity between good A and B?

Product A		Product B
Price	Quantity Demanded	Price
10	100	20
10	80	40

- Solution:
- Cross price elasticity of demand= % change in demand for good A/ % change in price of good B
- $P_{1B} = 20, P_{2B} = 40, Q_{1A} = 100, Q_{2A} = 80$
- $\Delta Q_A = -20, \Delta P_B = 20$
- $e_{AB} = -(20/20) \times [(20+40)/(100+80)]$
 $= -60/180 = -0.33$
(complimentary goods)

4. Compute income elasticity of demand using arc elasticity of demand.

Price	Quantity demanded	Consumer income
20	50	12000
30	40	12000
20	40	10000

- Solution:
- Income elasticity of demand= % change in quantity demanded/ % change in income
- We consider the case when income changes but price is fixed
- $I_1 = 12000, I_2 = 10000, Q_1 = 50, Q_2 = 40$
- $\Delta Q = 10, \Delta I = 2000$
- $e_i = (10/2000) \times [(12000+10000)/(50+40)]$
 $= (10/2000) \times (22000/90) = 11/9 = 1.22$ (elastic)

5. From the following table calculate price elasticity of demand.

Price	Quantity demanded	Consumer income
20	1000	30000
18	1200	24000
16	1450	26000
12	1600	30000
20	1200	32000
12	1600	31000

- Solution:
- We consider the case when price changes but income is fixed
- $P_1 = 20, P_2 = 12, Q_1 = 1000, Q_2 = 1600$
- $\Delta Q = 600, \Delta P = -8$
- $e_p = (600/8) \times [(20+12)/(1000+1600)]$
 $= -(600/8) \times (32/2600) = -0.923$
- (inelastic)

6. Given the following schedule, find the cross price elasticity of demand between X and Y.

Goods	Before price change		After price change	
	Price (Rs./unit)	Quantity (unit/ month)	Price (Rs./unit)	Quantity (unit/ month)
Y	5	60	4	80
X	2	25	2	15

- Solution:
- Cross price elasticity of demand= % change in demand for good X/ % change in price of good Y
- $P_{1Y}=5, P_{2Y}= 4, Q_{1X}= 25, Q_{2X}= 15$
- $\Delta Q_X= -10, \Delta P_Y= -1$
- $e_{xy} = (-10/-1) \times [5/25]$
 $= 2$

(substitutes)

7. The following is the demand schedule of goods X and Y. Compute the cross elasticity of demand between X and Y.

Price		Quantity Demanded	
X	Y	X	Y
3.5	2.5	400	550
4	3	450	600
4.5	3.5	425	700
4.5	4	450	650

Answer: 0.42

8. In a year number of cars sold decreased by 20% during the year, prices of cars increased by 5%, per capita income declined by 2% and price of petrol increased by 10%, income elasticity of demand for cars is estimated to be +1.5 and cross price elasticity of petrol and cars is estimated to be -0.30. Find:
- a. The impact of decline in per capita income on demand for cars.
 - b. The impact of increase in price of petrol on demand for cars
 - c. If sales decline because of increase in petrol and decrease in income are 3% and 3% respectively, what is the price elasticity of demand for cars?

a) $e_i = \% \Delta Q / \% \Delta I$

- $\% \Delta I = -2\%$
- $e_i = 1.5$
- Therefore, $\% \Delta Q = (-2 \times 1.5)\% = -3\%$
- Therefore, decrease in per capita income caused the sales of cars to decline by 3%

b) $e_{xy} = \% \Delta Q_x / \% \Delta P_y$

- ΔP_y (petrol) = 10%
- $e_{xy} = -0.30$
- $\% \Delta Q_x = 10 \times -0.30 = -3$
- Therefore, increase in price of petrol caused the sales of car to decline by 3%

c) Total decline in sales of cars= 20%

- Decline caused by decrease in per capita income and increase in price of petrol= 3+3= 6%
- Therefore, $20-6= 14\%$ decline in car sales is caused by increase in price of cars
- $e_p = \% \Delta Q / \% \Delta P = -14/5 = -2.8$

9. Demand Function: $Q_d = 250000 - 35P$

Find the price elasticity of demand between prices Rs. 2000 and Rs. 3000.

Answer: -0.538

10. Demand Function: $P=2000 - 50Q$

At what price the demand for the good is unitary elastic?

Solution:

$$P = 2000 - 50Q$$

$$\Rightarrow Q = 40 - 0.02P$$

$$\text{Now, given, } e_p = (\partial Q / \partial P) \times (P/Q) = -1$$

$$\Rightarrow -0.02 \times [P / (40 - 0.02P)] = -1$$

$$\Rightarrow 0.02P = 40 - 0.02P$$

$$\Rightarrow 0.04P = 40$$

$$\Rightarrow P = 40 / 0.04 = 1000$$

Demand, Supply, and Market Equilibrium

Prepared by:

Fernando & Yvonn Quijano



Demand, Supply, and Market Equilibrium

3

Chapter Outline

Firms and Households:

The Basic Decision-Making Units

Input Markets and Output Markets:

The Circular Flow

Demand in Product/Output Markets

Changes in Quantity Demanded versus
Changes in Demand

Price and Quantity Demanded: The Law of Demand

Other Determinants of Household Demand

Shift of Demand versus Movement
along a Demand Curve

From Household Demand to Market Demand

Supply in Product/Output Markets

Price and Quantity Supplied: The Law of Supply

Other Determinants of Supply

Shift of Supply versus Movement
along a Supply Curve

From Individual Supply to Market Supply

Market Equilibrium

Excess Demand

Excess Supply

Changes in Equilibrium

Demand and Supply in Product Markets: A Review

Looking Ahead: Markets and the Allocation of Resources

FIRMS AND HOUSEHOLDS: THE BASIC DECISION-MAKING UNITS

- We analyze the behavior of two fundamental decision making units:
 - *Firms* — the primary producing units in an economy
 - *Households* — the consuming units in an economy.
- Both are made up of people performing different functions and playing different roles.
- In essence, what we are developing is a theory of human behavior.

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.

FIRMS :

Assumption – Firms will maximize profits

- **Most firms exist to make a profit for their owners, but some do not.**
 - **BITS**, for example, fits the description of a firm: It takes inputs in the form of labor, land, skills, books, and buildings and produces a service that we call education.
 - Although the university sells that service for a price, **it does not exist to make a profit**; instead, **it exists to provide education of the highest quality possible.**
- **The analysis of a firm's behavior** that follows rests on the **assumption** that **firms make decisions in order to maximize profits**

HOUSEHOLDS: Some Assumptions

- Even though **households have wide-ranging preferences, they also have some things in common.**
- Things in Common:
 - All — even the very rich — **have ultimately limited incomes**, and all **must pay in some way for the goods and services they consume.**
 - Although **households may have some control over their incomes** —they can work more hours or fewer hours—**they are also constrained by the availability of jobs, current wages, their own abilities, and their accumulated and inherited wealth (or lack thereof)**

CHAPTER 3: Demand, Supply, and Market Equilibrium

INPUT MARKETS AND OUTPUT MARKETS: THE CIRCULAR FLOW

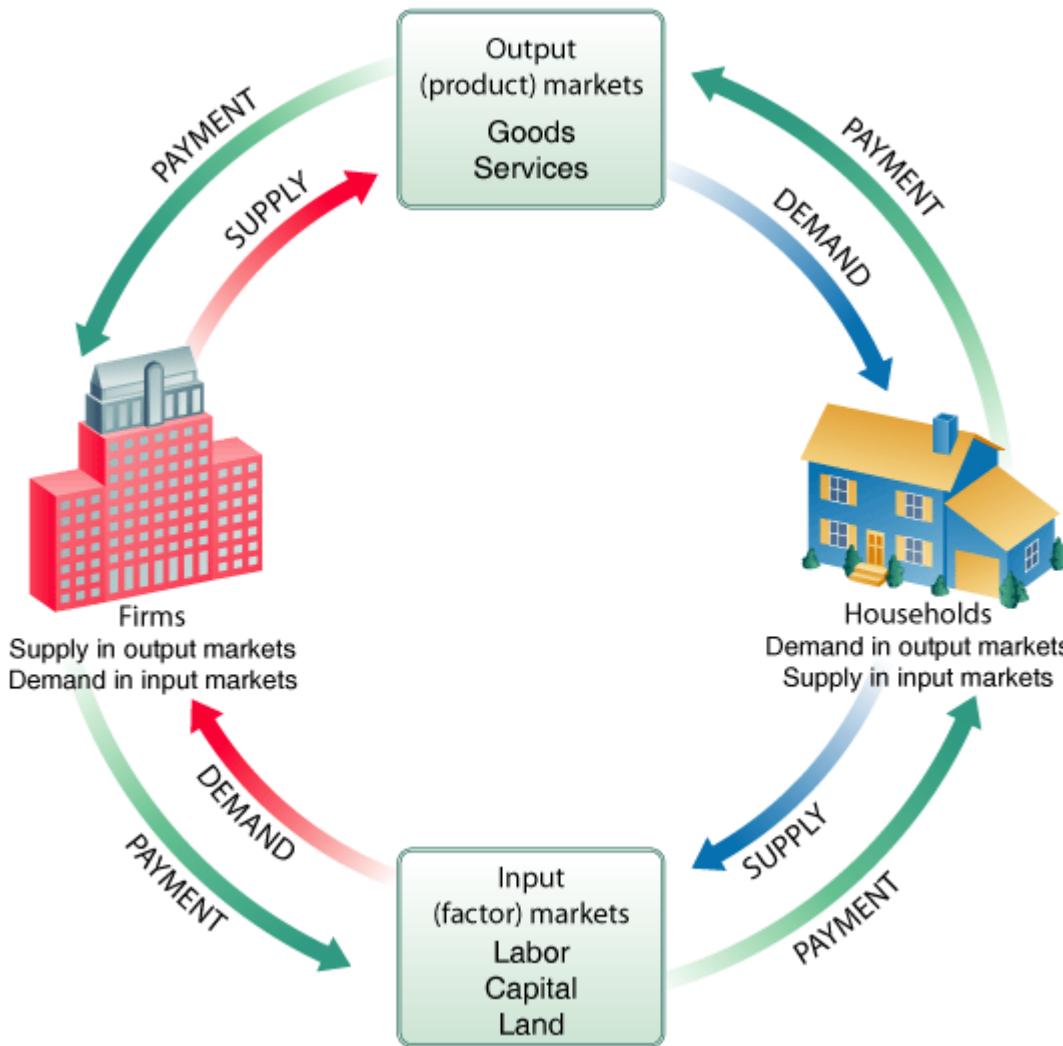


FIGURE 3.1 The Circular Flow of Economic Activity

INPUT MARKETS AND OUTPUT MARKETS: THE CIRCULAR FLOW (Output/ Input Markets)

product or output markets

The markets in which goods and services are exchanged.

In output markets, firms *supply* and households *demand*.

input or factor markets

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

Firms buy inputs from households, which supply these inputs.

The Circular Flow of Economic Activity

- **FIG 3.1: The Circular Flow of Economic Activity**
 - Diagrams like this one show the circular flow of economic activity, hence the name *circular flow diagram*.
- **Here goods and services flow clockwise:** Labor services supplied by households flow to firms, and goods and services produced by firms flow to households.
- **Payment (usually money) flows in the opposite (counterclockwise) direction:** Payment for goods and services flows from households to firms, and payment for labor services flows from firms to households.

CHAPTER 3: Demand, Supply, and Market Equilibrium

INPUT MARKETS AND OUTPUT MARKETS: THE CIRCULAR FLOW

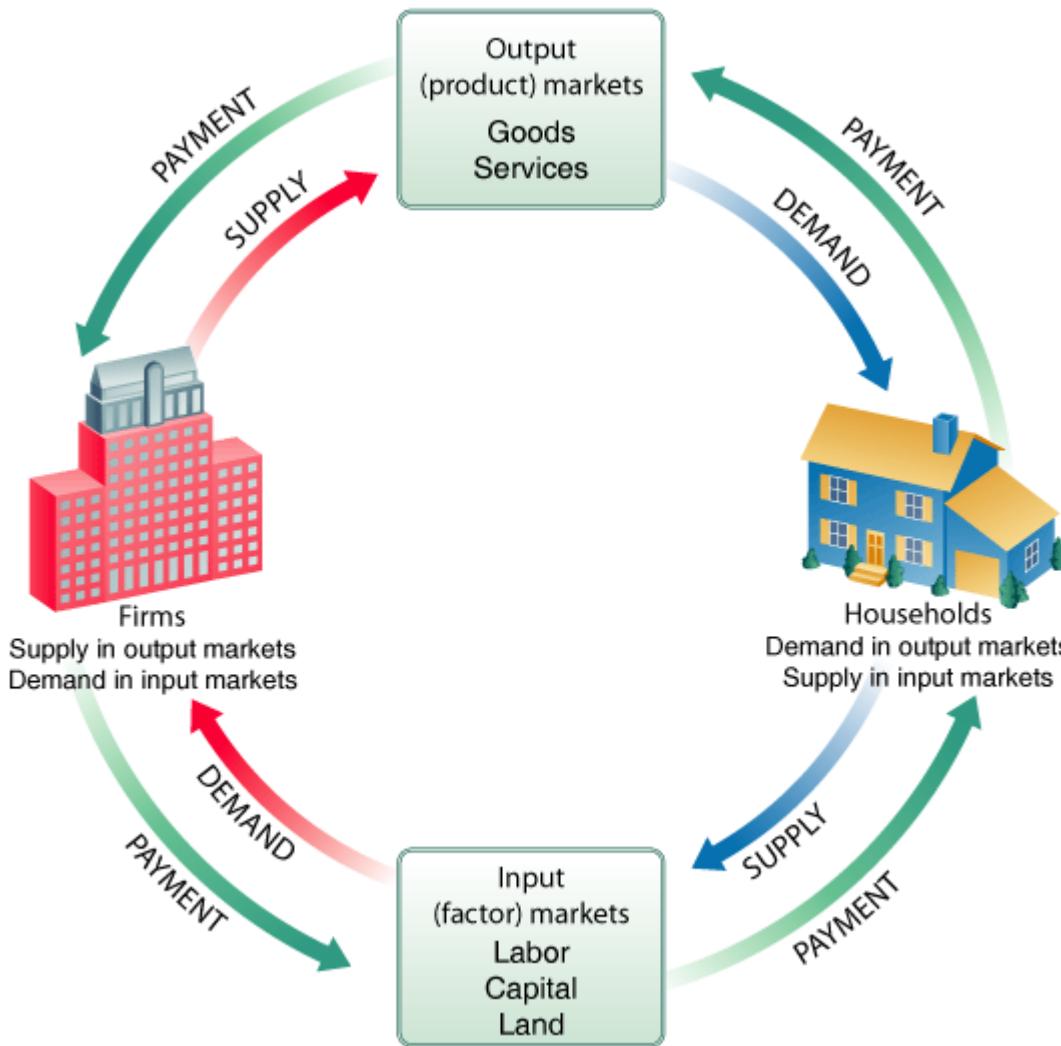


FIGURE 3.1 The Circular Flow of Economic Activity

Labor-Capital-Land Market

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.

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.

Household Income

- **The supply of inputs and their prices ultimately determine household income.**
 - Thus, **the amount of income a household earns** depends on the **decisions it makes concerning what types of inputs it chooses to supply.**

Input and output markets are connected

- **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

How market prices are determined: Through DD & SS

- The following **analysis of demand and supply** will lead up to a **theory of how market prices are determined**.
- Prices are determined by the interaction between demanders and suppliers.
- To understand this interaction, we first need to know how product prices influence the behavior of demanders and suppliers separately (IMP).

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**

1. 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.

CHANGES IN QUANTITY DEMANDED VERSUS CHANGES IN DEMAND

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

- For this reason, we need to begin our discussion by **analyzing the likely response of households to changes in price** using the device of *ceteris paribus*, or “all else equal.”
 - That is, **we will attempt to derive a relationship between the quantity demanded of a good per time period and the price of that good, holding income, wealth, other prices, tastes, and expectations constant**

Quantity demanded vs demand

- 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.

Price changes vs change in other factors

- It is very important to distinguish between **price changes**, which affect the quantity of a good demanded, and changes in **other factors (such as income)**, which change the entire relationship between price and quantity.
 - For example, if a family begins earning a higher income, it might buy more of a good at every possible price.

DEMAND IN PRODUCT/OUTPUT MARKETS

PRICE AND QUANTITY DEMANDED: THE LAW OF DEMAND

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

TABLE 3.1 Anna's 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

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

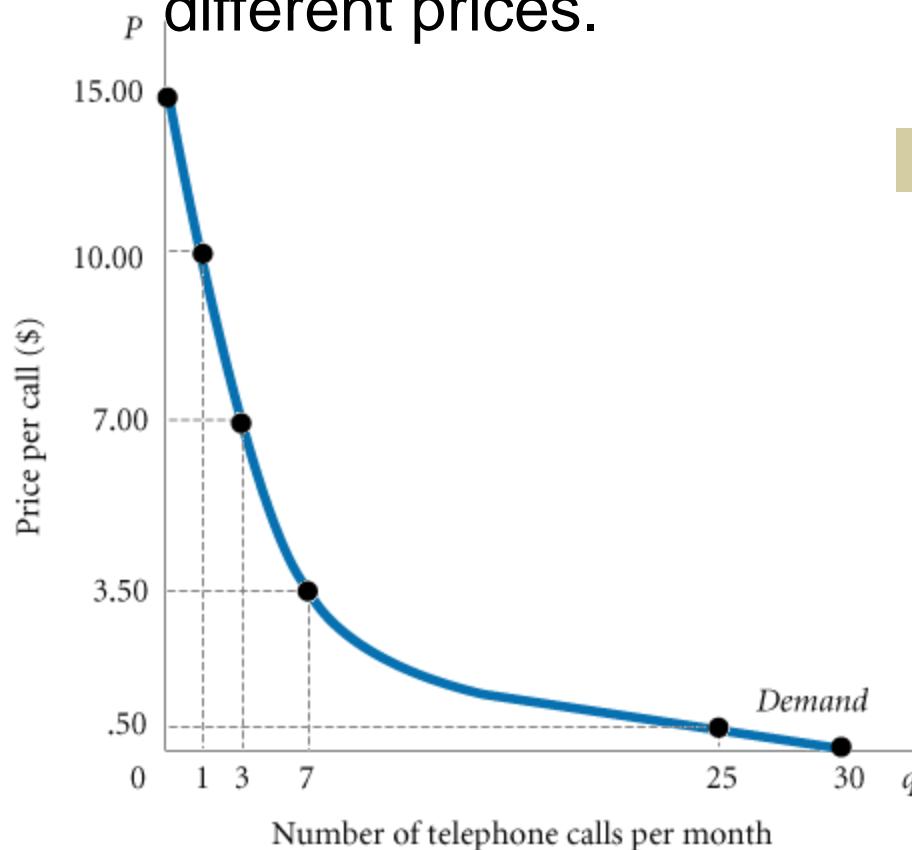


FIGURE 3.2 Anna's Demand Curve

DEMAND IN PRODUCT/OUTPUT MARKETS

**Demand Curves Slope Downward:
Negative relationship between price & quantity**

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

▪**This negative relationship between price and quantity demanded is often referred to as the law of demand, a term first used by economist Alfred Marshall**

Why demand curves slope downward: Concept of Utility

- Economists use the concept of utility to explain the slope of the demand curve.
- Presumably, we consume goods and services because they give us utility or satisfaction.
 - As we consume more of a product within a given period of time, **it is likely that each additional unit consumed will yield successively less satisfaction.**
 - The utility you gain from a second ice cream cone is likely to be less than the utility you gained from the first, the third is worth even less, and so on

Law of diminishing marginal utility- Downward slope of DD curve

- This law of diminishing marginal utility is an important concept in economics.
 - If each successive unit of a good is worth less to you, you are not going to be willing to pay as much for it.
- Thus, it is reasonable to expect a downward slope in the demand curve for that good

Example:

- **Example:** Luis lives and works in Mexico City.
 - His elderly mother lives in Santiago, Chile. Last year the airlines servicing South America got into a price war, and the price of flying between Mexico City and Santiago dropped from 20,000 pesos to 10,000 pesos.
 - **How might Luis's behavior change? [Initial: 3 Visits]**
- First, **he is better off.**
 - Last year he flew home to Chile three times at a total cost of 60,000 pesos.
 - This year he can fly to Chile the same number of times, buy exactly the same combination of other goods and services that he bought last year, and have 30,000 pesos left over.
 - **Because he is better off—his income can buy more—he may fly home more frequently.**

- Second, the opportunity cost of flying home has changed
 - Before the price war, Luis had to sacrifice 20,000 pesos worth of other goods and services each time he flew to Chile.
 - After the price war, he must sacrifice only 10,000 pesos worth of other goods and services for each trip.
 - The tradeoff has changed.
- Both of these effects are likely to lead to a higher quantity demanded in response to the lower price.

In sum:

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.

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:

Summary

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**.

OTHER DETERMINANTS OF HOUSEHOLD DEMAND

1. Income and Wealth

1. 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.

We must specify a time period for it—*income per month or per year.*

wealth or net worth

The total value of what a household owns minus what it owes. It is a stock measure.

It is measured at a given point in time

Income and Wealth On Demand

- Households with higher incomes and higher accumulated savings or inherited wealth can afford to **buy more goods and services.**
- In general, we would expect higher demand at higher levels of income/wealth and lower demand at lower levels of income/wealth.

DEMAND IN PRODUCT/OUTPUT MARKETS: Normal & Inferior Goods

normal goods:

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

Example - Movie tickets, restaurant meals, telephone calls, and shirts are all normal goods

inferior goods:

Goods for which demand tends to fall when income rises.

Example - Transportation provides a good example. When income is low, it makes sense to ride the bus

OTHER DETERMINANTS OF HOUSEHOLD DEMAND

2. 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 goes up.

Example- Domino's vs Pizza Hut

To be substitutes, two products do not need to be identical.

perfect substitutes

Identical products.

Example - Coke and Pepsi

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.

Example - the demand for one good (printers) generates demand for the other (ink cartridges), cars and gasoline

OTHER DETERMINANTS OF HOUSEHOLD DEMAND:

3. 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.
 - You know that you cannot afford to rent an apartment at \$1,200 per month if your monthly income is only \$400, **but within these constraints, you are more or less free to choose what to buy.**
- **Your final choice depends on your individual tastes and preferences.**
 - Example – Coke/Pepsi; Domino's/Pizza-Hut

Difficult to generalize about tastes & preferences

- 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: Five years ago more people smoked cigarettes and fewer people had computers.
- Second, tastes are idiosyncratic(distinctive): Some people like to text, whereas others still prefer to use e-mail; some people prefer dogs, whereas others are crazy about cats. Some eat fried cockroaches. The diversity of individual demands is almost infinite.

OTHER DETERMINANTS OF HOUSEHOLD DEMAND:

4. Expectations

- **What you decide to buy today** certainly **depends on today's prices and your current income and wealth.**
 - You also have **expectations about what your position will be in the future.**
 - You may have **expectations about future changes in prices too, and these may affect your decisions today.**
- There are many **examples of the ways expectations affect demand.**
 - **When people buy a house or a car,** they often must borrow part of the purchase price and repay it over a number of years.
 - **In deciding what kind of house or car to buy,** they presumably must think about their income today, **as well as what their income is likely to be in the future**

Imp.

- For the time being, however, it is important to understand that demand depends on more than just *current* incomes, prices, and tastes.

SHIFT OF DEMAND VERSUS MOVEMENT ALONG A DEMAND CURVE

- Demand curves are derived while holding income, tastes, and other prices constant.
 - **If income, tastes, or other prices change, we would have to derive an entirely new relationship between price and quantity.**

SHIFT OF DEMAND VERSUS MOVEMENT ALONG A DEMAND CURVE

TABLE 3.2 Shift of Anna's Demand Schedule Due to increase in Income

Price (Per Call)	SCHEDULE D ₀	SCHEDULE D ₁
	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	30	35
.50	25	33
3.50	7	18
7.00	3	12
10.00	1	7
15.00	0	2
20.00	0	0

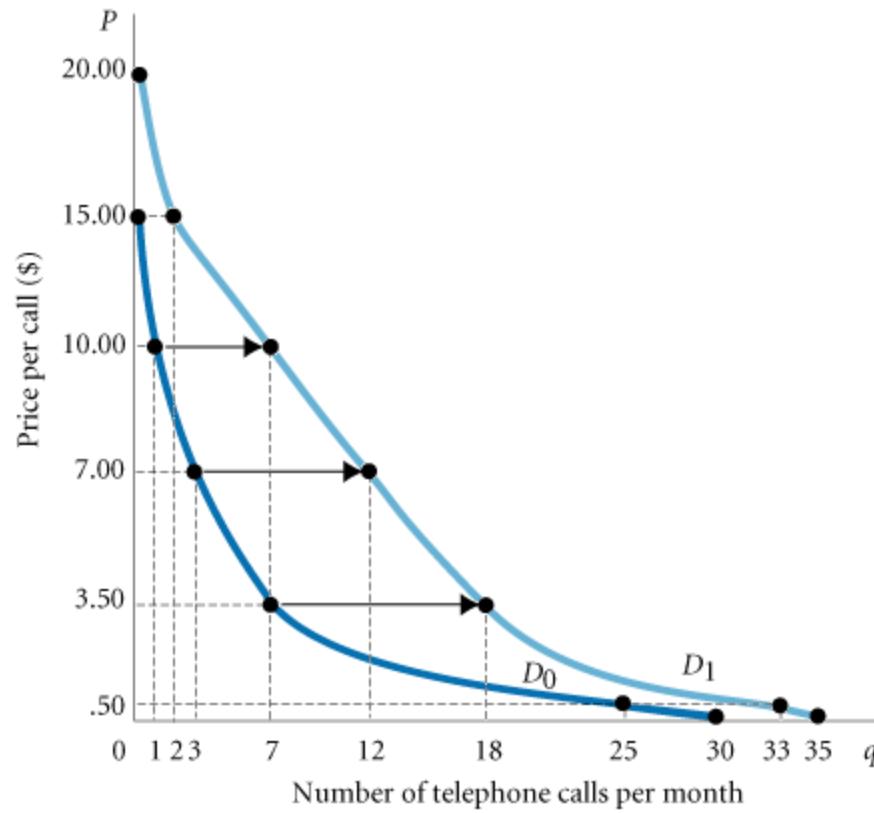
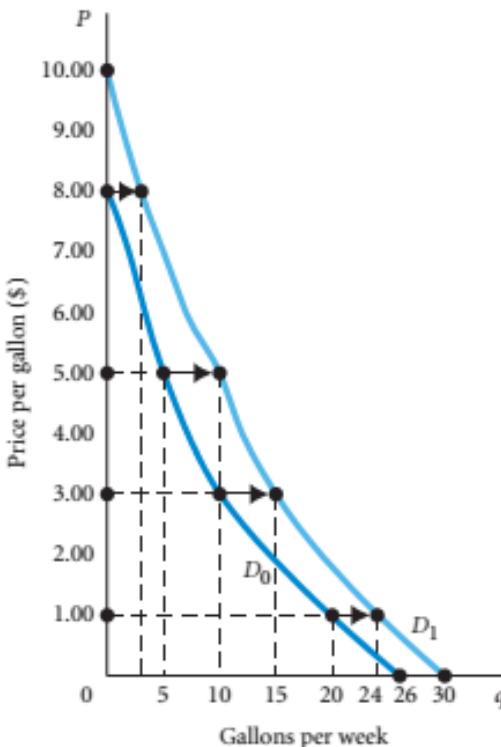


FIGURE 3.3 Shift of a Demand Curve Following a Rise in Income

CHAPTER 3: Demand, Supply, and Market Equilibrium

TABLE 3.2 Shift of Alex's Demand Schedule Due to an Increase in Income

Price (per Gallon)	Schedule D_0	Schedule D_1
	Quantity Demanded (Gallons per Week at an Income of \$500 per Week)	Quantity Demanded (Gallons per Week at an Income of \$700 per Week)
\$8.00	0	3
7.00	2	5
6.00	3	7
5.00	5	10
4.00	7	12
3.00	10	15
2.00	14	19
1.00	20	24
0.00	26	30



▲ FIGURE 3.3 Shift of a Demand Curve Following a Rise in Income

When the price of a good changes, we move *along* the demand curve for that good. When any other factor that influences demand changes (income, tastes, and so on), the relationship between price and quantity is different; there is a *shift* of the demand curve, in this case from D_0 to D_1 . Gasoline is a normal good.

SHIFT OF DEMAND VERSUS MOVEMENT ALONG A DEMAND CURVE: Summary

Shift of a Demand Curve Following a Rise in Income

- When the price of a good changes, we move along the demand curve for that good.
- When any other factor that influences demand changes (income, tastes, and so on), the relationship between price and quantity is different; there is a shift of the demand curve
- Gasoline is a normal good

SHIFT OF DEMAND VERSUS MOVEMENT ALONG A DEMAND CURVE: Summary

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).

CHAPTER 3: Demand, Supply, and Market Equilibrium

Shifts versus Movement along a Demand Curve: Example with graph

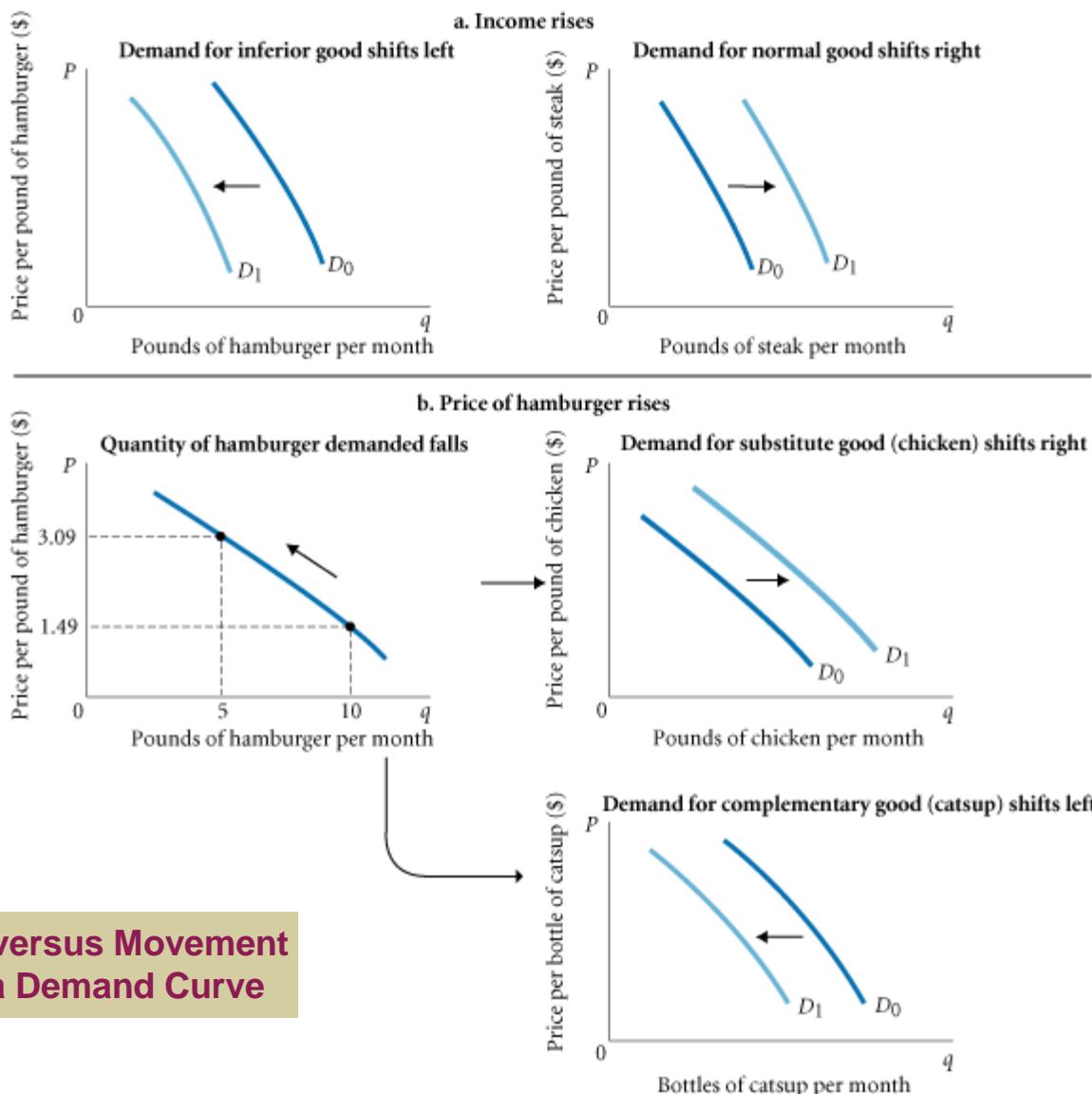


FIGURE 3.4 Shifts versus Movement along a Demand Curve

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.

CHAPTER 3: Demand, Supply, and Market Equilibrium

Deriving Market Demand from Individual Demand Curves

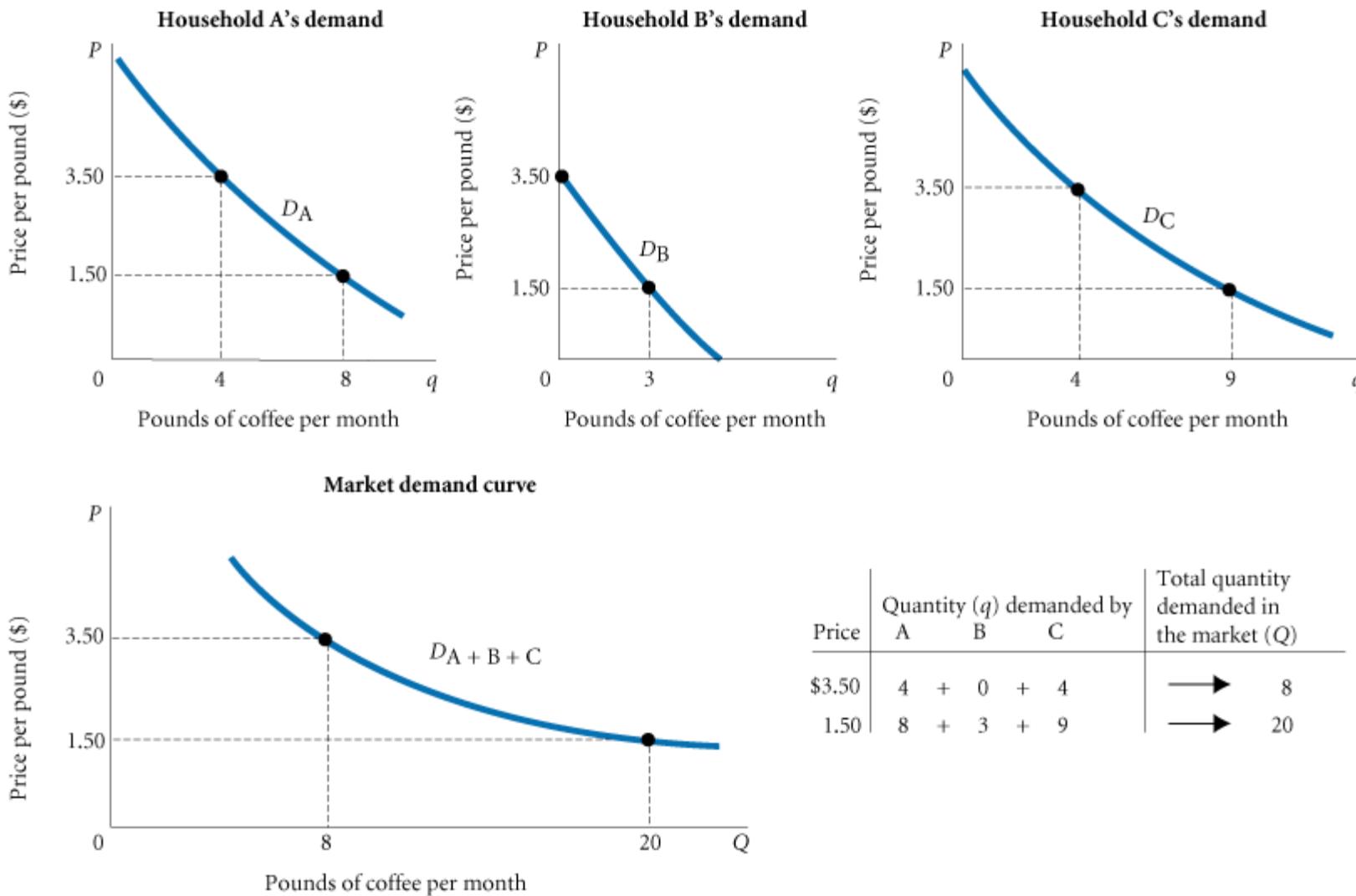


FIGURE 3.5 Deriving Market Demand from Individual Demand Curves

Market Demand

- Thus, the market demand curve takes its shape and position from the shapes, positions, and number of individual demand curves.
 - If more people decide to shop in a market, more demand curves must be added and the market demand curve will shift to the right.
- Market demand curves may also shift as a result of preference changes, income changes, or changes in the number of demanders.
- An interesting fact about the market demand curve in Figure 3.5 is that at different prices, not only the number of people demanding the product may change but also the type of people demanding the product.

SUPPLY IN PRODUCT/OUTPUT MARKETS

Why Supply?

Firms supply goods and services because they believe it will be profitable to do so.

- Supply decisions thus depend on profit potential.
 - Because profit is the difference between revenues and costs, supply is likely to react to
 - changes in revenues and
 - changes in production costs.

SUPPLY IN PRODUCT/OUTPUT MARKETS: Profit

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.

Firm: Revenue & Cost of Production

- **The amount of revenue that a firm earns depends on**
 - **what the price of its product in the market is &**
 - **how much it sells.**
- **Costs of production depend on many factors**, the most important of which are
 - **(1) the kinds of inputs needed to produce the product,**
 - **(2) the amount of each input required, and**
 - **(3) the prices of inputs.**

SUPPLY IN PRODUCT/OUTPUT MARKETS

PRICE AND QUANTITY SUPPLIED: THE LAW OF SUPPLY [4 Defn]

1. 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 IN PRODUCT/OUTPUT MARKETS

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

TABLE 3.3 Clarence Brown's Supply Schedule for Soybeans

PRICE (PER BUSHEL)	QUANTITY SUPPLIED (BUSHELS PER MONTH)
\$1.50	0
1.75	10,000
2.25	20,000
3.00	30,000
4.00	45,000
5.00	45,000

From the SS Schedule: Why no prod for P < \$1.5

- If the market paid \$1.50 or less for a bushel for soybeans, **Brown would not supply any soybeans:**
 - When Farmer Brown looks at the costs of growing soybeans, including the opportunity cost of his time and land, **\$1.50 per bushel will not compensate him for those costs**
- **The higher price may justify shifting land from wheat to soybean production or putting previously fallow land into soybeans, or it may lead to more intensive farming of land already in soybeans, using expensive fertilizer or equipment that was not cost justified at the lower price**

SUPPLY IN PRODUCT/OUTPUT MARKETS

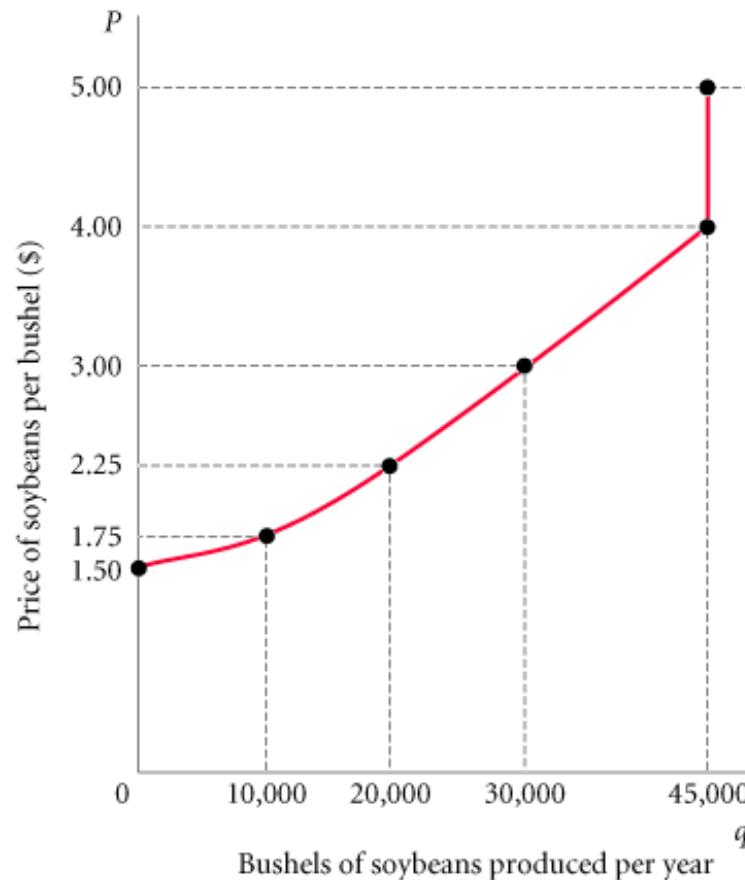
3. law of supply The positive relationship between price and quantity of a good supplied: An increase in market price will lead to an increase in quantity supplied, and a decrease in market price will lead to a decrease in quantity supplied.

An increase in market price, *ceteris paribus*, to lead to an increase in quantity supplied

SUPPLY IN PRODUCT/OUTPUT MARKETS

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

FIGURE 3.6 Clarence Brown's Individual Supply Curve



From the SS Schedule:

Why no increase in prod for P > \$4

- Note in Brown's supply schedule, however, that when price rises from \$4 to \$5, quantity supplied no longer increases.
 - Often an individual firm's ability to respond to an increase in price is constrained by its existing scale of operations, or capacity, in the short run.
- For example, Brown's ability to produce more soybeans depends on the size of his farm, the fertility of his soil, and the types of equipment he has.
 - The fact that output stays constant at 45,000 bushels per year suggests that he is running up against the limits imposed by the size of his farm, the quality of his soil, and his existing technology

From the SS Schedule:

Why no increase in prod for $P > \$4$ [But in the long run]

- In the longer run, however, Brown may acquire more land or technology may change, allowing for more soybean production.
- Here it is important only to understand that time plays a critical role in supply decisions.
 - When prices change, firms' immediate response may be different from what they are able to do after a month or a year.
- Imp:
 - Short-run and long-run supply curves are often different.

- **Imp:**
 - Once farmers have produced in any given season, they cannot change their minds and produce more, of course.
 - When we derived Clarence Brown's supply schedule in Table 3.3, we imagined him reacting to prices that existed at the time he decided how much land to plant in soybeans.
 - In Figure 3.9, the upward slope shows that higher prices justify shifting land from other crops.
 - Final price may not be determined until final production figures are in.

- For our purposes here, however, we have ignored this timing problem.
 - The best way to think about it is that demand and supply are flows, or rates, of production—that is, we are talking about the number of bushels produced per production period.
 - Adjustments in the rate of production may take place over a number of production periods.

SUPPLY IN PRODUCT/OUTPUT MARKETS

OTHER DETERMINANTS OF SUPPLY

2. The Cost of Production

Regardless of the price that a firm can command for its product, revenue must exceed the cost of producing the output for the firm to make a profit.

- As an individual producer, like **Farmer Brown**, thinks about how much to supply at a particular price, the producer will be looking at his or her costs.
 - **Brown's supply decision is likely to change in response to changes in the cost of production.**

Factor affecting Cost of production

- **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).**
- **Technological change** can have an enormous impact on the cost of production over time.
 - **Consider agriculture.**
 - The introduction of fertilizers, the development of complex farm machinery, and the use of bioengineering to increase the yield of individual crops have all powerfully affected the cost of producing agricultural products.
 - **When a technological advance lowers the cost of production, output is likely to increase.**
 - **When yield per acre increases,** individual farmers can and do produce more

SUPPLY IN PRODUCT/OUTPUT MARKETS

3. The Prices of Related Products



The Prices of Related Products: Example

- **Firms often react to changes in the prices of related products.**
- For example, **if land can be used for either corn or soybean production, an increase in soybean prices may cause individual farmers to shift acreage out of corn production into soybeans.**
 - Thus, **an increase in soybean prices actually affects the amount of corn supplied.**

SS depends on [Summary]

- 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**

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.

When factors other than price cause supply curves to shift, we say that there has been a **change in supply**

CHAPTER 3: Demand, Supply, and Market Equilibrium

Shift of Supply Curve for Soybeans Following Development of a New Seed Strain

TABLE 3.4 Shift of Supply Schedule for Soybeans Following Development of a New Disease-Resistant Seed Strain

	SCHEDULE D ₀	SCHEDULE D 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

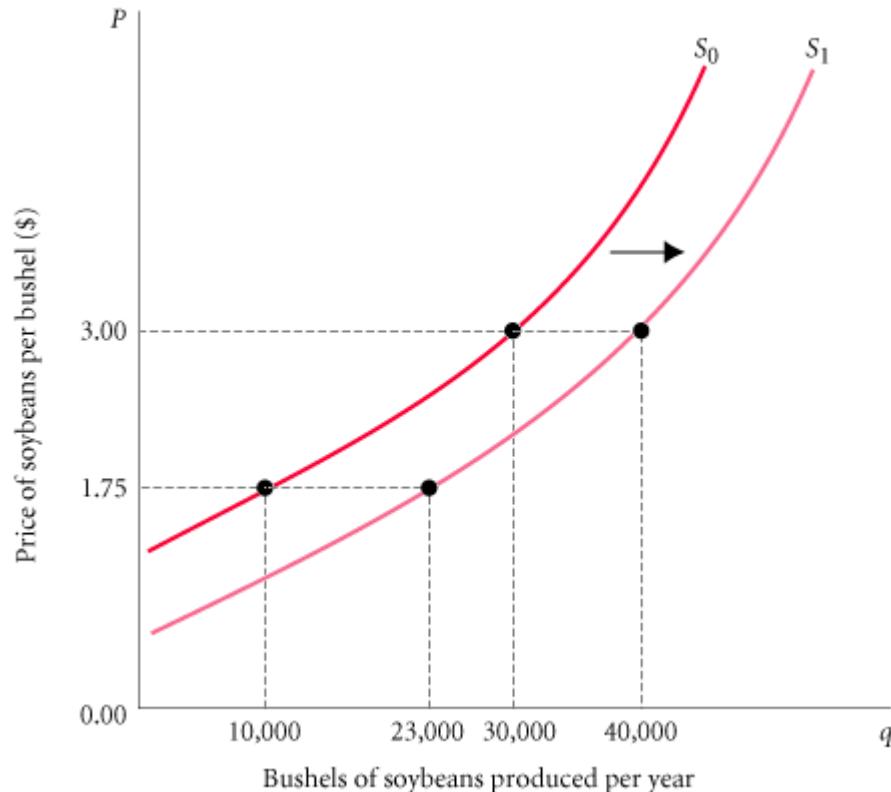


FIGURE 3.7 Shift of Supply Curve for Soybeans Following Development of a New Seed Strain

SS curve shift & Input Prices

- Increases in input prices may also cause supply curves to shift.
 - If Farmer Brown faces higher fuel costs, for example, his supply curve will shift to the left — that is, he will produce less at any given market price

SHIFT OF SUPPLY VERSUS MOVEMENT ALONG A SUPPLY CURVE: Summary

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 costs, input prices, technology, or prices of related goods and services

leads to

→ **Change in *supply* (shift of a supply curve).**

FROM INDIVIDUAL SUPPLY TO MARKET SUPPLY

market supply

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

CHAPTER 3: Demand, Supply, and Market Equilibrium

Deriving Market Supply from Individual Firm Supply Curves

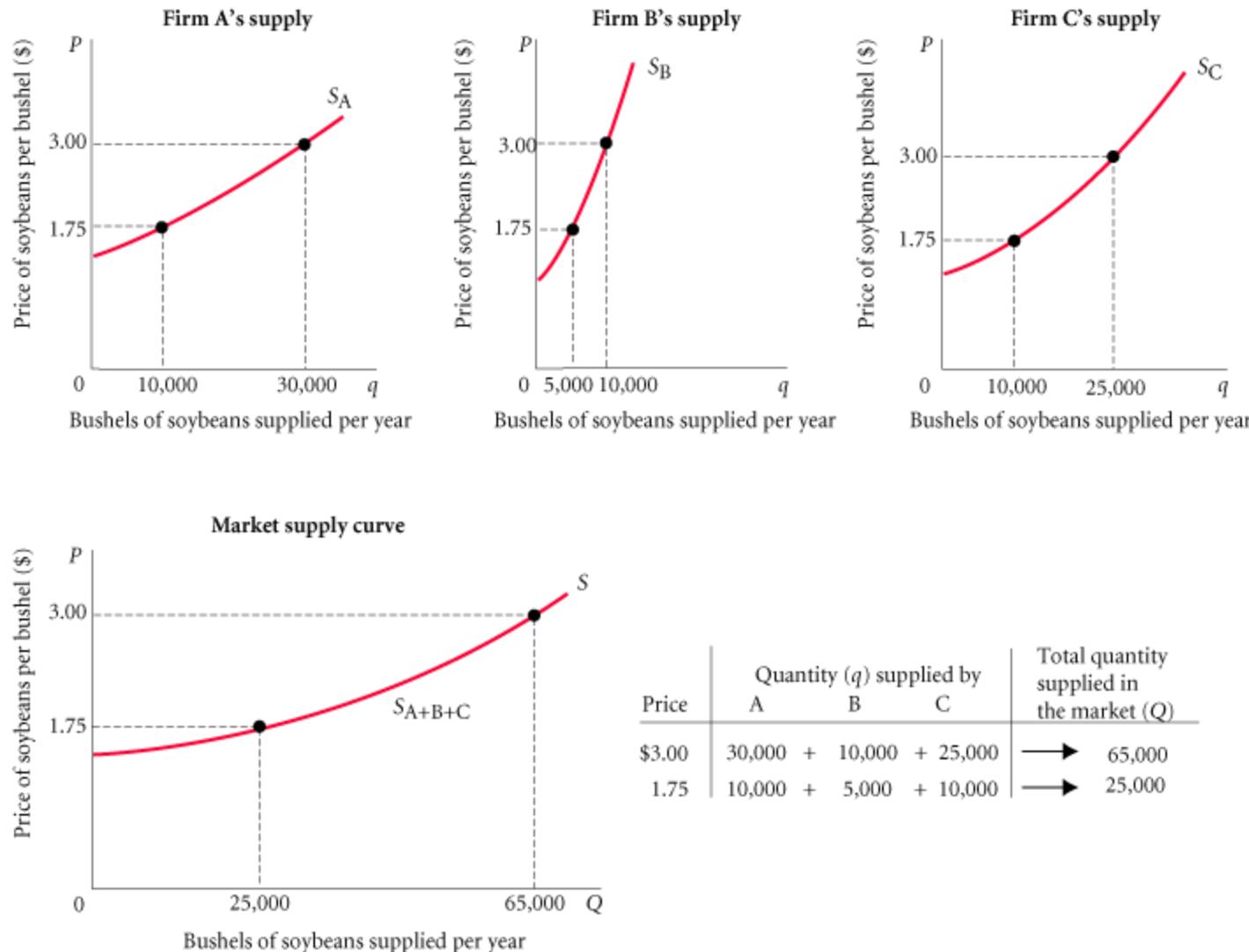


FIGURE 3.8 Deriving Market Supply from Individual Firm Supply Curves

The position and shape of the market supply curve

- The position and shape of the market supply curve depends on the positions and shapes of the individual firms' supply curves from which it is derived.
- The market supply curve also depends on the number of firms that produce in that market.
 - If firms that produce for a particular market are earning high profits, other firms may be tempted to go into that line of business.
- When new firms enter an industry, the supply curve shifts to the right.
 - When firms go out of business, or “exit” the market, the supply curve shifts to the left.

MARKET EQUILIBRIUM

- **The operation of the market, however, clearly depends on the interaction between suppliers and demanders.**

Three conditions of Market

- At any moment, one of three conditions prevails in every market:
 - (1) The quantity demanded exceeds the quantity supplied at the current price, a situation called **excess demand;**
 - (2) the quantity supplied exceeds the quantity demanded at the current price, a situation called **excess supply;** or
 - (3) the quantity supplied equals the quantity demanded at the current price, a situation called **equilibrium.**
 - At equilibrium, no tendency for price to change exists

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.

MARKET EQUILIBRIUM

EXCESS DEMAND

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

- When excess demand occurs in an unregulated market, there is a tendency for price to rise as **demanders compete against each other for the limited supply.**
 - The adjustment mechanisms may differ, but the outcome is always the same.

ED – Price will Rise (Auction)

- For example, **consider the mechanism of an auction**.
 - In an auction, items are sold directly to the highest bidder.
 - When the auctioneer starts the bidding at a low price, many people bid for the item.
 - At first, there is a shortage: Quantity demanded exceeds quantity supplied.
 - As would-be buyers offer higher and higher prices, bidders drop out until the one who offers the most ends up with the item being auctioned.
- **Price rises until quantity demanded and quantity supplied are equal**.

CHAPTER 3: Demand, Supply, and Market Equilibrium

MARKET EQUILIBRIUM

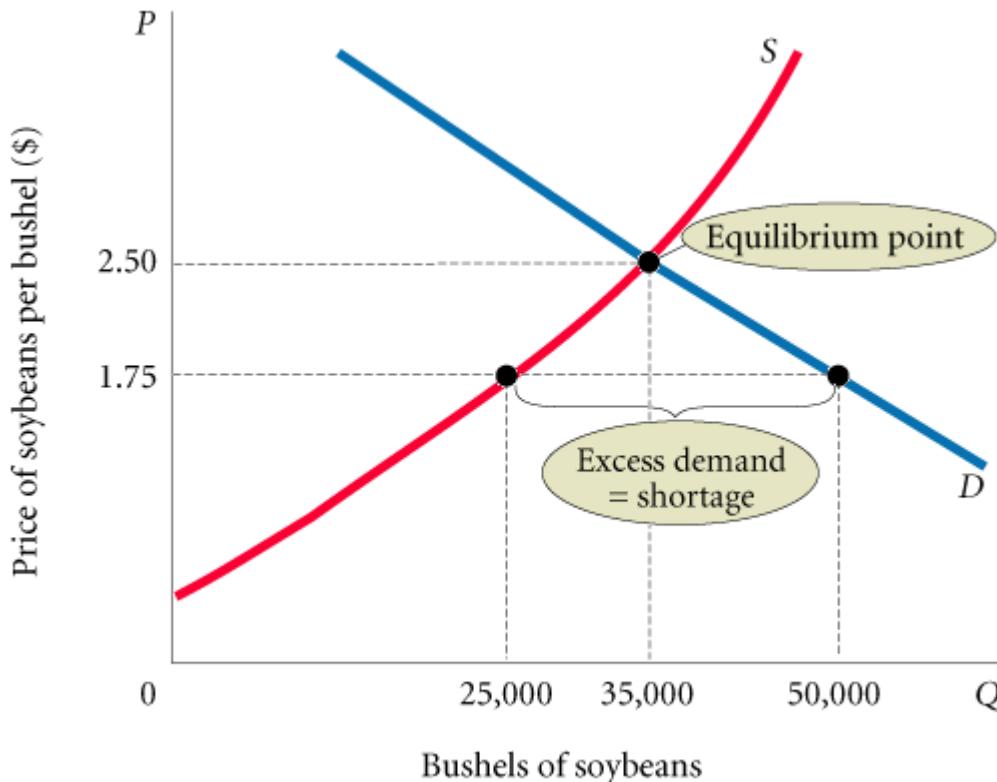


FIGURE 3.9 Excess Demand, or Shortage

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.

From Fig 3.9:

- **At a price of \$1.75, farmers produce soybeans at a rate of 25,000 bushels per year, but at that price, the demand is for 50,000 bushels.**
 - Most farm products are sold to local dealers who in turn sell large quantities in major market centers, where **bidding would push prices up if quantity demanded exceeded quantity supplied.**
- **As price rises above \$1.75, two things happen:**
 - (1) **The quantity demanded falls** as buyers drop out of the market and perhaps **choose a substitute**, and
 - (2) **the quantity supplied increases** as farmers find themselves receiving a higher price for their product and **shift additional acres into soybean production**
 - This process continues until the **shortage is eliminated.**
 - In Figure 3.9, **this occurs at \$2.50**, where **quantity demanded has fallen from 50,000 to 35,000 bushels per year and quantity supplied has increased from 25,000 to 35,000 bushels per year.**

From Fig 3.9:

- At price \$2.5:
 - When quantity demanded and quantity supplied are equal and there is no further bidding, the process has achieved an equilibrium, a situation in which there is no natural tendency for further adjustment.
 - Graphically, the point of equilibrium is the point at which the supply curve and the demand curve intersect

Price Rationing

- 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.
 - This process is called price rationing.
- When a shortage exists, some people will be satisfied and some will not.
 - When the market operates without interference, price increases will distribute what is available to those who are willing and able to pay the most.
- As long as there is a way for buyers and sellers to interact, those who are willing to pay more will make that fact known somehow

MARKET EQUILIBRIUM

EXCESS SUPPLY

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

CHAPTER 3: Demand, Supply, and Market Equilibrium

MARKET EQUILIBRIUM

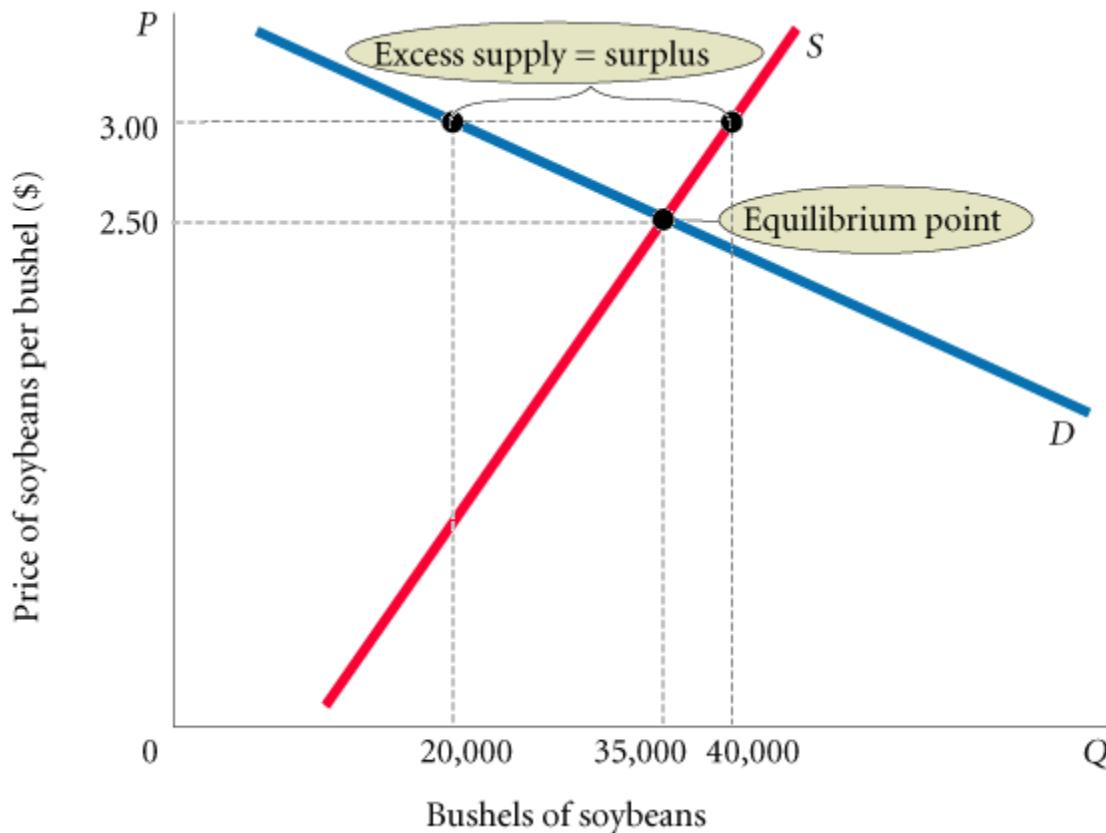


FIGURE 3.10 Excess Supply, or Surplus

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.

Other Example of Excess Supply

- Although oil prices rose to record levels in 2008, back in 2001, crude oil production worldwide exceeded the quantity demanded and prices fell significantly as competing producer countries tried to maintain their share of world markets.
- Although the mechanism by which price is adjusted is different for automobiles, housing, soybeans, and crude oil, the outcome is the same:
 - **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.

CHAPTER 3: Demand, Supply, and Market Equilibrium

MARKET EQUILIBRIUM

CHANGES IN EQUILIBRIUM

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

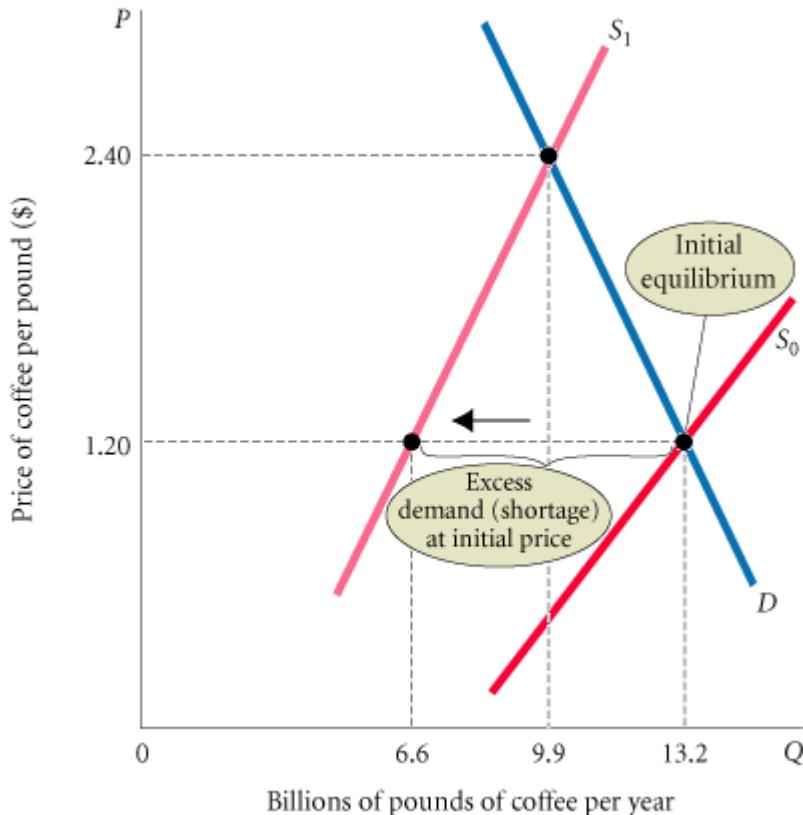


FIGURE 3.11 The Coffee Market: A Shift of Supply and Subsequent Price Adjustment

CHANGES IN EQUILIBRIUM:

The Coffee Market

- **South America is a major producer of coffee beans.**
 - A cold snap there can reduce the coffee harvest enough to affect the world price of coffee beans.
 - In the mid-1990s, **a major freeze hit Brazil and Colombia** and drove up the price of coffee on world markets to a record \$2.40 per pound.
 - Severe hurricanes in the Caribbean caused a similar shift of supply in 2005.
- **The freeze caused a decrease in the supply of coffee beans.**
 - That is, **the freeze caused the supply curve to shift to the left.**

CHANGES IN EQUILIBRIUM: The Coffee Market – Shift in SS curve

- In Figure 3.11, **the new supply curve** is labeled
 - At the initial equilibrium price, \$1.20, **there is now a shortage of coffee**. If the price were to remain at \$1.20, **quantity demanded would not change**; it would remain at 13.2 billion pounds
 - However, at that price, **quantity supplied would drop to 6.6 billion pounds**.
 - At a price of \$1.20, **quantity demanded is greater than quantity supplied**.
- **When excess demand exists in a market, price can be expected to rise**, and rise it did.
 - As the figure shows, price rose to a **new equilibrium at \$2.40**.
 - At \$2.40, **quantity demanded is again equal to quantity supplied**, this time at 9.9 billion pounds — the point at which the new supply curve (S1) intersects the demand curve.

CHAPTER 3: Demand, Supply, and Market Equilibrium

MARKET EQUILIBRIUM

CHANGES IN EQUILIBRIUM

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

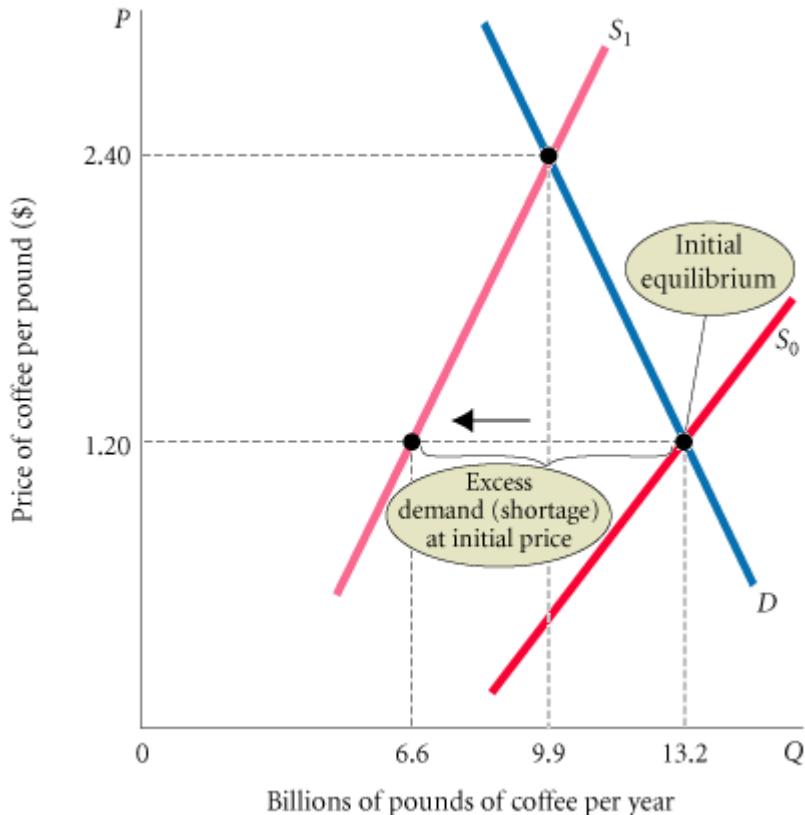


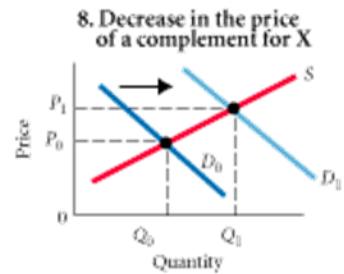
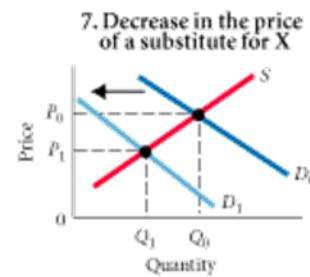
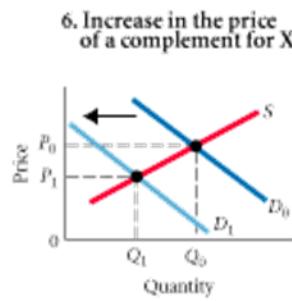
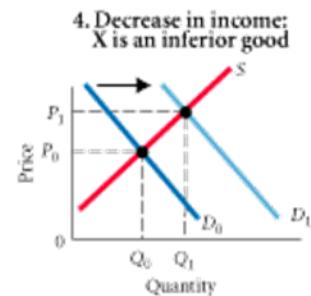
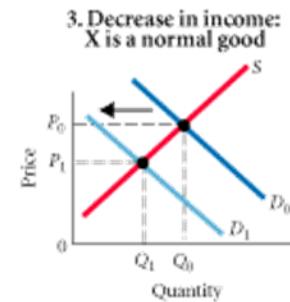
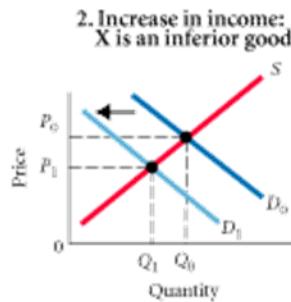
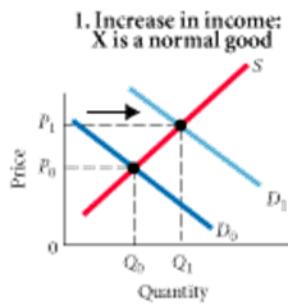
FIGURE 3.11 The Coffee Market: A Shift of Supply and Subsequent Price Adjustment

The Coffee Market – As Price increases, two things happened

- Notice that as the price of coffee rose from \$1.20 to \$2.40, two things happened.
 - First, the quantity demanded declined (a movement along the demand curve) as people shifted to substitutes such as tea and hot cocoa.
 - Second, the quantity supplied began to rise, but within the limits imposed by the damage from the freeze. (It might also be that some countries or areas with high costs of production, previously unprofitable, came into production and shipped to the world market at the higher price.)
 - That is, the quantity supplied increased in response to the higher price along the new supply curve, which lies to the left of the old supply curve.
- The final result was a higher price (\$2.40), a smaller quantity finally exchanged in the market (9.9 billion pounds), and coffee bought only by those willing to pay \$2.40 per pound.

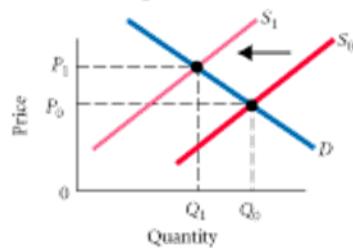
FIGURE 3.12 Examples of Supply and Demand Shifts for Product X

a. Demand shifts

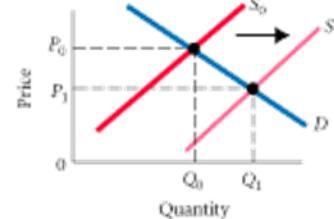


b. Supply shifts

9. Increase in the cost
of production of X



10. Decrease in the cost
of production of X

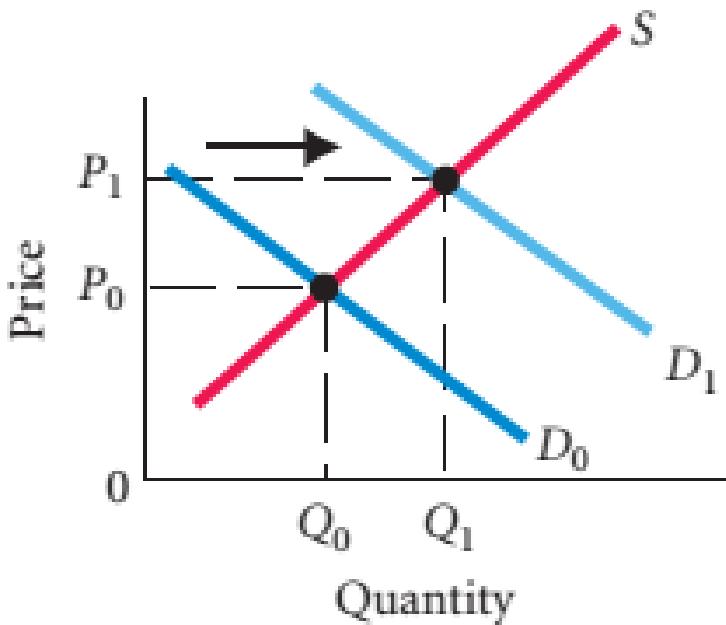


MARKET EQUILIBRIUM: Examples of Supply and Demand Shifts for Product X

CHAPTER 3: Demand, Supply, and Market Equilibrium

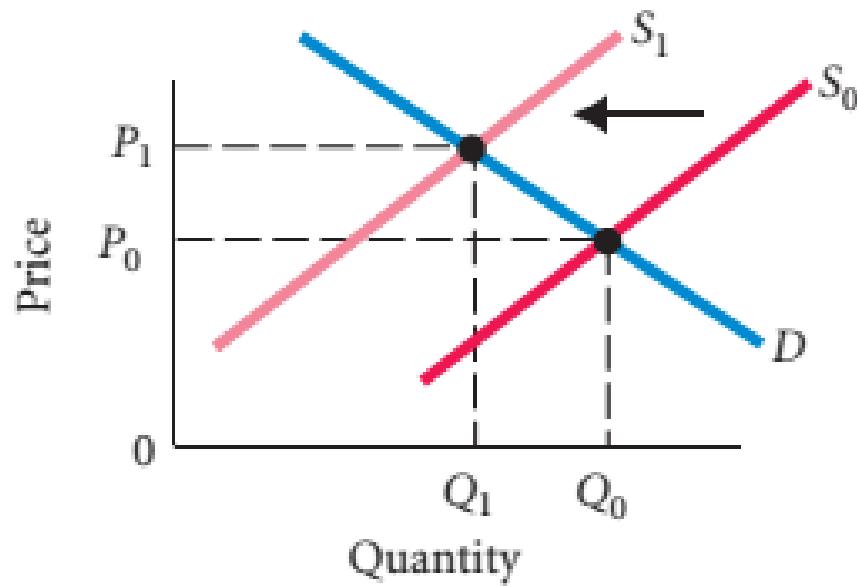
a. Demand shifts

1. Increase in income:
X is a normal good



b. Supply shifts

9. Increase in the cost of production of X



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.
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.

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; they 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.

ECONOMICS IN PRACTICE

Have You Bought This Textbook?

One might think that the total number of textbooks, used plus new, should match class enrollment. After all, the text is required!

Economists found that the higher the textbook price, the more text sales fell below class enrollments.

Students found substitutes when textbook prices were high.



THINKING PRACTICALLY

1. If you were to construct a demand curve for a required text in a course, where would that demand curve intersect the horizontal axis?
2. In the year before a new edition of a text is published, many college bookstores will not buy the older edition. Given this fact, what do you think happens to the gap between enrollments and new plus used book sales in the year before a new edition of a text is expected?

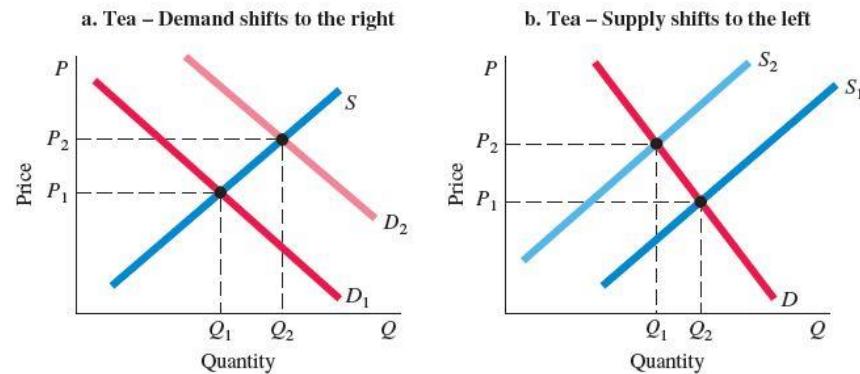
ECONOMICS IN PRACTICE

People Drink Tea on Rainy Days

Tea is a popular beverage among Asians, Americans, and Europeans, especially during rainy seasons.

But some economists recently found that the choices were heavily influenced by temporary weather changes, production, and other factors in the region.

While tea has become a common health drink only some countries have a suitable climate to grow tea leaves. Thus, a fall in supply outweighs the increase in demand, leading to an increase in equilibrium price, but a decrease in equilibrium quantity.



THINKING PRACTICALLY

1. When demand and supply curves shift simultaneously, what would be the factors that determine the magnitude of the changes in equilibrium price and quantity?

ECONOMICS IN PRACTICE

Quinoa

Quinoa, a high-protein grain, was once eaten mostly by people in Peru and Bolivia.

Growth in vegetarianism shifted the demand curve for quinoa to the right, resulting in higher prices.

Despite new farmer entry in response to higher quinoa prices, the particular nature of the production process limited the amount of the shift.

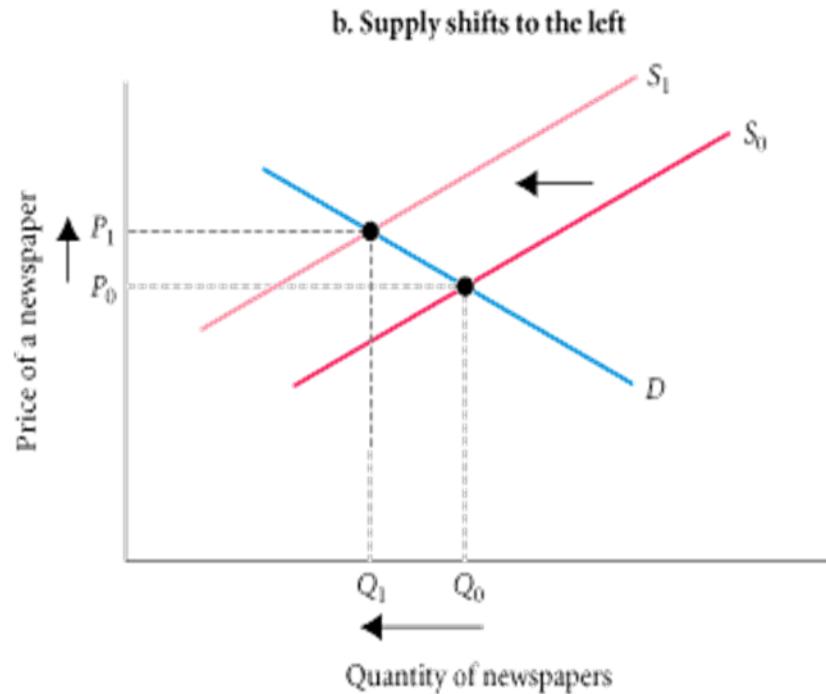
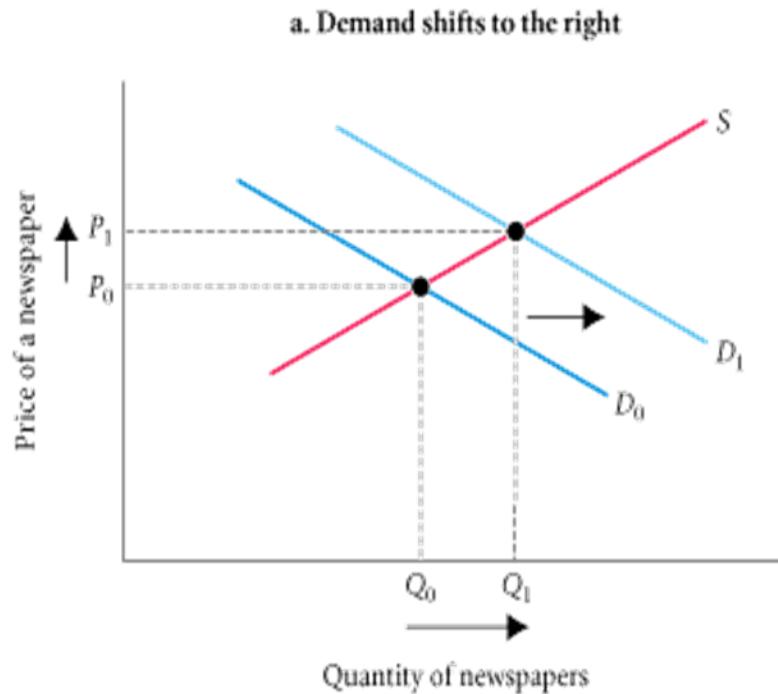


THINKING PRACTICALLY

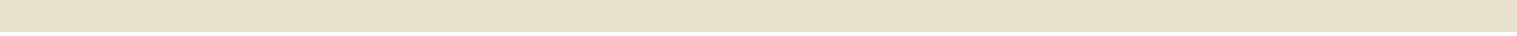
1. Use a graph to show the movement in prices and quantities described in the quinoa market.

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. Different analysts have different explanations for the higher equilibrium price.



THANK YOU

Demand and Supply Applications

Prepared by:

Fernando & Yvonn Quijano

Demand and Supply Applications

4



Chapter Outline

The Price System: Rationing and Allocating Resources

- Price Rationing
- Constraints on the Market and Alternative Rationing Mechanisms
- Prices and the Allocation of Resources
- Price Floors

Supply and Demand Analysis: An Oil Import Fee

Supply and Demand and Market Efficiency

- Consumer Surplus
- Producer Surplus
- Competitive Markets Maximize the Sum of Producer and Consumer Surplus
- Potential Causes of Deadweight Loss from Under- and Overproduction

Looking Ahead

INTRODUCTION

- Every society has a system of institutions that determines what is produced, how it is produced, and who gets what is produced.
 - In some societies, **these decisions are made centrally, through planning agencies or by government directive.**
 - However, in every society, **many decisions are made in a *decentralized* way, through the operation of markets**

THE PRICE SYSTEM: RATIONING AND ALLOCATING RESOURCES

Two Functions of the Price System

- The market system, also called the price system, performs two important and closely related functions.
 - First, it provides an automatic mechanism for distributing scarce goods and services.
 - That is, it serves as a price rationing device for allocating goods and services to consumers when the quantity demanded exceeds the quantity supplied.
 - Second, the price system ultimately determines both the allocation of resources among producers and the final mix of outputs

THE PRICE SYSTEM: RATIONING AND ALLOCATING RESOURCES

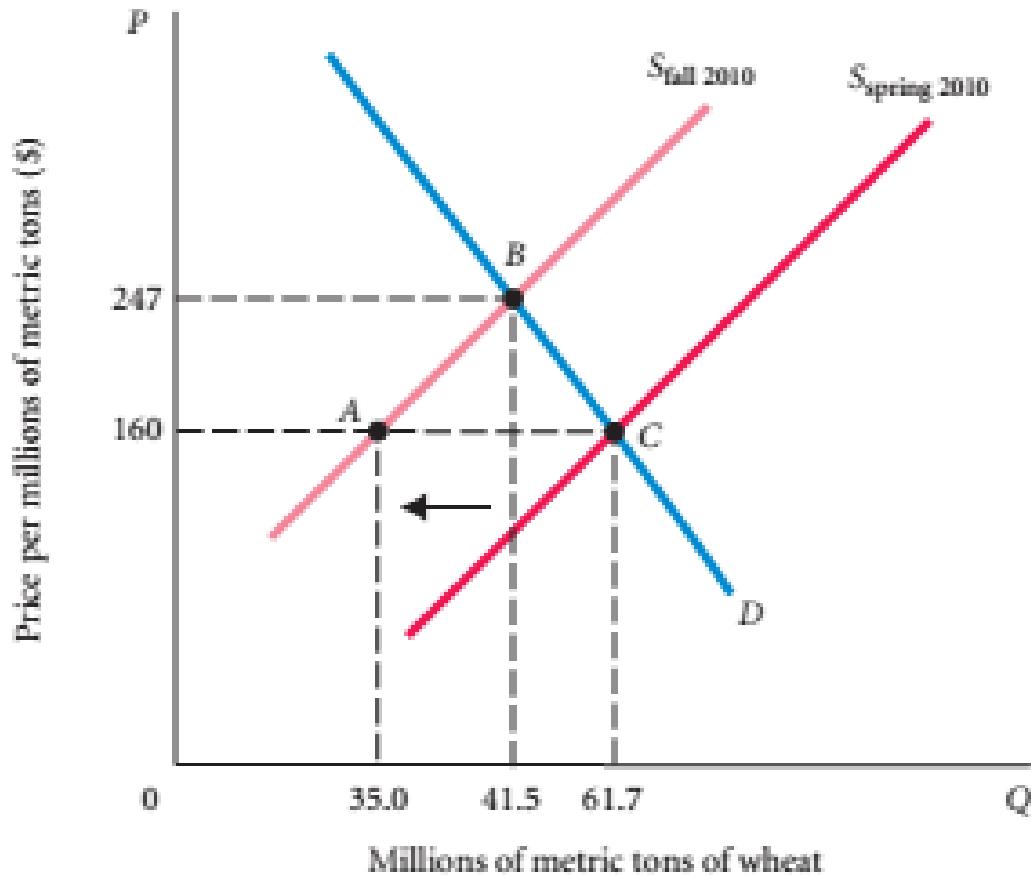
Price Rationing

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

Price Rationing Example: The market for wheat (Excess Demand)

- Consider the **simple process by which the price system eliminates a shortage.**
- Figure 4.1 shows **hypothetical supply and demand curves for wheat.**
 - As Figure 4.1 shows, the equilibrium price of wheat was \$160 per millions of metric tons in the spring of 2010. At this price, **farmers from around the world were expected to bring 61.7 million metric tons to market.**
- In the summer of 2010, Russia experienced its warmest summer on record. Fires swept through Russia, destroying a substantial portion of the Russia wheat crop. With almost a third of the world wheat normally produced in Russia, the effect of this environmental disaster on world wheat supply was substantial.
 - In the figure, **the supply curve for wheat, now shifted to the left, from $S_{\text{spring}2010}$ to $S_{\text{fall}2010}$**

CHAPTER 4: Demand and Supply Applications



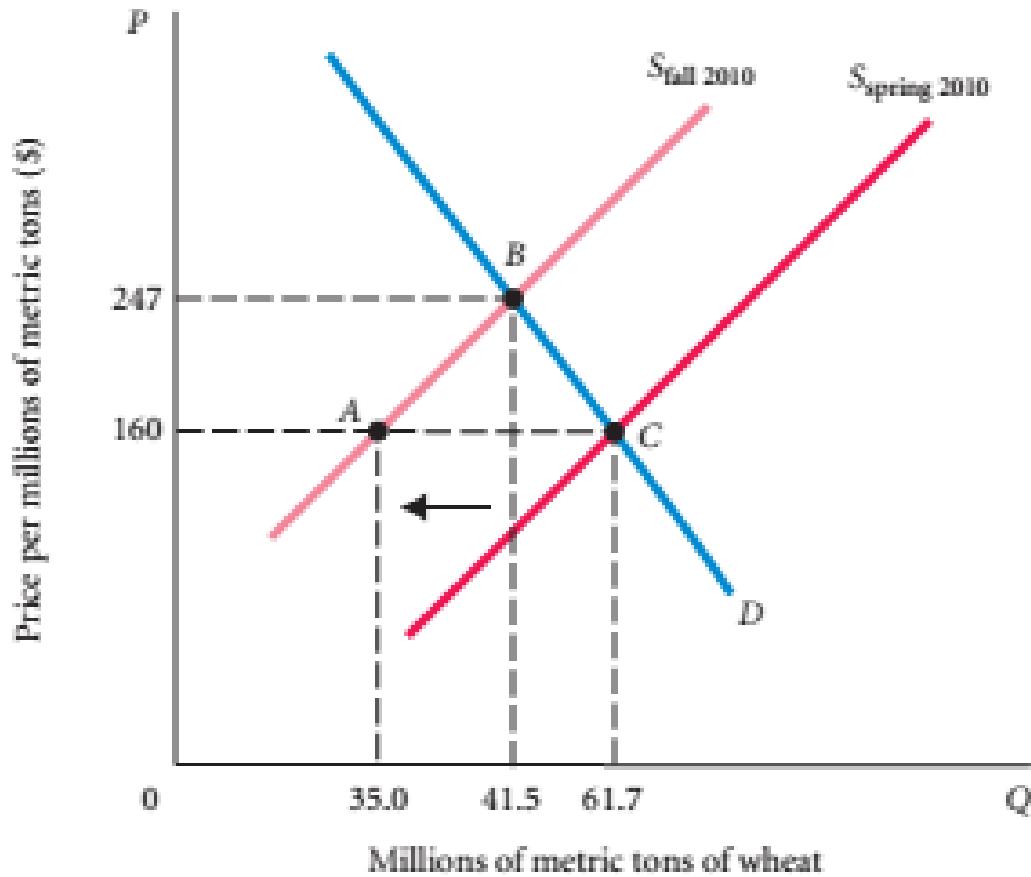
▲ FIGURE 4.1 The Market for Wheat

Fires in Russia in the summer of 2010 caused a shift in the world's supply of wheat to the left, causing the price to increase from \$160 per millions of metric tons to \$247. The equilibrium moved from C to B.

Price Rationing Example: The market for wheat (Excess Demand)

- This shift in the supply curve created a situation of excess demand at the old price of \$160.
 - Quantity demanded exceeded quantity supplied at the original price by 26.7 million metric tons.
- On the DD Side (Rationed):
 - The reduced supply caused the price of wheat to rise sharply.
 - As the price rises, the available supply is “rationed.”
 - Those who are willing and able to pay the most get it.
 - You can see the market’s rationing function clearly in Figure 4.1.
 - As the price rises from \$160, the quantity demanded declines along the demand curve, moving from point C (61.7 million tons) toward point B (41.5 million tons).

CHAPTER 4: Demand and Supply Applications



▲ FIGURE 4.1 The Market for Wheat

Fires in Russia in the summer of 2010 caused a shift in the world's supply of wheat to the left, causing the price to increase from \$160 per millions of metric tons to \$247. The equilibrium moved from C to B.

Price Rationing Example: The market for wheat (Excess Demand)

- **On the SS Side:**
 - As prices rise, wheat farmers also change their behavior, though supply responsiveness is limited in the short term.
 - Farmers outside of Russia, seeing the price rise, harvest their crops more carefully, getting more precious grains from each stalk.
 - Perhaps some wheat is taken out of storage and brought to market.
 - Quantity supplied increases from 35 million metric tons (point A) to 41.5 million tons (point B).
 - **The price increase has encouraged farmers who can to make up for part of the Russia wheat loss.**
 - **New Equilibrium:**
 - A new equilibrium is established at a price of \$247 per millions of metric tons, with 41.5 million tons transacted.

Price Rationing Example: The role of market

- The market has determined who gets the wheat:
 - The lower total supply is rationed to those who are willing and able to pay the higher price

Price Rationing Example: Willingness to Pay

- This idea of “willingness to pay” is central to the distribution of available supply, and **willingness depends on both desire (preferences) and income/wealth.**
 - Willingness to pay does not necessarily mean that only the very rich will continue to buy wheat when the price increases.
 - For anyone to continue to buy wheat at a higher price, his or her enjoyment comes at a higher cost in terms of other goods and services.

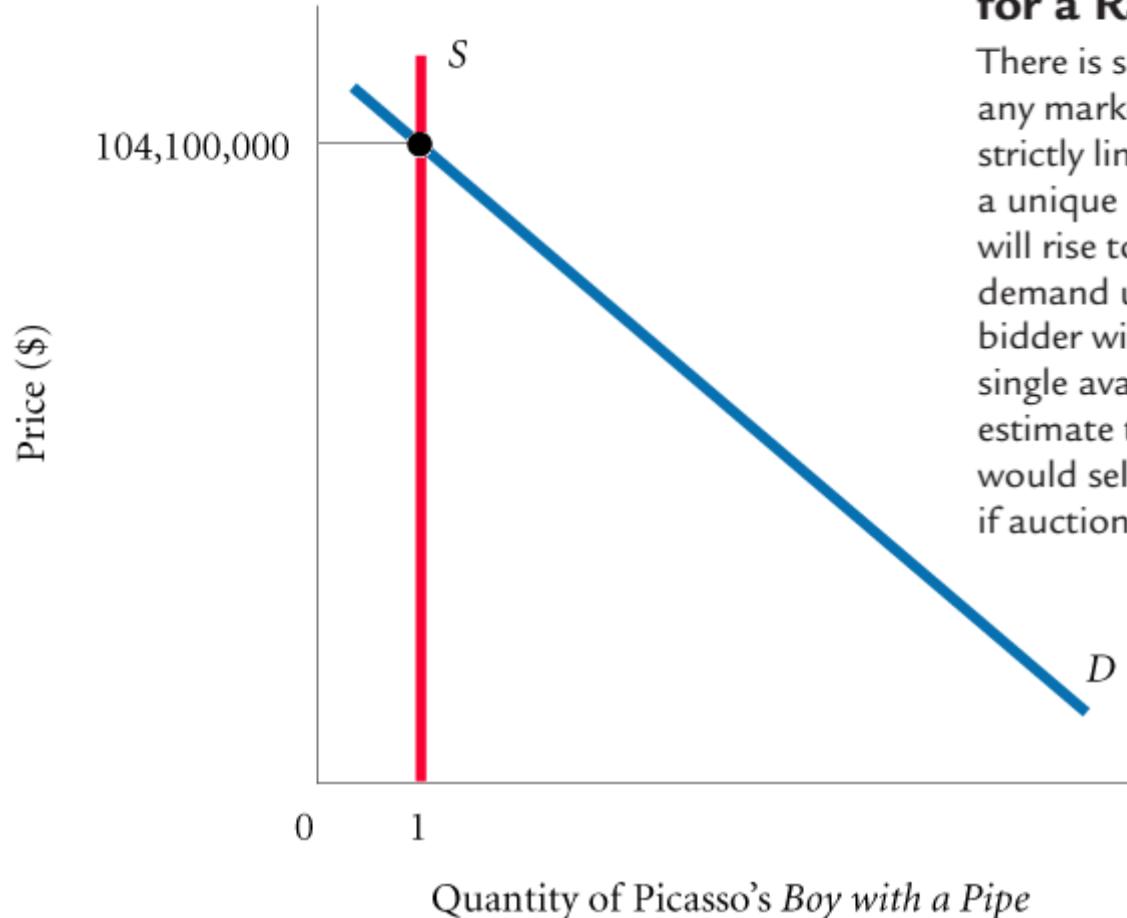
Price Rationing Example: Summary

- In sum:
 - **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**

Market for a Rare Painting: Demand-determined price (Scarce Supply)

- There is some price that will clear any market you can think of.
- Consider the market for a famous painting
 - At a low price, there would be an enormous excess demand for such an important painting.
 - The price would be bid up until there was only one remaining demander.
 - Presumably, that price would be very high.
- If the product is in strictly scarce supply, as a single painting is, its price is said to be demand-determined.
 - That is its price is determined solely and exclusively by the amount that the highest bidder or highest bidders are willing to pay.

Market for a Rare Painting: Demand-determined price



◀ FIGURE 4.2 Market for a Rare Painting

There is some price that will clear any market, even if supply is strictly limited. In an auction for a unique painting, the price (bid) will rise to eliminate excess demand until there is only one bidder willing to purchase the single available painting. Some estimate that the *Mona Lisa* would sell for \$600 million if auctioned.

FIGURE 4.2 Market for a Rare Painting

Everything has its price??

- One might interpret the statement that “there is some price that will clear any market” to mean “everything has its price,” but that is not exactly what it means.
 - Suppose you own a small silver bracelet that has been in your family for generations. It is quite possible that you would not sell it for *any* amount of money.
 - **Does this mean that the market is not working**, or that quantity supplied and quantity demanded are not equal?
 - Not at all. **It simply means that you are the highest bidder. By turning down all bids, you must be willing to forgo what anybody offers for it**

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.
- Policies designed to stop price rationing are commonly justified in a number of ways

Why stop price rationing?

- **The rationale most often used is fairness.**
 - **It is not “fair” to let landlords charge high rents, not fair for oil companies to run up the price of gasoline, not fair for insurance companies to charge enormous premiums, and so on.**
 - **After all, the argument goes, we have no choice but to pay — housing and insurance are necessary, and one needs gasoline to get to work.**
- **Various schemes to keep price from rising to equilibrium are based on several perceptions of injustice, among them**
 - (1) that price-overcharging is bad,
 - (2) that income is unfairly distributed, and
 - (3) that some items are necessities and everyone should be able to buy them at a “reasonable” price.

Price rationing for fairness but...

- Regardless of the rationale, the following examples will make two things clear:
 - 1. **Attempts to bypass price rationing in the market and to use alternative rationing devices are more difficult and more costly than they would seem at first glance.**
 - 2. **Very often such attempts distribute costs and benefits among households in unintended ways.**

OPEC Example: Oil, Gasoline, and OPEC

- One of the **most important prices** in the world is the **price of crude oil**.
 - **Its price has fluctuated wildly, leading to major macroeconomic problems.**
 - But oil is like other commodities in that its price is determined by the basic forces of supply and demand.
- Oil provides a good example of how markets work and how markets sometimes fail

OPEC

- **OPEC**
 - The Organization of the Petroleum Exporting Countries (OPEC) is an organization of twelve countries (Algeria, Angola, Ecuador, Iran, Iraq, Kuwait, Libya, Nigeria, Qatar, Saudi Arabia, the United Arab Emirates, and Venezuela) that **together controlled about one-third of the known supply of oil in the year 2010.**
- **In 1973 and 1974, OPEC imposed an embargo** (an official ban on trade) on shipments of crude oil to the United States.
 - What followed was a drastic reduction in the quantity of gasoline available at local gas pumps

OPEC Example: If market operate vs Price Ceiling

- Had the market system been allowed to operate, refined gasoline prices would have increased dramatically until quantity supplied was equal to quantity demanded.
- However, the government decided that rationing gasoline only to those who were willing and able to pay the most was unfair, and Congress imposed a price ceiling, or maximum price, of \$0.57 per gallon of leaded regular gasoline.
 - That price ceiling was intended to keep gasoline “affordable,” but it also perpetuated the shortage.
 - At the restricted price, quantity demanded remained greater

Excess Demand (Shortage) Created by a Price Ceiling

Oil, Gasoline, and OPEC

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

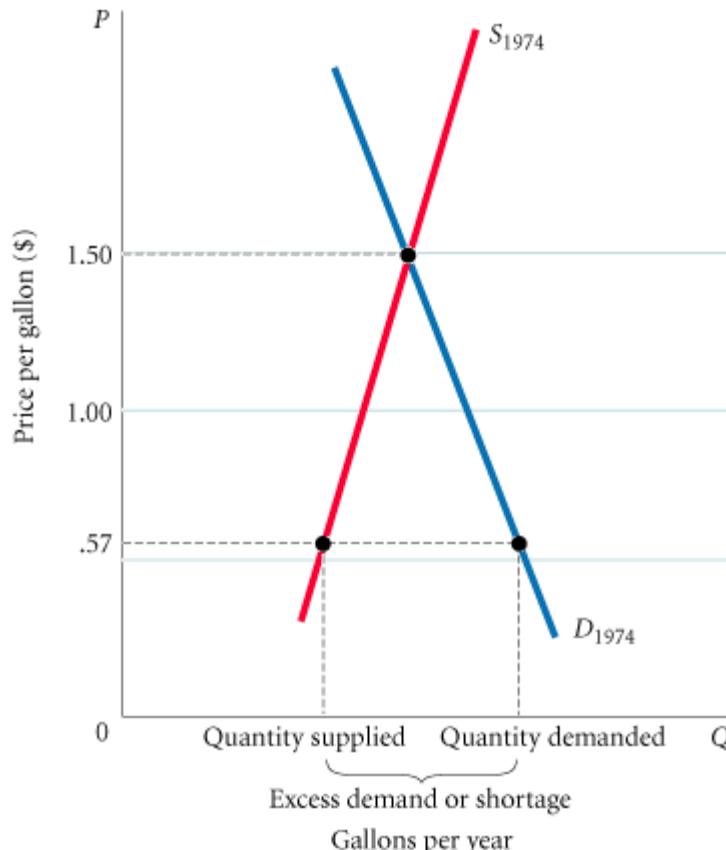


FIGURE 4.3 Excess Demand (Shortage) Created by a Price Ceiling

Excess demand created by Price Ceiling

- You can see the **effects of the price ceiling** by looking carefully at Figure 4.3.
 - If the price had been set by the interaction of supply and demand, it would have increased to approximately \$1.50 per gallon.
 - Instead, Congress made it illegal to sell gasoline for more than \$0.57 per gallon.
- At that price, quantity demanded exceeded quantity supplied and a shortage existed.
 - Because the price system was not allowed to function
 - an alternative rationing system had to be found to distribute the available supply of gasoline

▲ **FIGURE 4.3 Excess Demand (Shortage) Created by a Price Ceiling**

In 1974, a ceiling price of \$0.57 cents per gallon of leaded regular gasoline was imposed. If the price had been set by the interaction of supply and demand instead, it would have increased to approximately \$1.50 per gallon. At \$0.57 per gallon, the quantity demanded exceeded the quantity supplied. Because the price system was not allowed to function, an alternative rationing system had to be found to distribute the available supply of gasoline.

Alternative Rationing System

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

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

Alternative Rationing System

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.

Even when trading coupons is declared illegal, it is virtually impossible to stop black markets from developing.

In a black market, illegal trading takes place at market-determined prices.

Alternative Rationing System:

1. Queuing

- The most common of all non-price rationing systems is **queuing**, a term that means waiting in line.
 - Under this system, gasoline went to those people who were willing to pay the most, but the sacrifice was measured in hours and aggravation instead of dollars
- You can also show formally that the result is inefficient — that there is a resulting net loss of total value to society.
 - First, there is the cost of waiting in line.
 - Time has a value. With price rationing, no one has to wait in line and the value of that time is saved.
 - Second, there may be additional lost value if the gasoline ends up in the hands of someone who places a lower value on it than someone else who gets no gas.

Why queuing is inefficient? (deadweight loss)

- Suppose, for example, that the market price of gasoline if unconstrained would rise to \$2 but that the government has it fixed at \$1. There will be long lines to get gas.
- Imagine that to **motorist A**, 10 gallons of gas is worth \$35 but that she fails to get gas because her time is too valuable to wait in line.
 - To **motorist B**, 10 gallons is worth only \$15, but his time is worth much less, so he gets the gas.
 - In the end, **A could pay B for the gas and both would be better off.**
 - If A pays B \$30 for the gas, **A is \$5 better off and B is \$15 better off**. In addition, A does not have to wait in line.
- Thus, **the allocation that results from non-price rationing involves a net loss of value. Such losses are called deadweight losses.**

Alternative Rationing System: 2. Favored Customers

- A second non-price rationing device used during the gasoline crisis was that of **favored customers**.
 - Many gas station owners decided not to sell gasoline to the general public, but to reserve their scarce supplies for friends and favored customers.
 - Not surprisingly, many customers tried to become “favored” by offering **side payments to gas station owners**.
 - Owners also charged high prices for service.
 - **By doing so, they increased the real price of gasoline but hid it in service overcharges to get around the ceiling**

Alternative Rationing System:

3. Ration Coupons

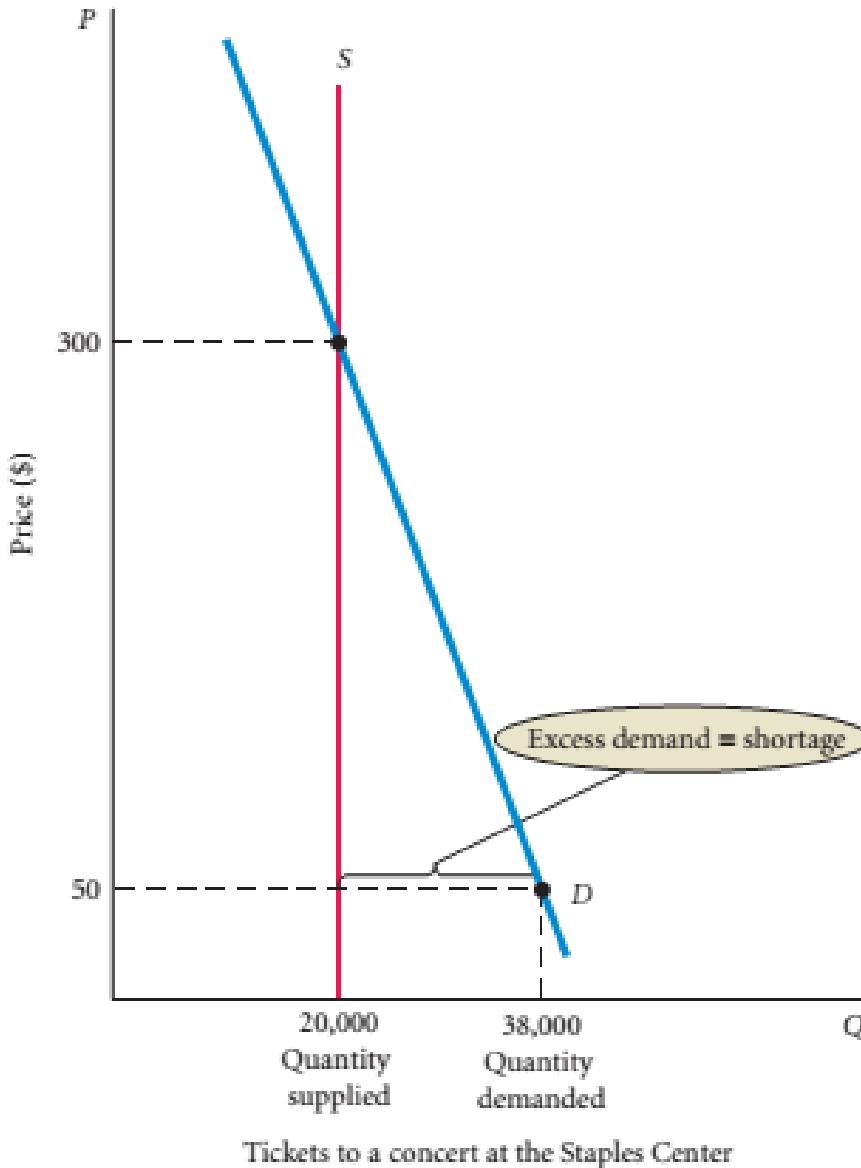
- Yet another method of dividing up available supply is the use of **ration coupons**.
 - It was suggested in both 1974 and 1979 that **families be given ration tickets or coupons** that would **entitle them to purchase a certain number of gallons of gasoline each month**.
 - That way, **everyone would get the same amount regardless of income**.
- **When ration coupons are used with no prohibition against trading them, however, **the result is almost identical to a system of price rationing**.**
 - **Those who are willing and able to pay the most buy up the coupons** and use them to purchase gasoline, chocolate, fresh eggs, or anything else that is sold at a restricted price.
 - This means that the **price of the restricted good will effectively rise to the market-clearing price**.

- For instance, suppose that you decide not to sell your ration coupon.
 - You are then forgoing what you would have received by selling the coupon.
 - Thus, the “real” price of the good you purchase will be higher (if only in opportunity cost) than the restricted price.
- Even when trading coupons is declared illegal, it is virtually impossible to stop black markets from developing.
 - In a black market, illegal trading takes place at market determined prices

Rationing Mechanisms for Concert & Sports Tickets

- Tickets for sporting events such as the World Series, the Super Bowl, and the World Cup command huge prices in the open market
 - You might ask **why a profit-maximizing enterprise would not charge the highest price it could?**
 - Ordinary loyal fans earning reasonable salaries **would not be able to afford those prices.**
- Let's consider a concert at the Staples Center, which has **20,000 seats**.
 - **The supply of tickets is thus fixed at 20,000.**
 - Of course, there are good seats and bad seats, but to keep things simple, let's assume that **all seats are the same** and that the promoters charge \$50 per ticket for all tickets.
 - **Supply is represented by a vertical line at 20,000.** Changing the price does not change the supply of seats.

CHAPTER 4: Demand and Supply Applications



▲ FIGURE 4.4 Supply of and Demand for a Concert at the Staples Center

At the face-value price of \$50, there is excess demand for seats to the concert. At \$50 the quantity demanded is greater than the quantity supplied, which is fixed at 20,000 seats. The diagram shows that the quantity demanded would equal the quantity supplied at a price of \$300 per ticket.

Who will get the tickets? (Non-Price Rationing methods)

- Who would get to buy the \$50 tickets?
 - As in the case of gasoline, a variety of rationing mechanisms might be used.
 - The most common is queuing, waiting in line.
 - The tickets would go on sale at a particular time, and people would show up and wait.
 - There are also, of course, favored customers.
 - Those who get tickets without queuing are local politicians, sponsors, and friends of the artist or friends of the players.

Who will get the tickets? (Non-Price Rationing methods) But ...

- But “once the dust settles,” **the power of technology and the concept of opportunity cost take over.**
 - **Even if you get the ticket for the (relatively) low price of \$50, that is not the true cost.**
 - **The true cost is what you give up to sit in the seat.**
 - If people on eBay, StubHub, or Ticketmaster are willing to pay \$300 for your ticket, that’s what you must pay, or sacrifice, to go to the concert.
 - Many people—even strong fans—will choose to sell that ticket.

Who will get the tickets? (Non-Price Rationing methods) But Market will still Ration the Tickets

- Once again, it is difficult to stop the market from rationing the tickets to those people who are willing and able to pay the most.
 - 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 people's 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 what would result from simple price rationing

THE PRICE SYSTEM: RATIONING AND ALLOCATING RESOURCES



There are many ways to deal with the excess demand to premiere sporting events such as the NCAA finals, but it is hard to keep tickets from those who are willing to pay high prices. Syracuse played Kansas in the NCAA championship game in 2003.

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.

PRICES AND THE ALLOCATION OF RESOURCES

Thinking of the market system as a mechanism for allocating scarce goods and services among competing demanders is very revealing, **but the market determines much more than just the distribution of final outputs.**

It also determines what gets produced and how resources are allocated among competing uses.

PRICES AND THE ALLOCATION OF RESOURCES: The role of Market [Example: Restaurants Business]

What gets Produced [Role of Market]

- Consider a change in consumer preferences that leads to an increase in demand for a specific good or service.
 - During the 1980s, for example, people began going to restaurants more frequently than before.
 - Partially the result of social changes (such as a dramatic rise in the number of two-earner families) and partially the result of rising incomes.
 - The market responded to this change in demand by shifting resources, both capital and labor, into more and better restaurants
 - With the increase in demand for restaurant meals, the price of eating out rose and the restaurant business became more profitable.
 - The higher profits attracted new businesses and provided old restaurants with an incentive to expand.

PRICES AND THE ALLOCATION OF RESOURCES: The role of Market [Example: Restaurants Business]

How Resources are Allocated [Role of Market]

- **As new capital, seeking profits, flowed into the restaurant business, so did labor.**
 - **New restaurants need chefs.**
 - **Chefs need training**, and the higher wages that came with increased demand provided an incentive for them to get it.
 - In response to the increase in demand for training, **new cooking schools opened and existing schools began to offer courses in the culinary arts.**
- **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 goods and services produced.**

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 under the price of labor.

Price Floor [Excess Supply]

- As we have seen, **price ceilings**, often imposed because price rationing is viewed as unfair, **result in alternative rationing mechanisms that are inefficient and may be equally unfair.**
 - Some of the same arguments can be made for price floors.
- If a price floor is set above the equilibrium price, **the result will be excess supply**; quantity supplied will be greater than quantity demanded.
 - The most common example of a price floor is the **minimum wage**, which is a floor set for the price of labor.
 - Employers (who demand labor) are not permitted under federal law to pay a wage less than \$7.25 per hour (in 2010) to workers (who supply labor).
 - **India**
 - Minimum Wages Act 1948
 - Wage Code Bill 2017

Price Floor [Excess Supply] - Criticism

- **Discuss the Figure**
- **Critics argue that since the minimum wage is above equilibrium, the result will be wasteful unemployment.**
 - At the wage of \$7.25, the quantity of labor demanded is less than the quantity of labor supplied.
 - Whenever a price floor is set above equilibrium, there will be an excess supply

SUPPLY AND DEMAND ANALYSIS: Another Example - An oil import fee

- The basic logic of supply and demand is a powerful tool of analysis.
 - As an extended example of the power of this logic, **we will consider a proposal to impose a tax on imported oil.**
- **US & Oil Example:**
 - The idea of taxing imported oil is hotly debated, and the tools we have learned thus far will show us the **effects of such a tax.**
 - Consider the facts. Between 1985 and 1989, **the United States increased its dependence on oil imports dramatically.**
 - In 1989, total **U.S. demand for crude oil was 13.6 million barrels per day.**
 - Of that amount, only 7.7 million barrels per day (**57 % were supplied by U.S. producers**, with the remaining 5.9 million barrels per day (**43 %) imported.**

Why Oil Import Fee (Tax)?

- The price of oil on world markets that year averaged about \$18 (1989).
 - This heavy dependence on foreign oil left the United States **vulnerable to the price shock** that followed the Iraqi invasion of Kuwait in August 1990.
 - In the months following the invasion, **the price of crude oil on world markets shot up to \$40 per barrel**
- Even before the invasion, many economists and some politicians had recommended a stiff oil import fee (or tax) that would, it was argued, reduce the U.S. dependence on foreign oil by
 1. Reducing overall consumption and
 2. Providing an incentive for increased domestic production.
 3. An added bonus would be improved air quality from the reduction in driving

Supply and Demand analysis: An oil import fee

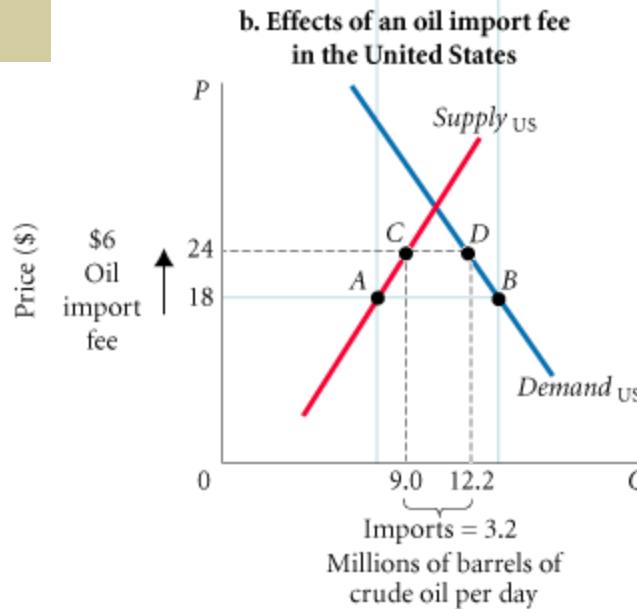
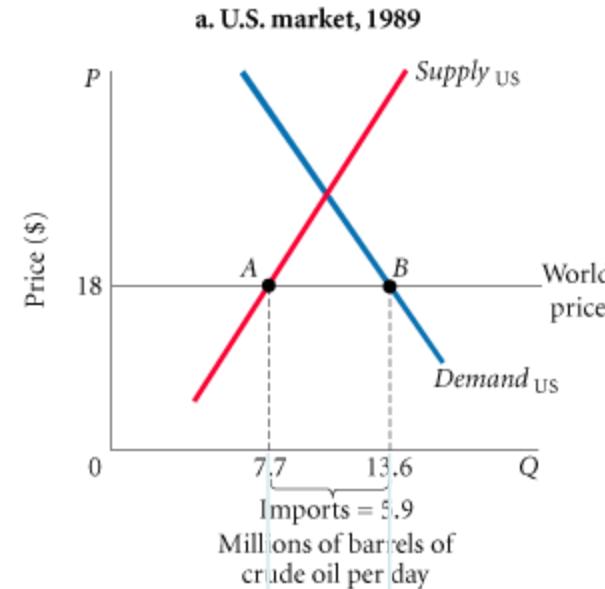
- Figure 4.5(a) shows the U.S. market for oil.
 - The world price of oil is assumed to be \$18, and the United States is assumed to be able to buy all the oil that it wants at this price.
 - This means that domestic producers cannot charge any more than \$18 per barrel (Imp)
 - The curve labeled Supply_{US} shows the amount that domestic suppliers will produce at each price level.
- At price of \$18 (world price):
 - Domestic production is 7.7 million barrels per day and the total quantity of oil demanded in the United States is 13.6 million barrels per day.
 - The difference is total imports (5.9 million barrels per day).

CHAPTER 4: Demand and Supply Applications

SUPPLY AND DEMAND ANALYSIS: AN OIL IMPORT FEE

The basic logic of supply and demand is a powerful tool of analysis.

FIGURE 4.5 The U.S. Market for Crude Oil, 1989



If the Govt. levies a 33.33 % tax?

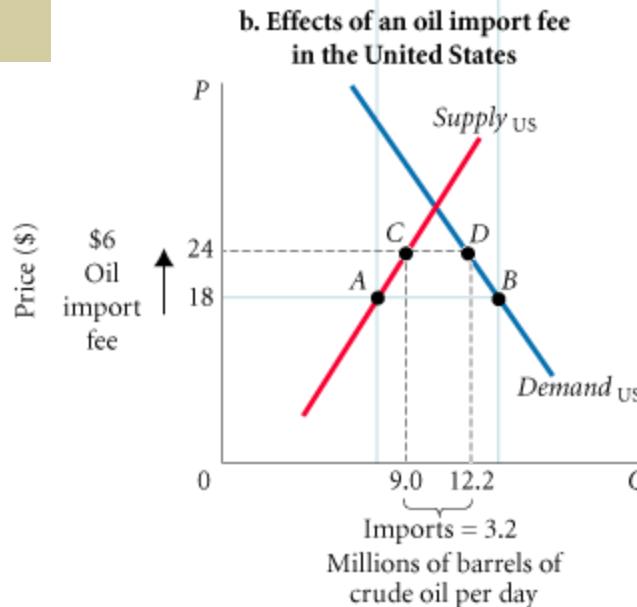
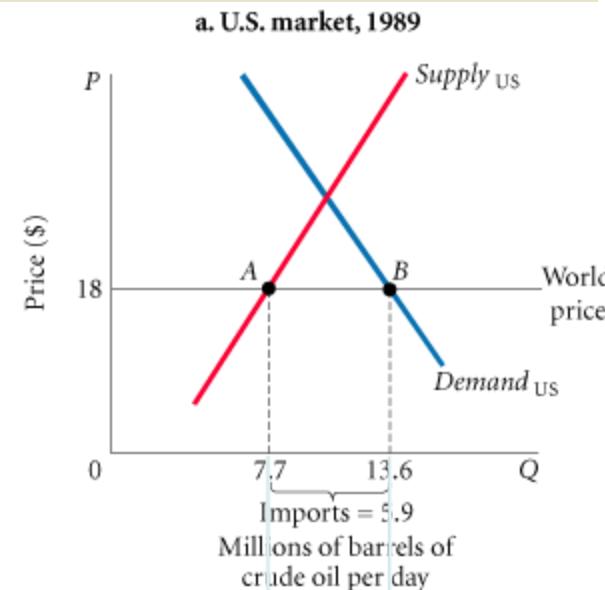
- If the government levies a 33 1/3 percent tax on imports, the price of a barrel of oil rises to \$24.
 - The quantity demanded falls to 12.2 million barrels per day.
 - At the same time, the quantity supplied by domestic producers increases to 9.0 million barrels per day and
 - The quantity imported falls to 3.2 million barrels per day
- Note, however, that the **tax is paid only on imported oil.**
 - Thus, the entire \$24 paid for domestic crude goes to domestic producers.
- The tax also generates revenues for the federal government.
 - The total tax revenue collected is equal to the tax per barrel (\$6) times the number of imported barrels.
 - When the quantity imported is 3.2 million barrels per day, total revenue is $\$6 * 3.2$ million, or $\$19.2$ million per day (about $\$7$ billion per year).

CHAPTER 4: Demand and Supply Applications

SUPPLY AND DEMAND ANALYSIS: AN OIL IMPORT FEE

The basic logic of supply and demand is a powerful tool of analysis.

FIGURE 4.5 The U.S. Market for Crude Oil, 1989



Effect of Oil Import Fee

- In the final analysis, an oil import fee would
 - (1) Increase domestic production and
 - (2) Reduce overall consumption.

SUPPLY AND DEMAND AND MARKET EFFICIENCY: Positive & Normative Economics

- Supply and demand curves help explain the way that markets and market prices work to allocate scarce resources.
 - When we try to understand “how the system works,” we are doing “positive economics.”
 - Supply and demand curves can also be used to illustrate the idea of market efficiency, an important aspect of “normative economics.”

SUPPLY AND DEMAND AND MARKET EFFICIENCY: CONSUMER SURPLUS

CONSUMER SURPLUS

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

CONSUMER SURPLUS: Market reveal preferences

- The argument, made several times already, that the market forces us to reveal a great deal about our personal preferences is an extremely important one
 - **If you are free to choose within the constraints imposed by prices and your income and you decide to buy, for example, a hamburger for \$2.50, you have “revealed” that a hamburger is worth at least \$2.50 to you.**
- A simple market demand curve such as the one in Figure 4.6(a) illustrates this point quite clearly.
 - **At the current market price of \$2.50, consumers will purchase 7 million hamburgers per month.**
 - There is only one price in the market, and the demand curve tells us how many hamburgers households would buy if they could purchase all they wanted at the posted price of \$2.50.
 - **Anyone who values a hamburger at \$2.50 or more will buy it.**
 - **Anyone who does not value a hamburger that highly will not buy it**

SUPPLY AND DEMAND AND MARKET EFFICIENCY

CHAPTER 4: Demand and Supply Applications

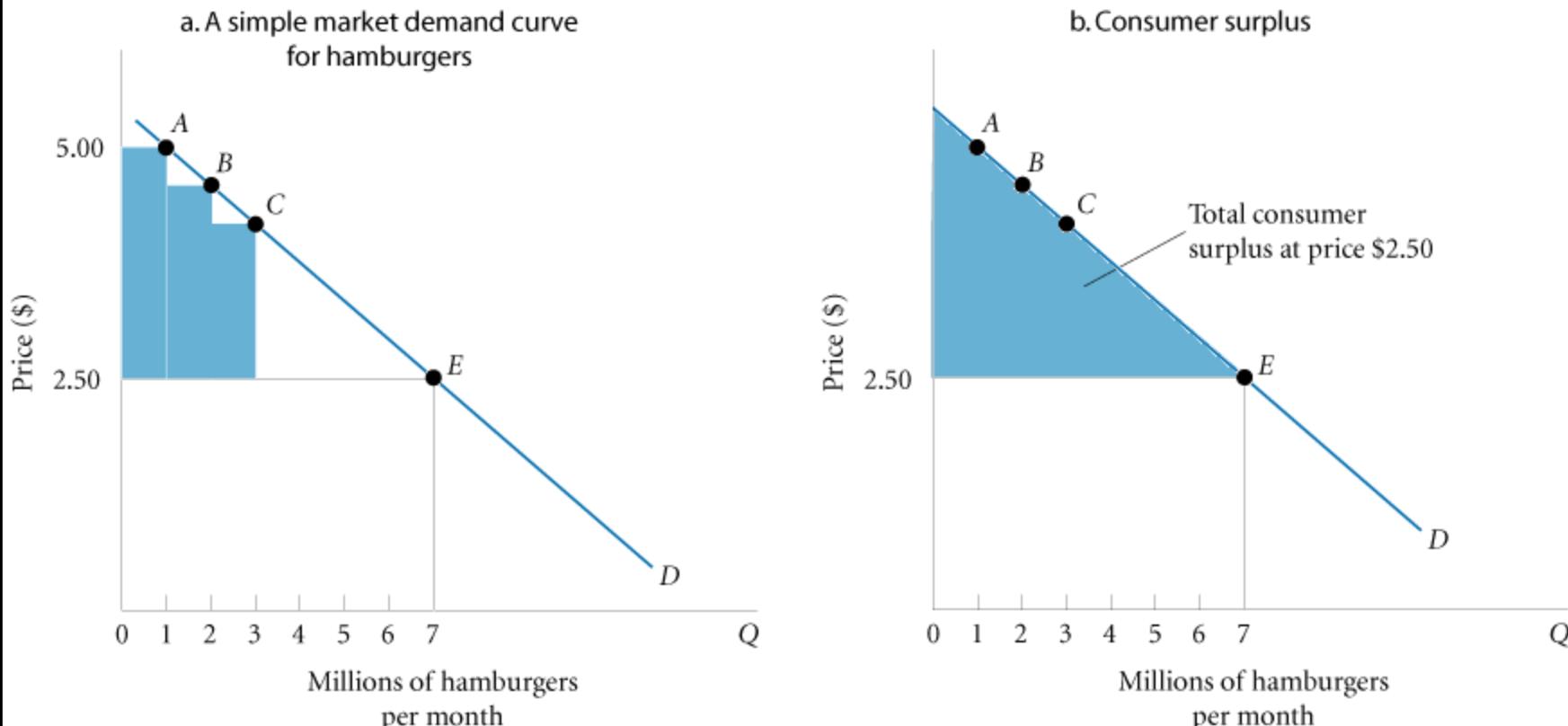


FIGURE 4.6 Market Demand and Consumer Surplus

CONSUMER SURPLUS

- **Consumer surplus is the difference between the maximum amount a person is willing to pay for a good and its current market price.**
 - The consumer surplus earned by the people willing to pay \$5.00 for a hamburger is approximately equal to the shaded area between point A and the price, \$2.50
 - Point B on the market demand curve shows the maximum amount that consumers would be willing to pay for the second million hamburgers.
 - The consumer surplus earned by these people is equal to the shaded area between B and the price, \$2.50.

SUPPLY AND DEMAND AND MARKET EFFICIENCY

CHAPTER 4: Demand and Supply Applications

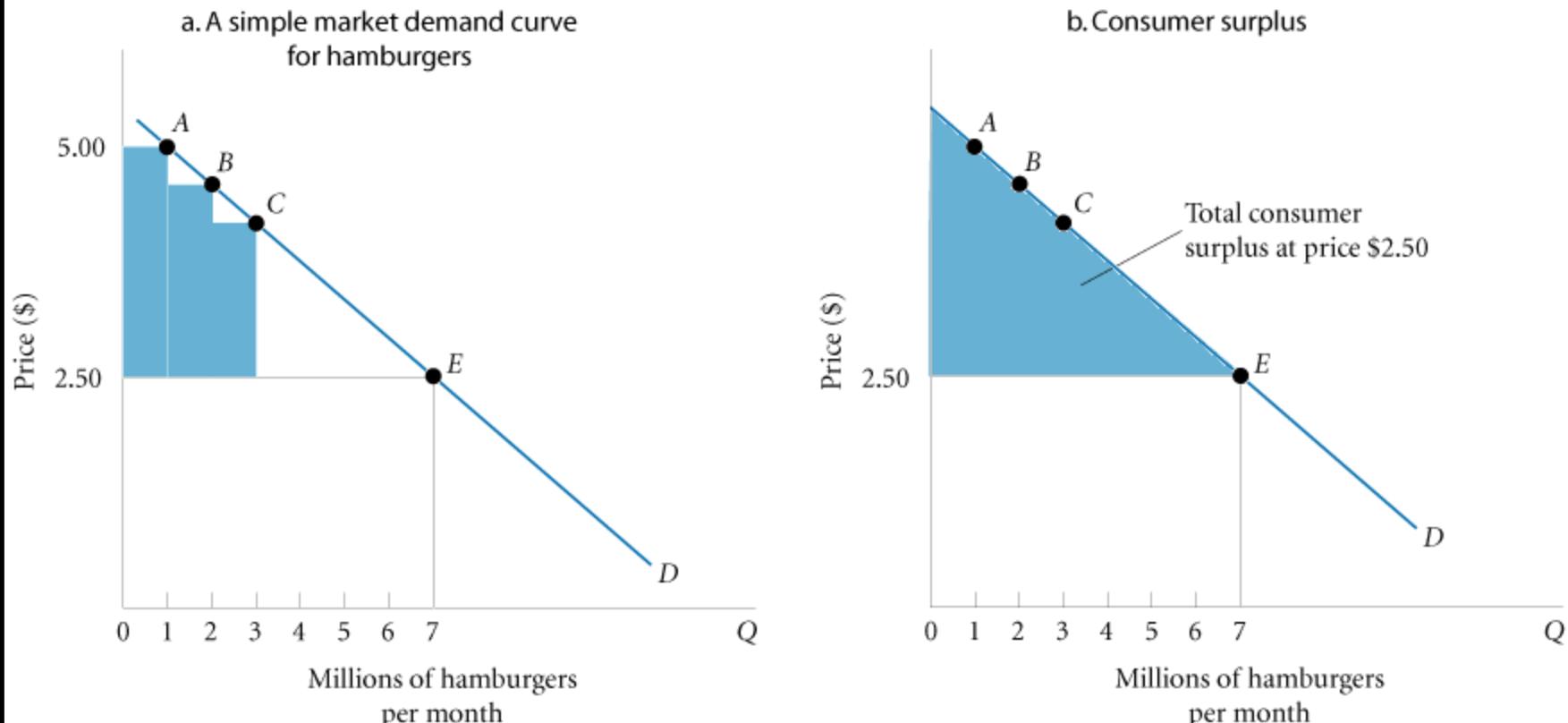


FIGURE 4.6 Market Demand and Consumer Surplus

Fig 4.6

- As illustrated in Figure 4.6(a)
 - Some consumers (see point A) are willing to pay as much as \$5.00 each for hamburgers.
 - Since the market price is just \$2.50, they receive a consumer surplus of \$2.50 for each hamburger that they consume.
 - Others (see point B) are willing to pay something less than \$5.00 and receive a slightly smaller surplus.
 - Since the market price of hamburgers is just \$2.50, the area of the shaded triangle in Figure 4.6(b) is equal to total consumer surplus

SUPPLY AND DEMAND AND MARKET EFFICIENCY: PRODUCER SURPLUS

PRODUCER SURPLUS

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

PRODUCER SURPLUS: SS Curve

- The supply curve in a market shows the amount that firms willingly produce and supply to the market at various prices.
 - Presumably it is because the price is sufficient to cover the costs or the opportunity costs of production and give producers enough profit to keep them in business.
- A simple market supply curve like the one in Figure 4.7(a) illustrates this point quite clearly.
 - At the current market price of \$2.50 (Point E), producers will produce and sell 7 million hamburgers.
 - Notice, however, that if the price were just \$0.75 (75 cents) (Point A), although production would be much lower — most producers would be out of business at that price — a few producers would actually be supplying burgers.
 - In fact, producers would supply about 1 million burgers to the market.

CHAPTER 4: Demand and Supply Applications

SUPPLY AND DEMAND AND MARKET EFFICIENCY

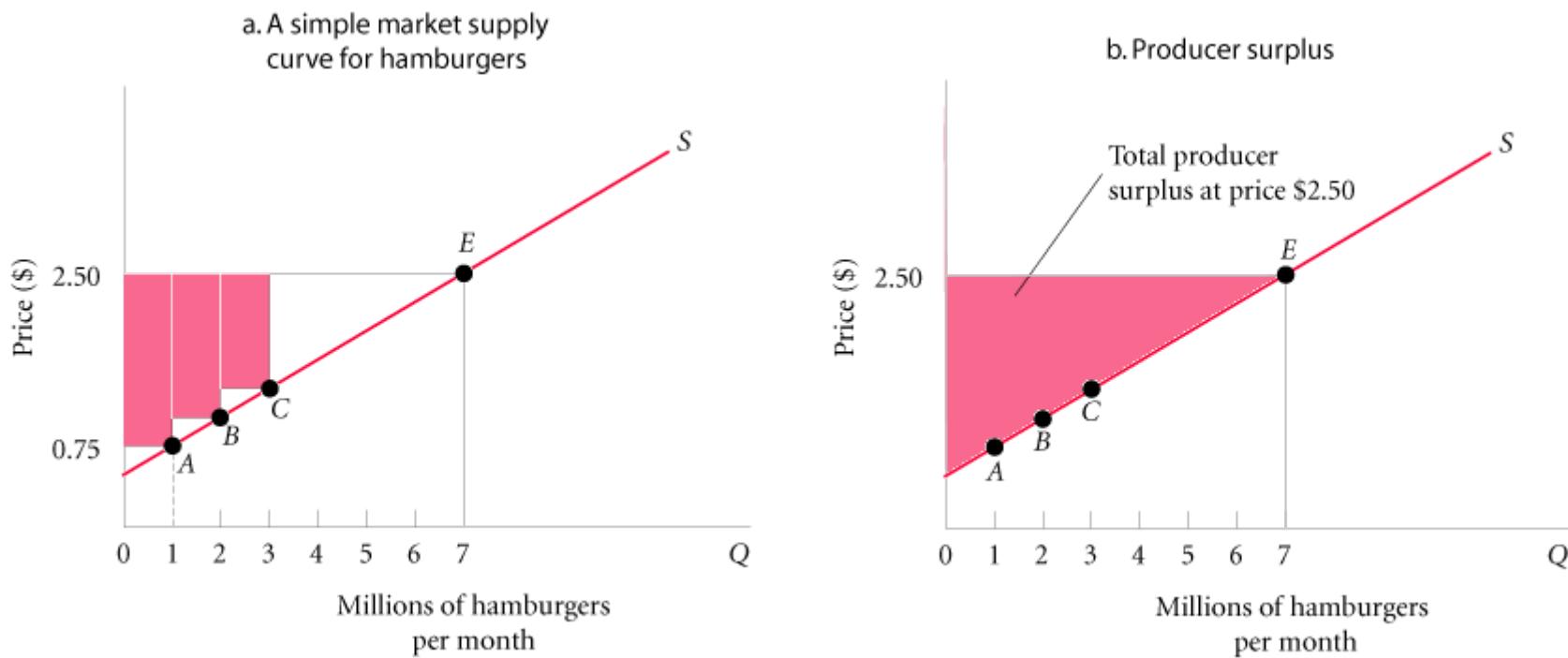


FIGURE 4.7 Market Supply and Producer Surplus

Why some firm are able to SS at lower price while others firms don't SS

- **These firms must have lower costs:** They are more efficient or they have access to raw beef at a lower price or perhaps they can hire low-wage labor.
- If these efficient, low-cost producers are able to charge \$2.50 for each hamburger, **they are earning what is called a producer surplus.**

Producer Surplus

- **Producer surplus** is the difference between the current market price and the full cost of production for the firm.
- The first million hamburgers would generate a producer surplus of \$2.50 minus \$0.75, or \$1.75 per hamburger: a total of \$1.75 million.
 - The second million hamburgers would also generate a producer surplus because the price of \$2.50 exceeds the producers' total cost of producing these hamburgers, which is above \$0.75 but much less than \$2.50

CHAPTER 4: Demand and Supply Applications

SUPPLY AND DEMAND AND MARKET EFFICIENCY

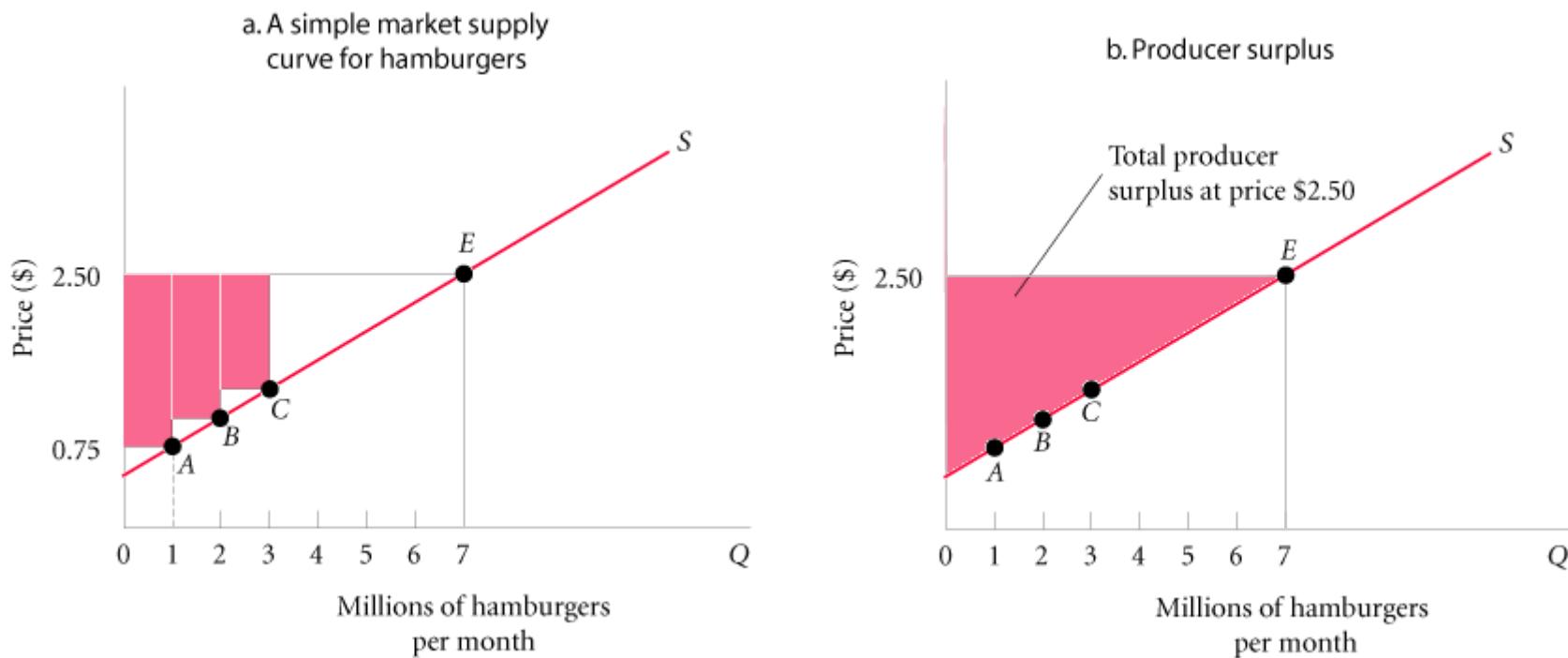


FIGURE 4.7 Market Supply and Producer Surplus

Figure 4.7:

- As illustrated in Figure 4.7(a), **some producers are willing to produce hamburgers for a price of \$0.75 each.**
 - **Since they are paid \$2.50, they earn a producer surplus equal to \$1.75.**
- **Other producers** are willing to supply hamburgers at a **price of \$1.00**; **they receive a producer surplus equal to \$1.50.**
- **Since the market price of hamburgers is \$2.50, the area of the shaded triangle in Figure 4.7(b) **is equal to total producer surplus.****

SUPPLY AND DEMAND AND MARKET EFFICIENCY: COMPETITIVE MARKETS MAXIMIZE THE SUM OF PRODUCER AND CONSUMER SURPLUS

- In the preceding example, the quantity of hamburgers supplied and the quantity of hamburgers demanded are equal at \$2.50.
 - **Figure 4.8 shows the total net benefits to consumers and producers resulting from the production of 7 million hamburgers.**
- **Consumer:**
 - Consumers receive benefits in excess of the price they pay and equal to the blue shaded area between the demand curve and the price line at \$2.50; the area is equal to the amount of consumer surplus being earned.
- **Producer:**
 - Producers receive compensation in excess of costs and equal to the red shaded area between the supply curve and the price line at \$2.50; the area is equal to the amount of producer surplus being earned.

COMPETITIVE MARKETS MAXIMIZE THE SUM OF PRODUCER AND CONSUMER SURPLUS

COMPETITIVE MARKETS MAXIMIZE THE SUM OF PRODUCER AND CONSUMER SURPLUS

CHAPTER 4: Demand and Supply Applications

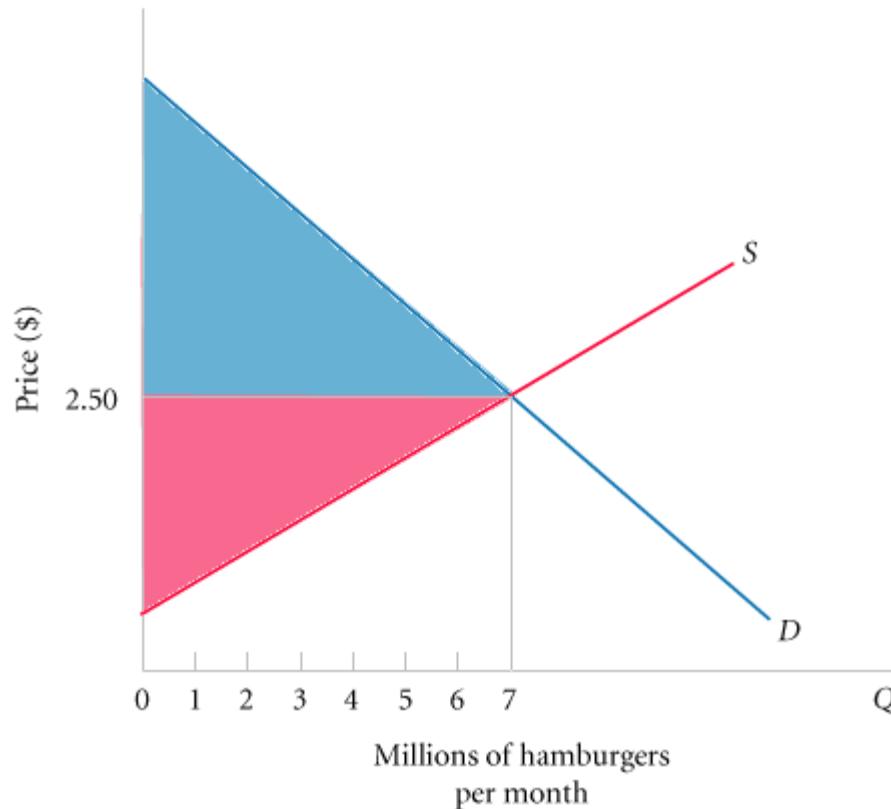


FIGURE 4.8 Total Producer and Consumer Surplus

What will happen to CS & PS, If Production reduced to 4 million (Underproduction) – Deadweight Loss

- Now consider the result to consumers and producers **if production were to be reduced to 4 million burgers.**
- Look carefully at **Figure 4.9(a).**
 - **At 4 million burgers, consumers are willing to pay \$3.75 for hamburgers and there are firms whose costs make it worthwhile to supply at a price as low as \$1.50, yet something is stopping production at 4 million.**
 - **The result is a loss of both consumer and producer surplus.**
- **IMP:**
 - You can see in Figure 4.9(a) that if production were expanded from 4 million to 7 million, **the market would yield more consumer surplus and more producer surplus.**

SUPPLY AND DEMAND AND MARKET EFFICIENCY

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

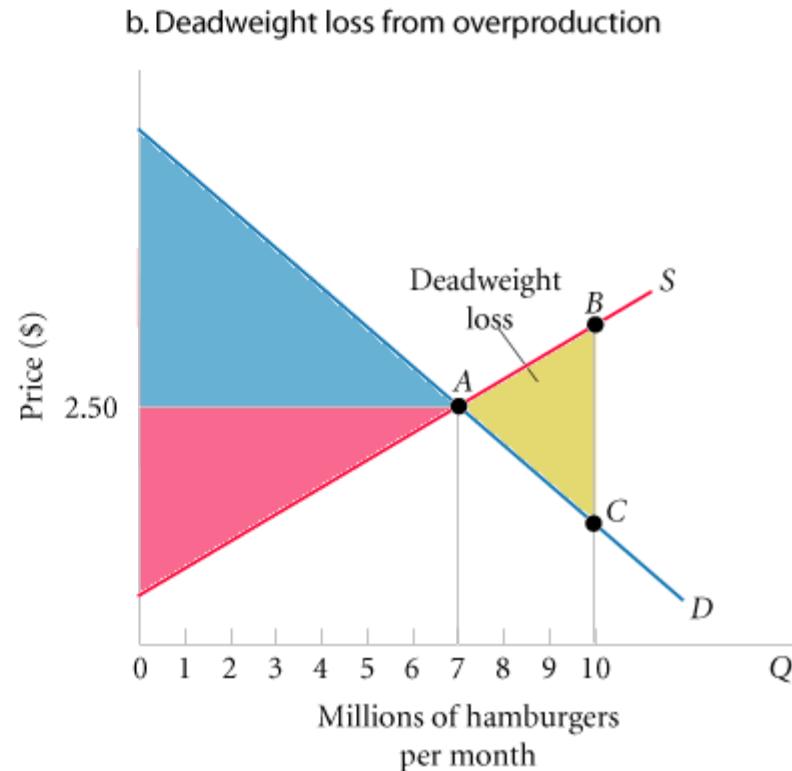
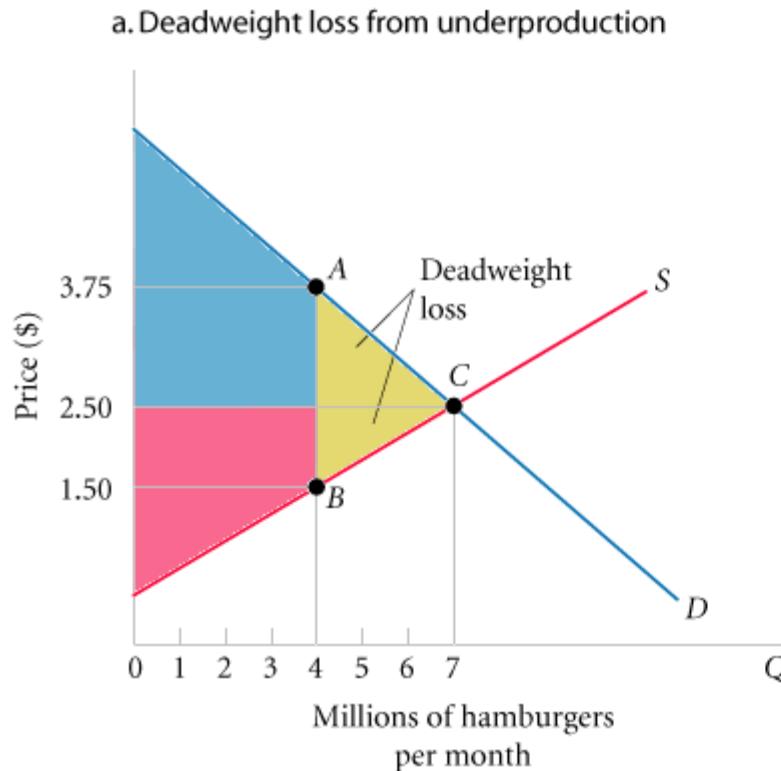


FIGURE 4.9 Deadweight Loss

Deadweight Loss

- The total loss of producer and consumer surplus from *underproduction* and, as we will see shortly, from *overproduction* is referred to as a *deadweight loss*.
 - In Figure 4.9(a) the deadweight loss is equal to the area of triangle ABC shaded in yellow

Deadweight Loss from Overproduction

- Figure 4.9(b) illustrates how a deadweight loss of both producer and consumer surplus can result from overproduction as well.
 - For every hamburger produced above 7 million, consumers are willing to pay less than the cost of production.
- The cost of the resources needed to produce hamburgers above 7 million exceeds the benefits to consumers, resulting in a net loss of producer and consumer surplus equal to the yellow shaded area ABC.

SUPPLY AND DEMAND AND MARKET EFFICIENCY

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

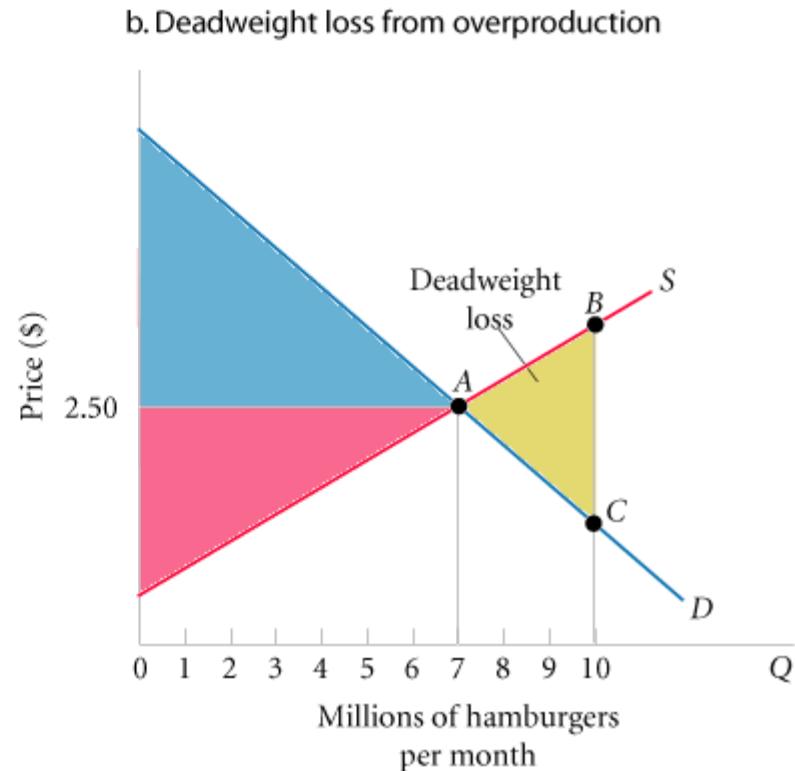
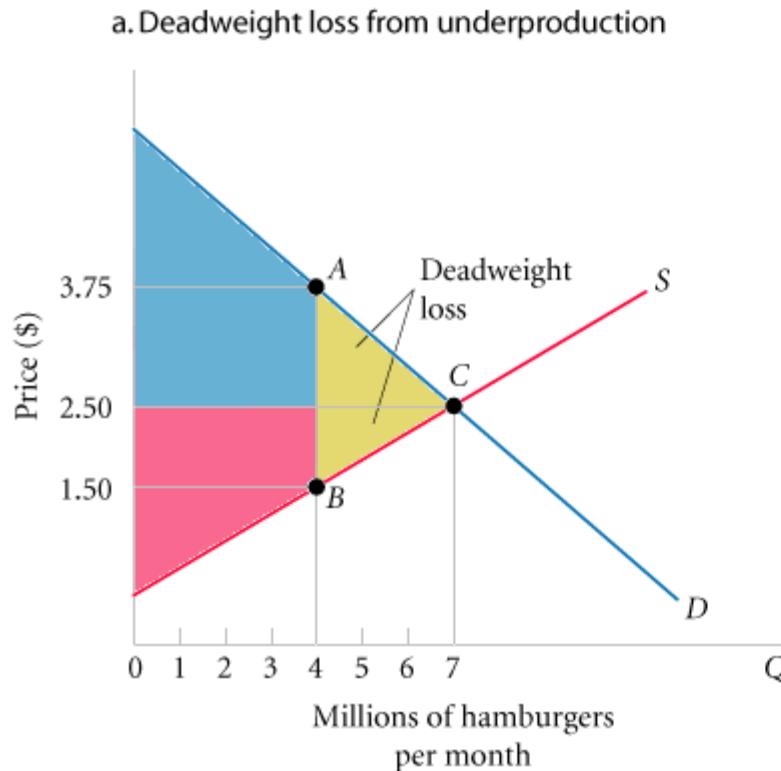
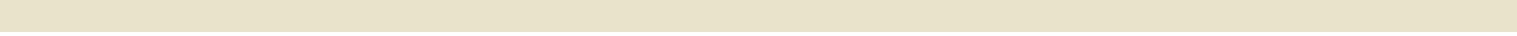
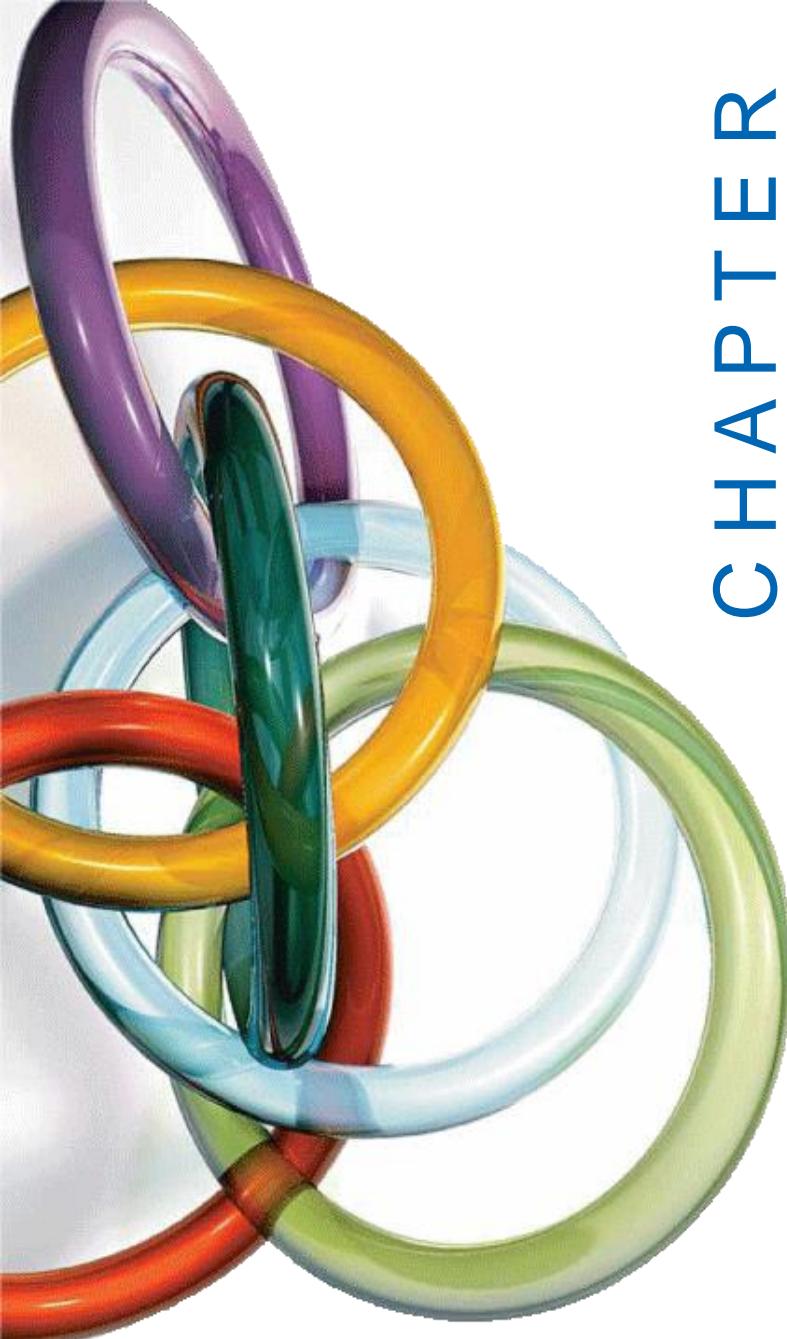


FIGURE 4.9 Deadweight Loss



THANK YOU



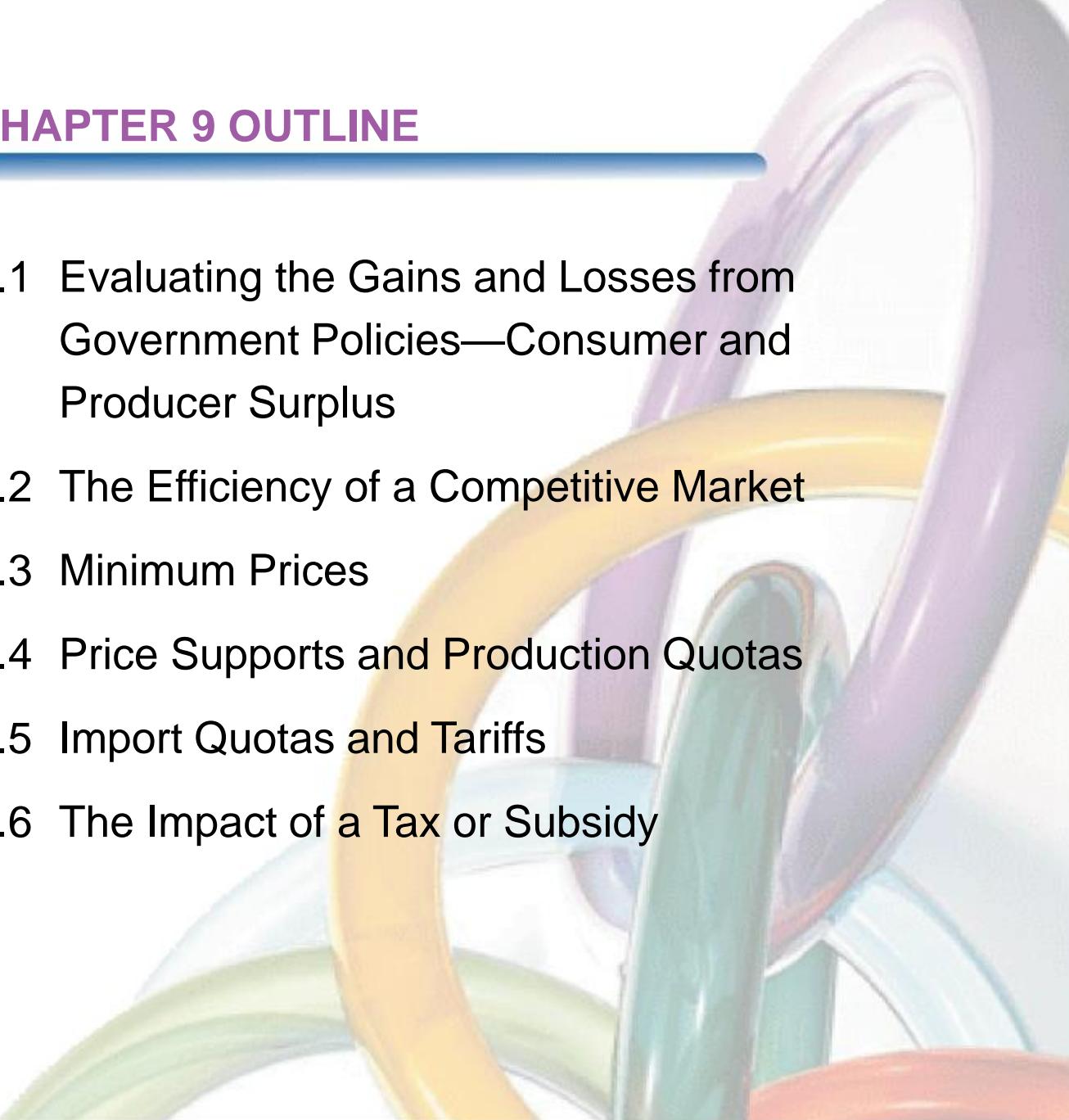
CHAPTER
9

The Analysis of Competitive Markets

Prepared by:

Fernando & Yvonn Quijano

CHAPTER 9 OUTLINE

- 
- 9.1 Evaluating the Gains and Losses from Government Policies—Consumer and Producer Surplus
 - 9.2 The Efficiency of a Competitive Market
 - 9.3 Minimum Prices
 - 9.4 Price Supports and Production Quotas
 - 9.5 Import Quotas and Tariffs
 - 9.6 The Impact of a Tax or Subsidy

9.1

EVALUATING THE GAINS AND LOSSES FROM GOVERNMENT POLICIES— CONSUMER AND PRODUCER SURPLUS (NR)



Review of Consumer and Producer Surplus

Figure 9.1

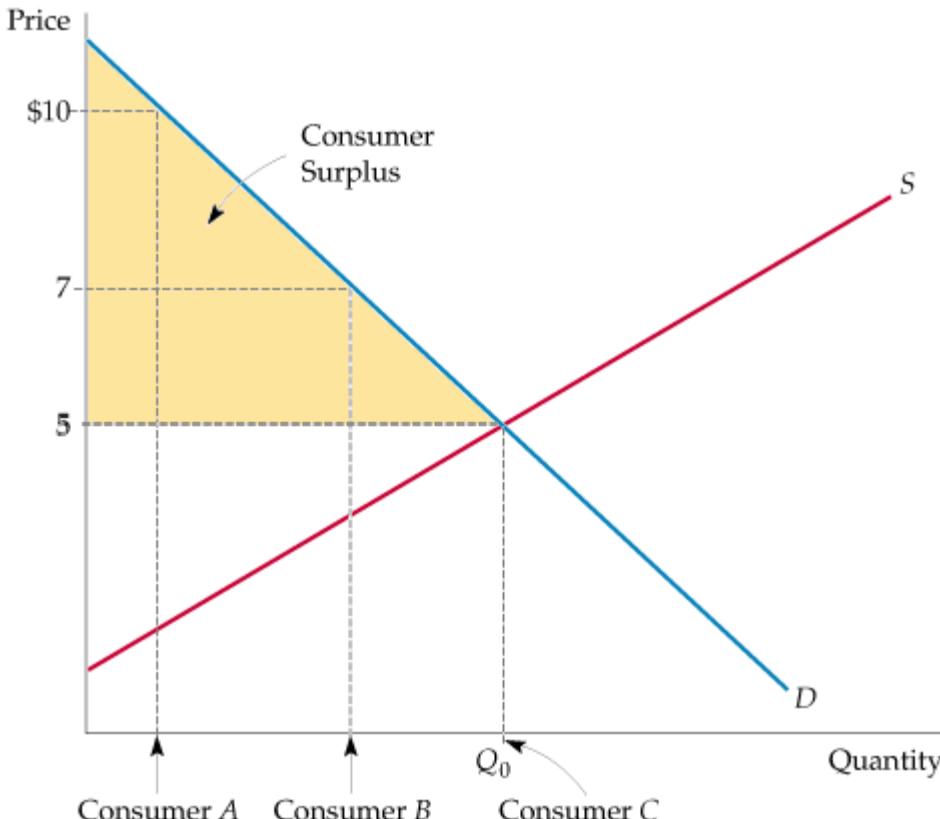
Consumer and Producer Surplus

Consumer *A* would pay \$10 for a good whose market price is \$5 and therefore enjoys a benefit of \$5.

Consumer *B* enjoys a benefit of \$2,

and Consumer *C*, who values the good at exactly the market price, enjoys no benefit.

Consumer surplus, which measures the total benefit to all consumers, is the yellow-shaded area between the demand curve and the market price.



9.1

EVALUATING THE GAINS AND LOSSES
FROM GOVERNMENT POLICIES—
CONSUMER AND PRODUCER SURPLUS (NR)

Review of Consumer and Producer Surplus

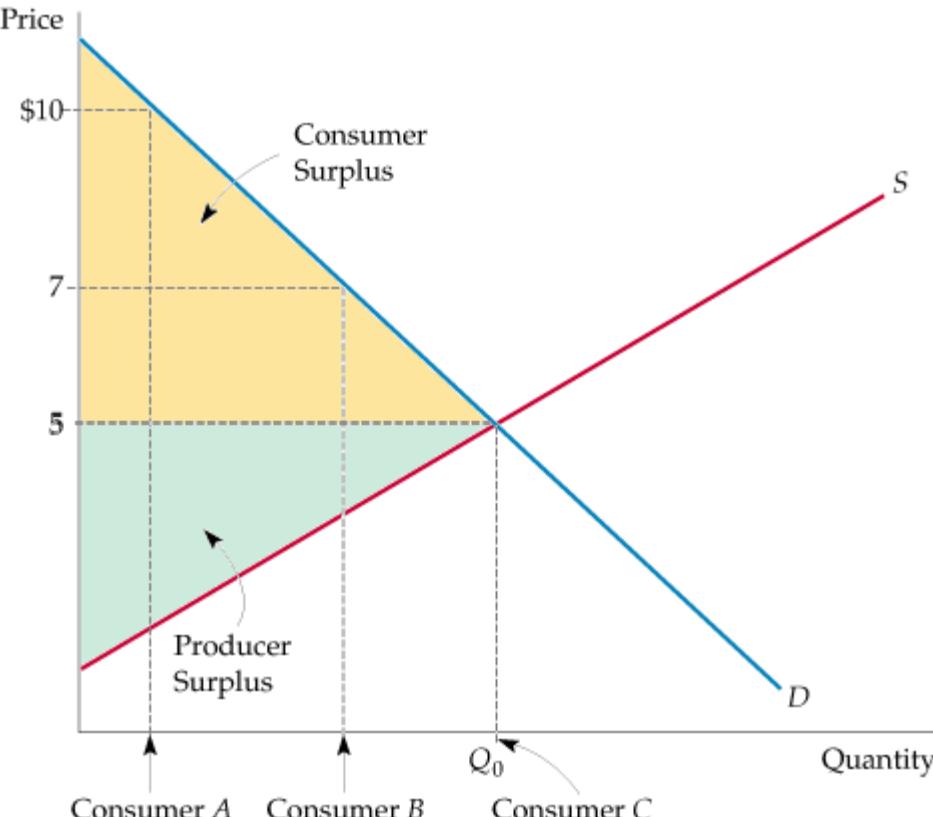
Figure 9.1

Consumer and Producer
Surplus (continued)

Producer surplus measures the total profits of producers, plus rents to factor inputs.

It is the green-shaded area between the supply curve and the market price.

Together, consumer and producer surplus measure the welfare benefit of a competitive market.



9.1

EVALUATING THE GAINS AND LOSSES FROM GOVERNMENT POLICIES— CONSUMER AND PRODUCER SURPLUS



Application of Consumer and Producer Surplus

- **welfare effects** Gains and losses to consumers and producers.

Figure 9.2

Change in Consumer and Producer Surplus from Price Controls

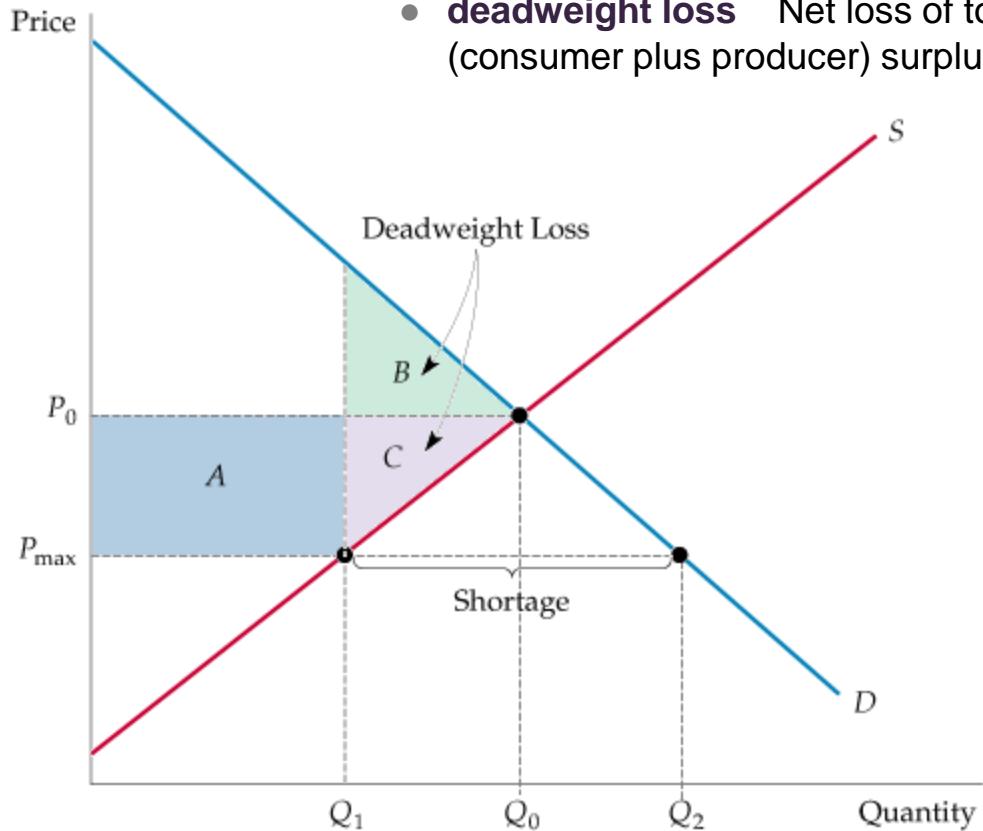
The price of a good has been regulated to be no higher than P_{\max} , which is below the market-clearing price P_0 .

The gain to consumers is the difference between rectangle A and triangle B.

The loss to producers is the sum of rectangle A and triangle C.

Triangles B and C together measure the deadweight loss from price controls.

- **deadweight loss** Net loss of total (consumer plus producer) surplus.



9.2

THE EFFICIENCY OF A COMPETITIVE MARKET



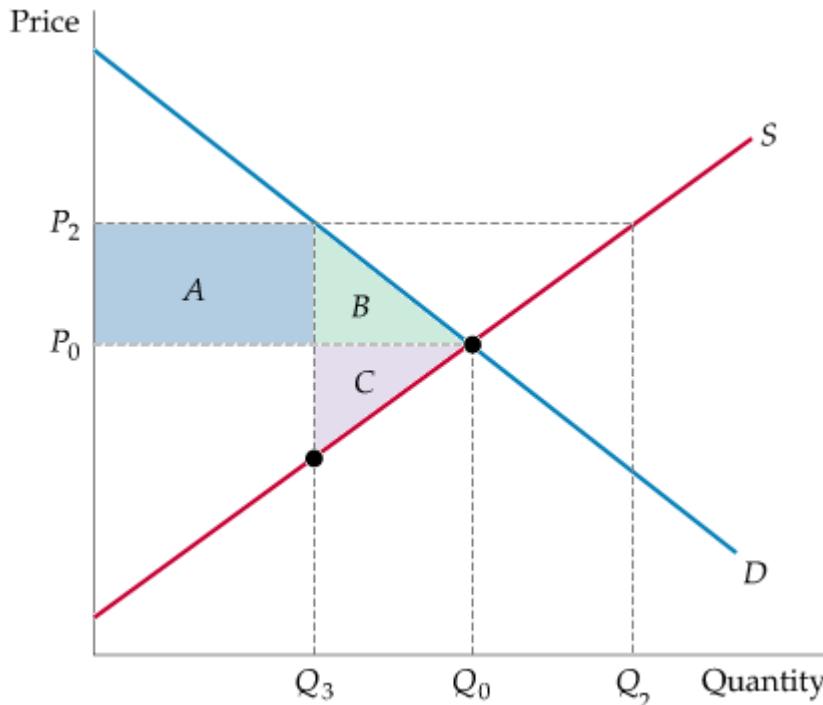
Figure 9.5

Welfare Loss When Price is Held Above Market-Clearing Level

When price is regulated to be no lower than P_2 , only Q_3 will be demanded.

If Q_3 is produced, the deadweight loss is given by triangles B and C .

At price P_2 , producers would like to produce more than Q_3 . If they do, the deadweight loss will be even larger.



9.3 MINIMUM PRICES



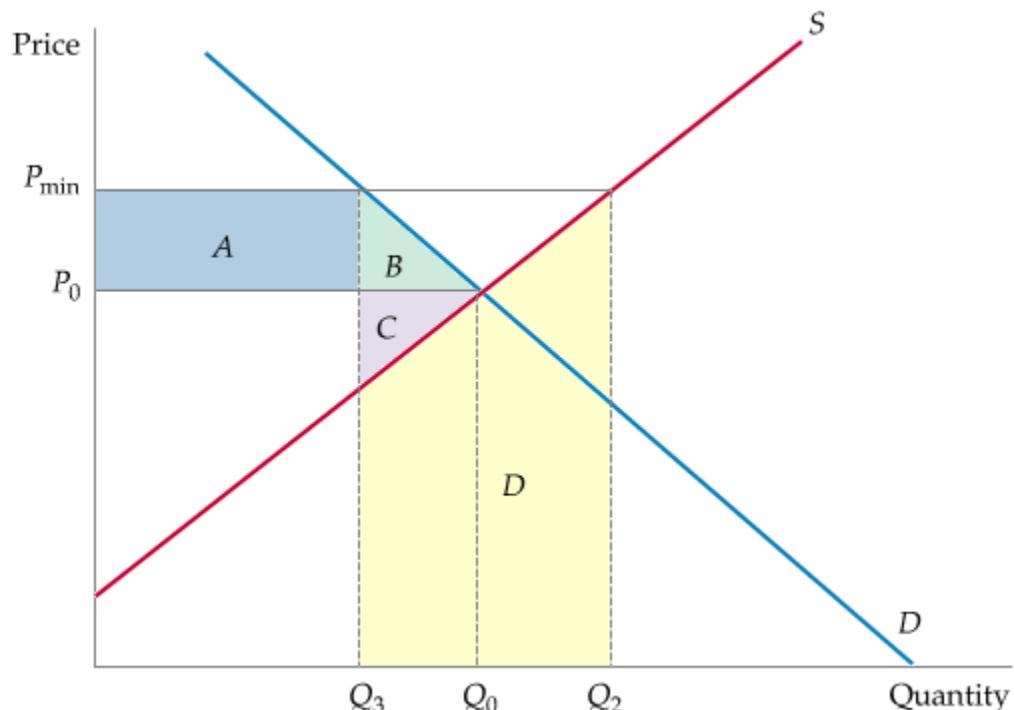
Figure 9.7

Price Minimum

Price is regulated to be no lower than P_{\min} .

Producers would like to supply Q_2 , but consumers will buy only Q_3 .

If producers indeed produce Q_2 , the amount $Q_2 - Q_3$ will go unsold and the change in producer surplus will be $A - C - D$. In this case, producers as a group may be worse off.



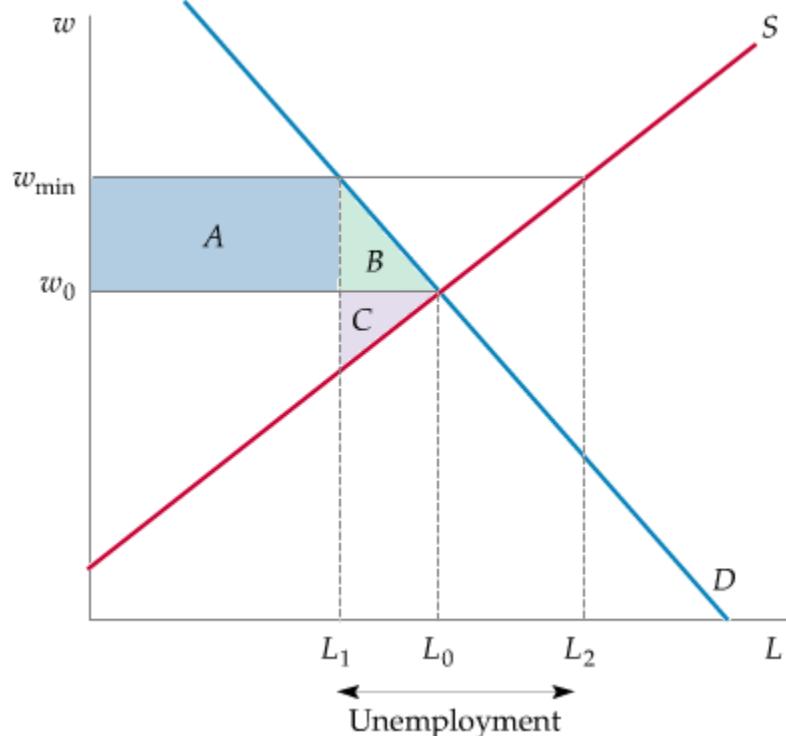
9.3 MINIMUM PRICES



Figure 9.8

The Minimum Wage

Although the market-clearing wage is w_0 , firms are not allowed to pay less than w_{\min} . This results in unemployment of an amount $L_2 - L_1$ and a deadweight loss given by triangles B and C .



9.4

PRICE SUPPORTS AND PRODUCTION QUOTAS



Price Supports

- **price support** Price set by government above free-market level and maintained by governmental purchases of excess supply.

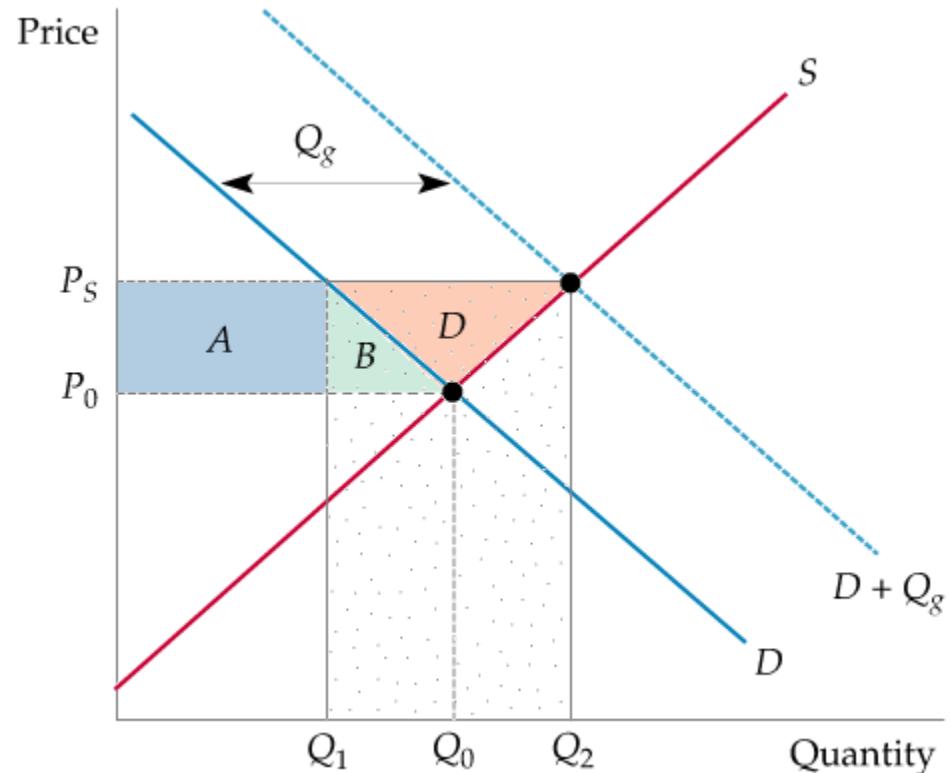
Figure 9.10

Price Supports

To maintain a price P_s above the market-clearing price P_0 , the government buys a quantity Q_g .

The gain to producers is $A + B + D$. The loss to consumers is $A + B$.

The cost to the government is the speckled rectangle, the area of which is $P_s(Q_2 - Q_1)$.



$$\text{Total change in welfare: } \Delta CS + \Delta PS - \text{Cost to Govt.} = D - (Q_2 - Q_1)P_s$$

9.4

PRICE SUPPORTS AND PRODUCTION QUOTAS
(NR)

Production Quotas

Figure 9.11

Supply Restrictions

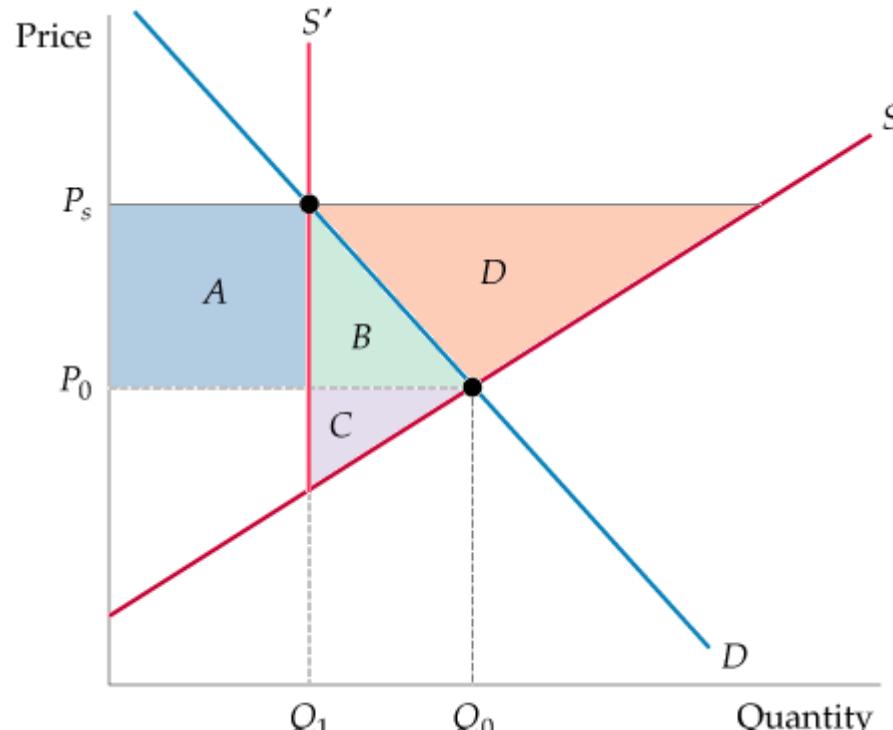
To maintain a price P_s above the market-clearing price P_0 , the government can restrict supply to Q_1 , either by imposing production quotas (as with taxicab medallions) or by giving producers a financial incentive to reduce output (as with acreage limitations in agriculture).

For an incentive to work, it must be at least as large as $B + C + D$, which would be the additional profit earned by planting, given the higher price P_s . The cost to the government is therefore at least $B + C + D$.

$$\Delta CS = -A - B$$

$$\Delta PS = A - C + \text{Payments for not producing}$$

$$\Delta \text{Welfare} = -A - B + A + B + D - B - C - D = -B - C$$



9.5 IMPORT QUOTAS AND TARIFFS



- **import quota** Limit on the quantity of a good that can be imported.
- **tariff** Tax on an imported good.

Figure 9.14

Import Tariff or Quota That Eliminates Imports

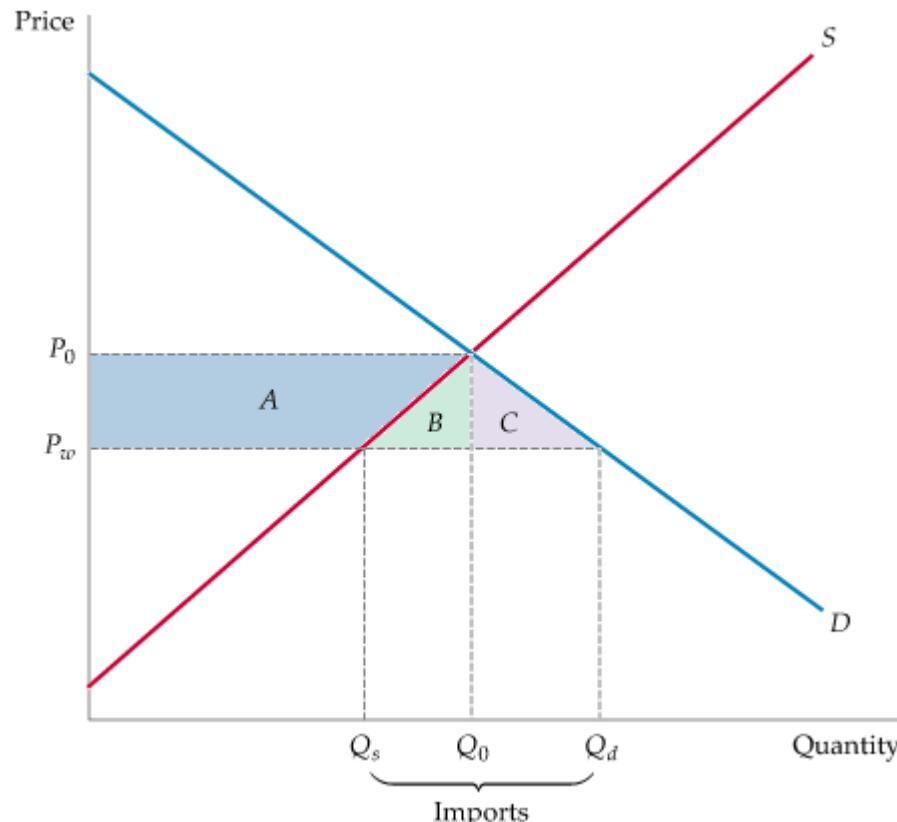
In a free market, the domestic price equals the world price P_w .

A total Q_d is consumed, of which Q_s is supplied domestically and the rest imported.

When imports are eliminated, the price is increased to P_0 .

The gain to producers is trapezoid A.

The loss to consumers is A + B + C, so the deadweight loss is B + C.



9.5

IMPORT QUOTAS AND TARIFFS



Figure 9.15

Import Tariff or Quota (General Case)

When imports are reduced, the domestic price is increased from P_w to P^* .

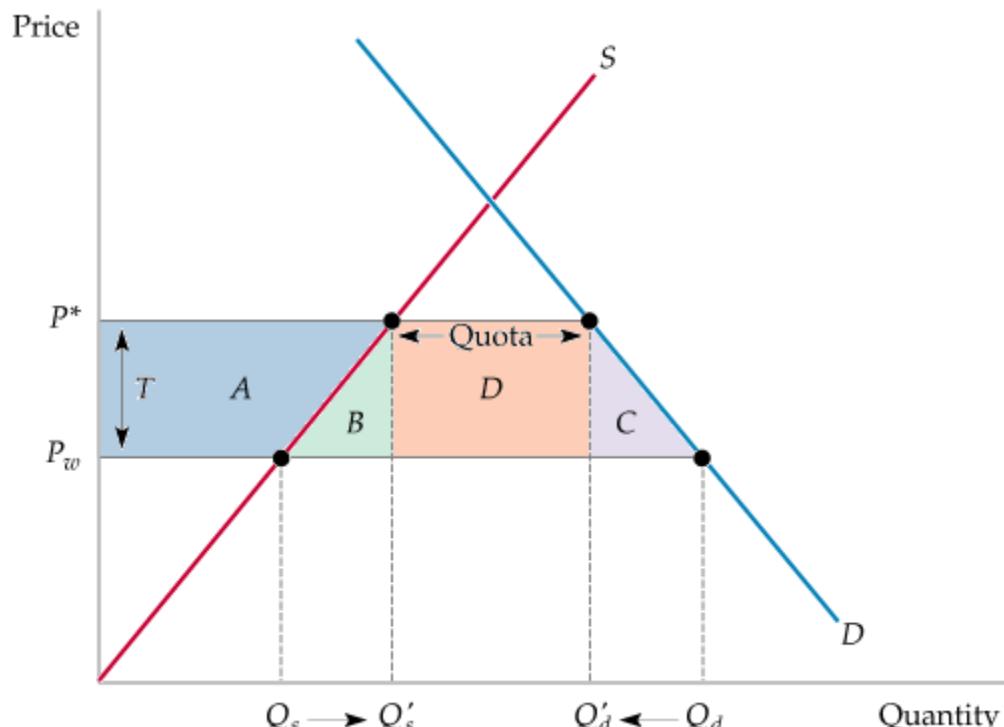
This can be achieved by a quota, or by a tariff $T = P^* - P_w$.

Trapezoid A is again the gain to domestic producers.

The loss to consumers is $A + B + C + D$.

If a tariff is used, the government gains D , the revenue from the tariff. The net domestic loss is $B + C$.

If a quota is used instead, rectangle D becomes part of the profits of foreign producers, and the net domestic loss is $B + C + D$.



→ Dead weight loss from overprod^y

↳ This arises because of negative externality

⇒ Neg. Externality

↳ When an ind. or a firm making a decision doesn't have to pay the full cost of decision

↳ e.g. → pollution

Suppose, producer doesn't take neg. externality into account while calculating their marginal cost [they don't take responsibility for -ve ext.]

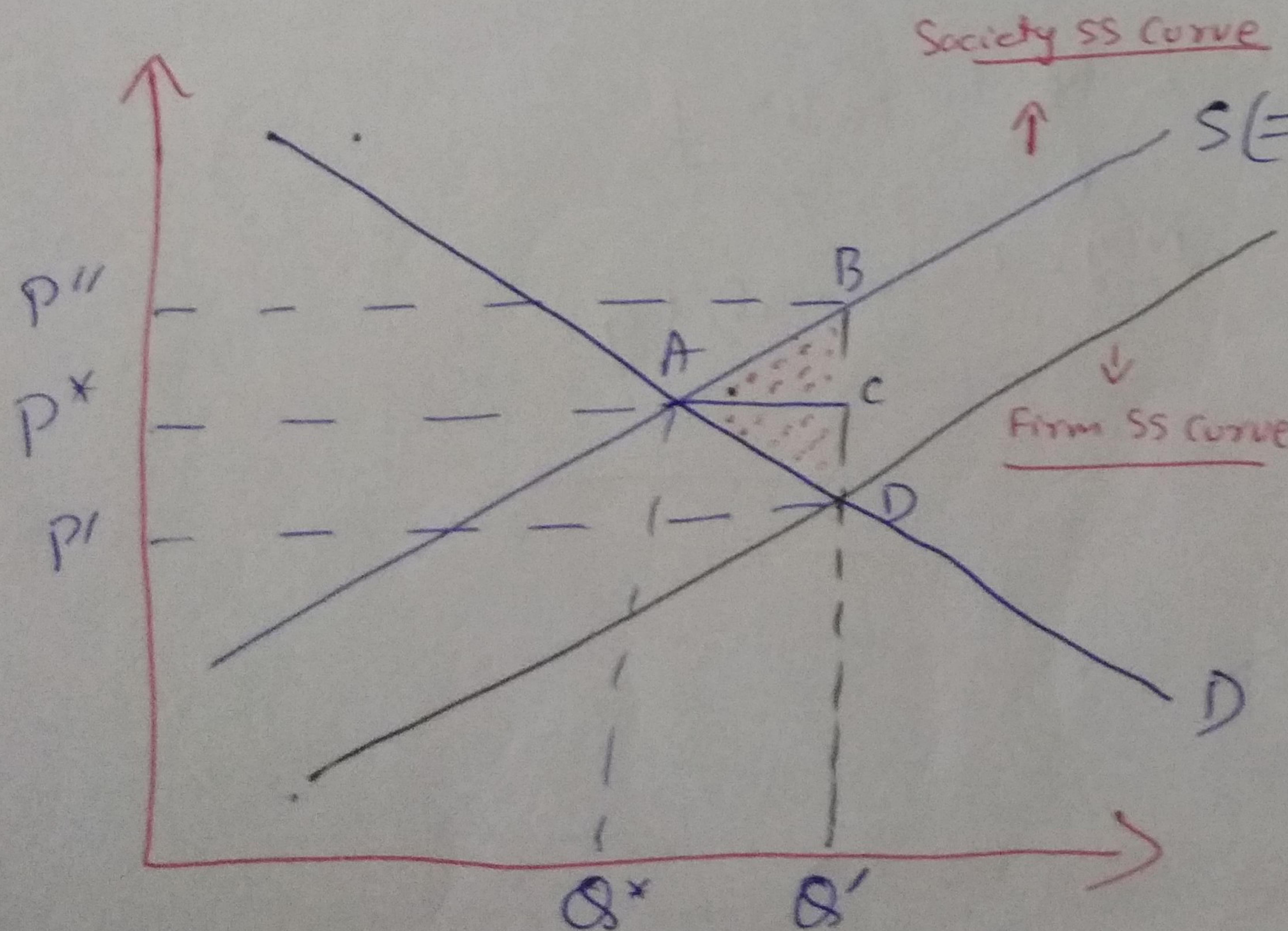
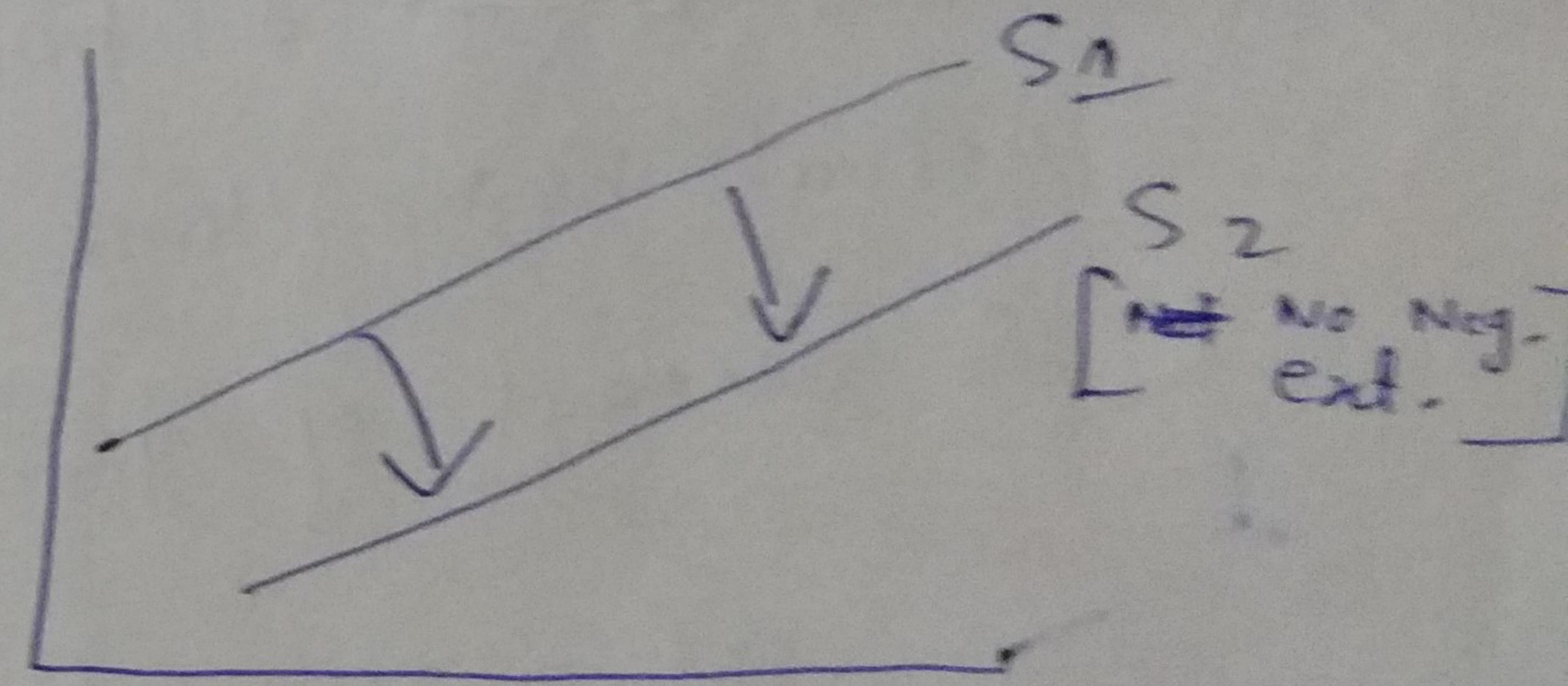
Therefore,

actual mar. cost = $\underline{MC_1}$

but

producer mar. cost = MC_2

Where, $\underline{MC_2 < MC_1}$



This graph shows the effect of Neg. Externality

Optimal quantity produced = Q^*
but because of negative externality,
production = Q'

For consumer;

They thought they are paying P'
but actually they are paying P^*

$$P^* = P' + \text{Price [due to polly: on their health etc]}$$

↓
Neg. Externality

Because firms are not paying the price for polly,
consumer have to pay the price

Sly,

for society's supply curve,

they thought they are receiving P'' for
producing Q'

but if you take pollution into account,
actual price that they are getting for producing
 Q' amount of goods = P^*

$$P^* = P'' - \text{Price [due to polly]}$$

↓
Neg. Externality

Elasticity

Prepared by:

Fernando & Yvonn Quijano



Elasticity

5

Chapter Outline

Price Elasticity of Demand

Slope and Elasticity

Types of Elasticity

Calculating Elasticities

Calculating Percentage Changes

Elasticity Is a Ratio of Percentages

The Midpoint Formula

Elasticity Changes along a Straight-Line Demand Curve

Elasticity and Total Revenue

The Determinants of Demand Elasticity

Availability of Substitutes

The Importance of Being Unimportant

The Time Dimension

Other Important Elasticities

Income Elasticity of Demand

Cross-Price Elasticity of Demand

Elasticity of Supply

Looking Ahead

Appendix: Point Elasticity

Why elasticity?

To understand the responsiveness of consumers and producers in markets to price changes

- Understanding the responsiveness of consumers and producers in markets to price changes **is key to answering a wide range of economic problems.**
 - Should McDonald's lower the price of its Big Mac?
 - For McDonald's, the answer depends on **whether that price cut increases or decreases its profits.**
 - The answer to that, in turn, depends on **how its customers are likely to respond to the price cut.**
 - How many more Big Macs will be sold, and will the new sales come at the expense of the sandwiches sold at Subway or be a substitution of McDonald's Chicken McNuggets for Big Macs?
 - How many potential new smokers will be deterred from smoking by higher cigarette prices the government has induced?

Why elasticity?

To understand the responsiveness of consumers and producers in markets to price changes

- Questions such as these lie at the core of economics.
 - To answer these questions, we need to measure the magnitude of market responses

ELASTICITY

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

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

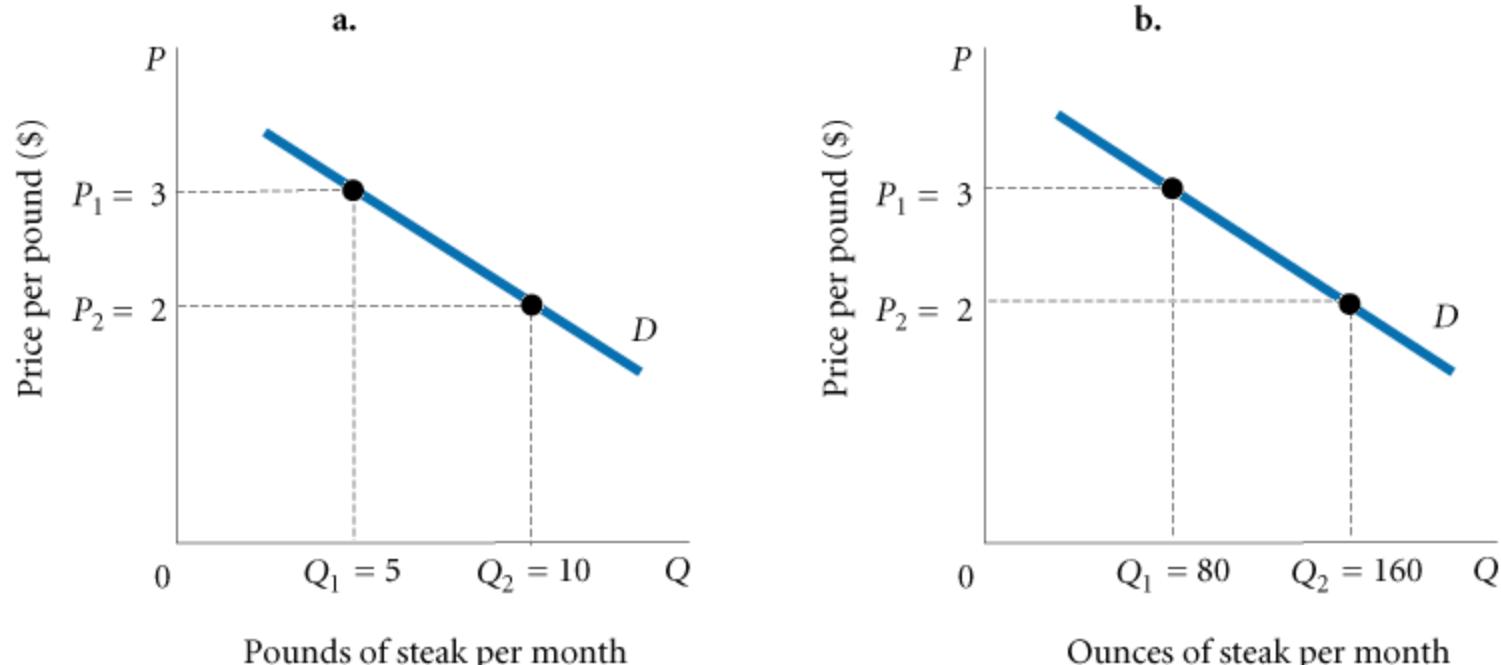
PRICE ELASTICITY OF DEMAND:

1. SLOPE AND ELASTICITY

- The slope of a demand curve may in a rough way reveal the responsiveness of the quantity demanded to price changes, **but slope can be quite misleading.**
 - In fact, it is not a good formal measure of responsiveness.
- Consider the **two identical demand curves** in Figure 5.1.
 - The only difference between the two is that quantity demanded is measured in pounds in the graph on the left and in ounces in the graph on the right.
 - The curve on the left has a slope of -1/5, and the curve on the right has a slope of -1/80; yet the two curves represent the exact same behavior

CHAPTER 5: Elasticity

SLOPE AND ELASTICITY



$$\text{Slope: } \frac{\Delta Y}{\Delta X} = \frac{P_2 - P_1}{Q_2 - Q_1}$$
$$= \frac{2 - 3}{10 - 5} = -\frac{1}{5}$$

$$\text{Slope: } \frac{\Delta Y}{\Delta X} = \frac{P_2 - P_1}{Q_2 - Q_1}$$
$$= \frac{2 - 3}{160 - 80} = -\frac{1}{80}$$

FIGURE 5.1 Slope Is Not a Useful Measure of Responsiveness

Why we don't use slope?

- The problem is that the **numerical value of slope depends on the units used to measure the variables on the axes.**
 - **To correct this problem, we must convert the changes in price and quantity to percentages.**
- **Changes in Percentage:**
 - By looking at **by how much the percent quantity demanded changes for a given percent price change, we have a measure of responsiveness that does not change with the unit of measurement.**
 - **The price increase in Figure 5.1 leads to a decline of 5 pounds, or 80 ounces, in the quantity of steak demanded — a decline of 50 percent from the initial 10 pounds, or 160 ounces, whether we measure the steak in pounds or ounces**

PRICE ELASTICITY OF DEMAND

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 demand 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

elastic demand

A demand relationship in which the percentage change in quantity demanded is larger in absolute value than the percentage change in price (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

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.

perfectly inelastic demand

Demand in which quantity demanded does not respond at all to a change in price

Types of Elasticity: Example

- What type of good might have a perfectly elastic demand curve?
 - Suppose there are two identical vendors selling Good Humor bars on a beach. If one vendor increased his price, all the buyers would flock to the second vendor. In this case, a small price increase costs the first vendor all his business; the demand he faces is perfectly elastic.
- Products with perfectly inelastic demand are harder to find, but some life-saving medical products like insulin may be close, in that very high price increases may elicit no response in terms of quantity demanded.
- The demand for oil is inelastic, for example, because even with a price increase, it is hard to substitute oil for other products.
- The demand for a Nestlé Crunch bar is much more elastic, in part because there are so many more substitutes

PRICE ELASTICITY OF DEMAND

TYPES OF ELASTICITY

TABLE 5.1 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%	0.0 → Perfectly inelastic
Basic telephone service	+10%	-1%	-0.1 → Inelastic
Beef	+10%	-10%	-1.0 → Unitarily elastic
Bananas	+10%	-30%	-3.0 → Elastic

unitary elasticity/ Unitarily elastic

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).

PRICE ELASTICITY OF DEMAND

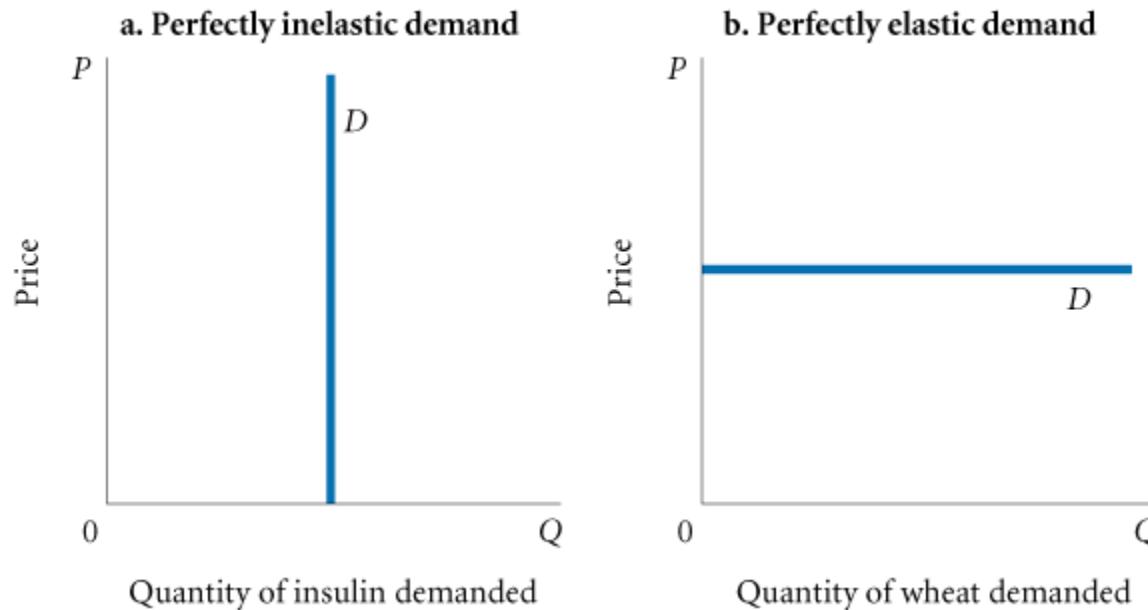
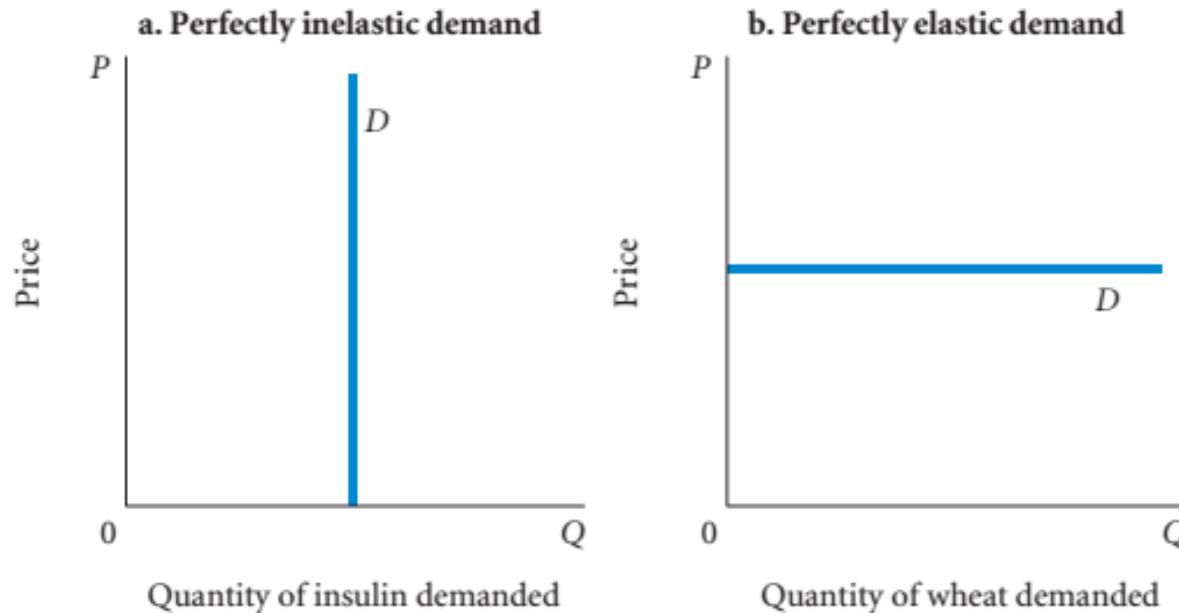


FIGURE 5.2 Perfectly Elastic and Perfectly Inelastic Demand Curves

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

**Perfectly Elastic
and Perfectly Inelastic**



▲ **FIGURE 5.2** Perfectly Inelastic and Perfectly Elastic Demand Curves

Figure 5.2(a) shows a perfectly inelastic demand curve for insulin. Price elasticity of demand is zero. Quantity demanded is fixed; it does not change at all when price changes. Figure 5.2(b) shows a perfectly elastic demand curve facing a wheat farmer. A tiny price increase drives the quantity demanded to zero. In essence, perfectly elastic demand implies that individual producers can sell all they want at the going market price but cannot charge a higher price.

PRICE ELASTICITY OF DEMAND

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.

For example, a technical paper might report that the demand for housing “appears to be inelastic with respect to price, or less than 1 (0.6).” What the writer means is that the estimated elasticity is -.6, which is between zero and -1. Its absolute value is less than 1.

CALCULATING ELASTICITIES

CALCULATING PERCENTAGE CHANGES

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

$$\begin{aligned}\% \text{ change in quantity demanded} &= \frac{\text{change in quantity demanded}}{Q_1} \times 100\% \\ &= \frac{Q_2 - Q_1}{Q_1} \times 100\%\end{aligned}$$

CALCULATING ELASTICITIES

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 simply:

$$\begin{aligned}\% \text{ change in price} &= \frac{\text{change in price}}{P_1} \times 100\% \\ &= \frac{P_2 - P_1}{P_1} \times 100\%\end{aligned}$$

CALCULATING ELASTICITIES

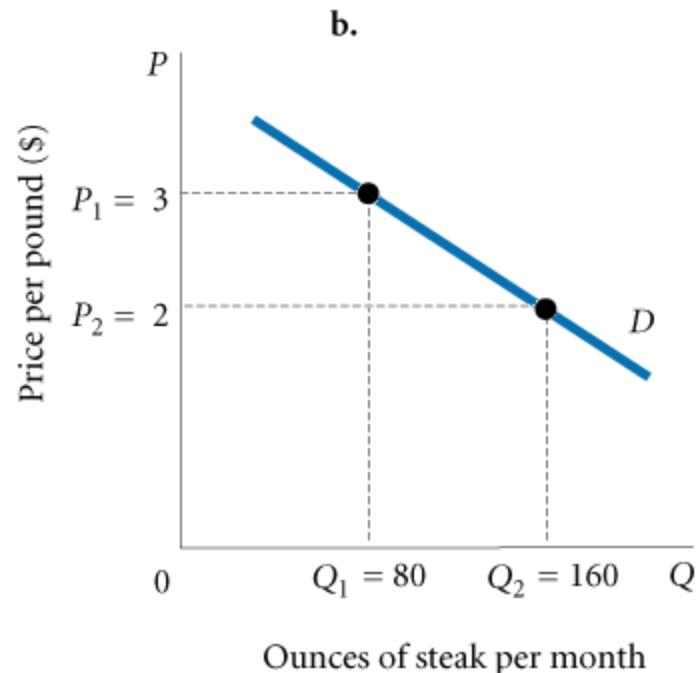
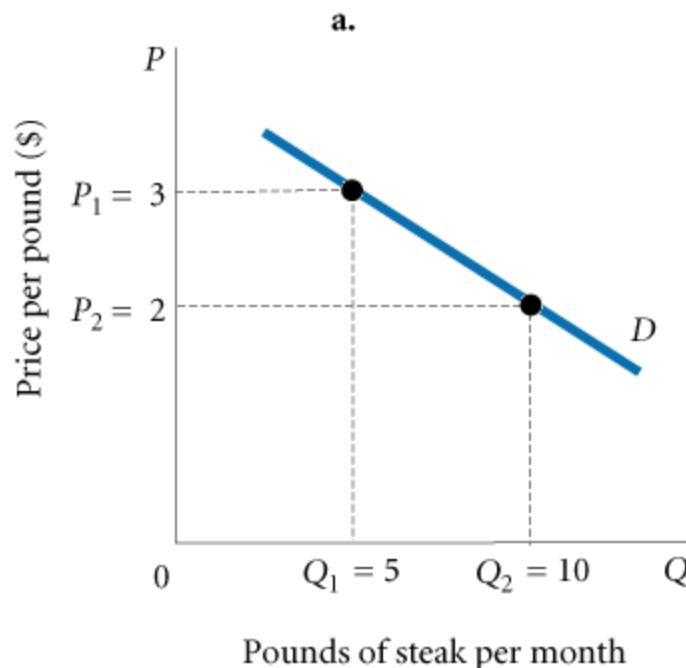
ELASTICITY IS A RATIO OF PERCENTAGES

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

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

PRICE ELASTICITY OF DEMAND

SLOPE AND ELASTICITY



$$\text{Slope: } \frac{\Delta Y}{\Delta X} = \frac{P_2 - P_1}{Q_2 - Q_1}$$

$$= \frac{2 - 3}{10 - 5} = -\frac{1}{5}$$

$$\text{Slope: } \frac{\Delta Y}{\Delta X} = \frac{P_2 - P_1}{Q_2 - Q_1}$$

$$= \frac{2 - 3}{160 - 80} = -\frac{1}{80}$$

FIGURE 5.1 Slope Is Not a Useful Measure of Responsiveness

- **For our Example:**
 - % change in quantity = $(10-5) / 5 * 100\% = 100\%$
 - % change in price = $(2-3) / 3 * 100\% = -33.3\%$
 - Therefore, Price elasticity of demand = $+100\% / -33.3\% = -3.0$
 - Hence, the demand for steak is elastic

CALCULATING ELASTICITIES

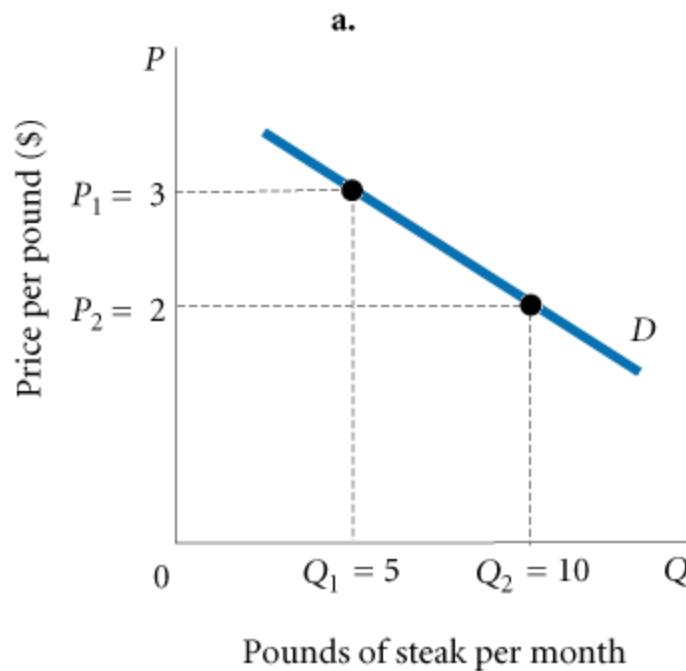
THE MIDPOINT FORMULA

- Although simple, the use of the initial values of P and Q as the bases for calculating percentage changes can be misleading.
- Let us return to the **example of demand for steak** in Figure 5.1(a), where we have a change in quantity demanded of 5 pounds.
 - Using the initial value Q₁ as the base, we calculated that this change represents a 100 percent increase over the base.
 - Now suppose that the price of steak rises to \$3 again, causing the quantity demanded to drop back to 5 pounds.
 - How much of a percentage decrease in quantity demanded is this?
 - Earlier, Q₁= 5 & Q₂ = 10
 - Now, Q₁= 10 & Q₂ = 5
 - Therefore, % change in quantity demanded = $(5-10) / 10 * 100\% = -50\%$
 - While earlier, % change in quantity demanded = $(10-5) / 5 * 100\% = 100\%$

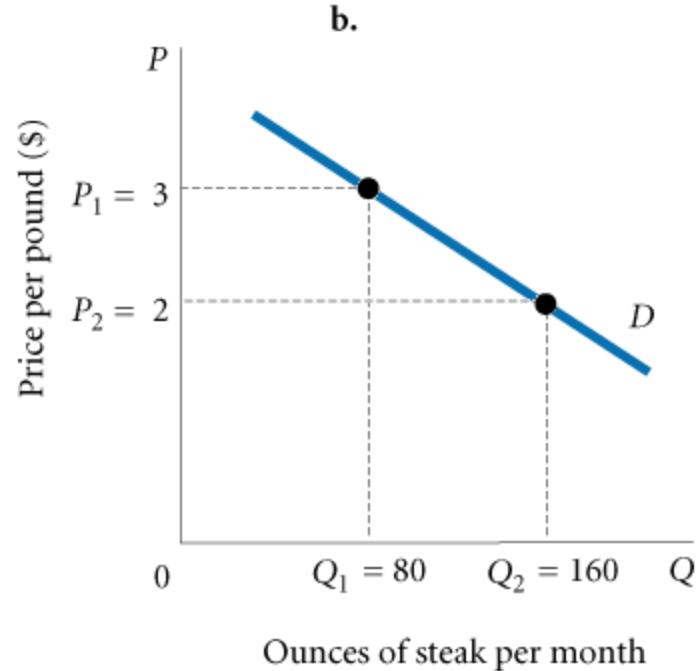
CHAPTER 5: Elasticity

PRICE ELASTICITY OF DEMAND

SLOPE AND ELASTICITY



$$\text{Slope: } \frac{\Delta Y}{\Delta X} = \frac{P_2 - P_1}{Q_2 - Q_1}$$
$$= \frac{2 - 3}{10 - 5} = -\frac{1}{5}$$



$$\text{Slope: } \frac{\Delta Y}{\Delta X} = \frac{P_2 - P_1}{Q_2 - Q_1}$$
$$= \frac{2 - 3}{160 - 80} = -\frac{1}{80}$$

FIGURE 5.1 Slope Is Not a Useful Measure of Responsiveness

Why mid-point?

- Thus, an increase from 5 pounds to 10 pounds is a 100 percent increase but a decrease from 10 pounds to 5 pounds is only a 50 percent decrease
 - This does not make much sense because **in both cases, we are calculating elasticity on the same interval on the demand curve.**
- Changing the “direction” of the calculation should not change the elasticity
- **To describe percentage changes more accurately**, a simple convention has been adopted.
 - Instead of using the initial percentages, we use the midpoints of these variables as values of Q and P as the bases for calculating as the bases.
 - That is, we use the value halfway between P1 and P2 for the base in calculating the percentage change in price and the value halfway between Q1 and Q2 as the base for calculating percentage change in quantity demanded.

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.

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

CALCULATING ELASTICITIES

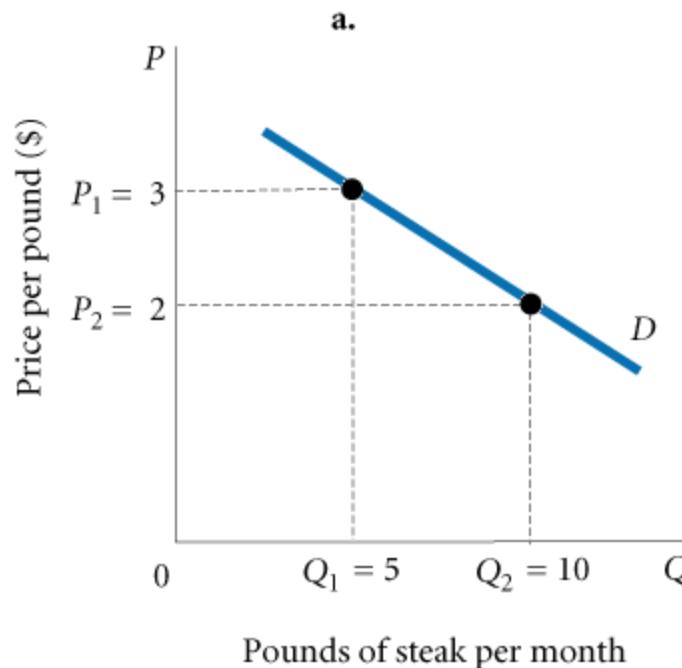
Using the point halfway between P_1 and P_2 as the base for calculating the percentage change in price, we get

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

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

CHAPTER 5: Elasticity

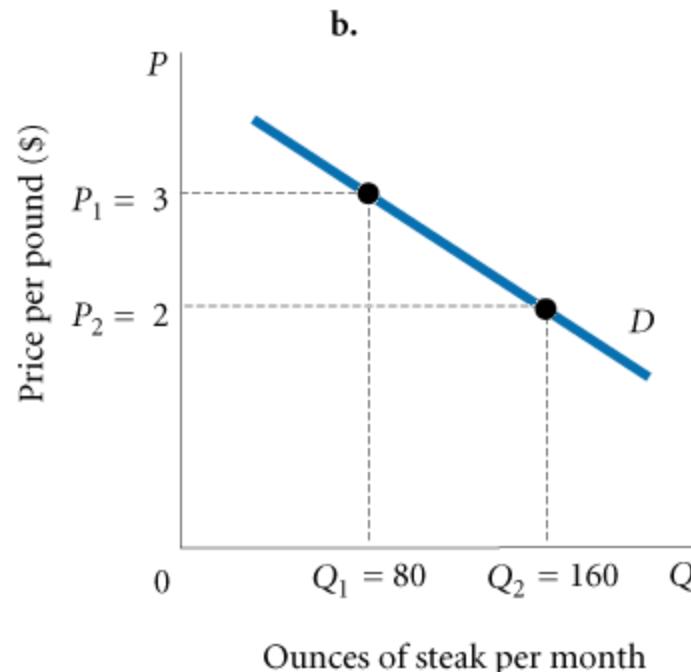
PRICE ELASTICITY OF DEMAND: By Mid-Point formula



Pounds of steak per month

$$\text{Slope: } \frac{\Delta Y}{\Delta X} = \frac{P_2 - P_1}{Q_2 - Q_1}$$

$$= \frac{2 - 3}{10 - 5} = -\frac{1}{5}$$



Ounces of steak per month

$$\text{Slope: } \frac{\Delta Y}{\Delta X} = \frac{P_2 - P_1}{Q_2 - Q_1}$$

$$= \frac{2 - 3}{160 - 80} = -\frac{1}{80}$$

FIGURE 5.1 Slope Is Not a Useful Measure of Responsiveness

CALCULATING ELASTICITIES

TABLE 5.2 Calculating Price Elasticity with the Midpoint Formula

First, Calculate Percentage Change in Quantity Demanded (%ΔQ_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 (%ΔP):

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

PRICE ELASTICITY COMPARES THE PERCENTAGE CHANGE IN QUANTITY DEMANDED AND THE PERCENTAGE CHANGE IN PRICE:

$$\begin{aligned} \frac{\% \Delta Q_D}{\% \Delta P} &= \frac{66.7\%}{-40.0\%} \\ &= 1.67 \\ &= \text{PRICE ELASTICITY OF DEMAND} \\ &\text{DEMAND IS ELASTIC} \end{aligned}$$

By substituting the numbers from Figure 5.1(a):

$$\% \text{ change in price} = \frac{2 - 3}{(3 + 2) / 2} \times 100\% = \frac{-1}{2.5} \times 100\% = -40.0\%$$

CHAPTER 5: Elasticity

CALCULATING ELASTICITIES: ELASTICITY CHANGES ALONG A STRAIGHT-LINE DEMAND CURVE

ELASTICITY CHANGES ALONG A STRAIGHT-LINE DEMAND CURVE

TABLE 5.3 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

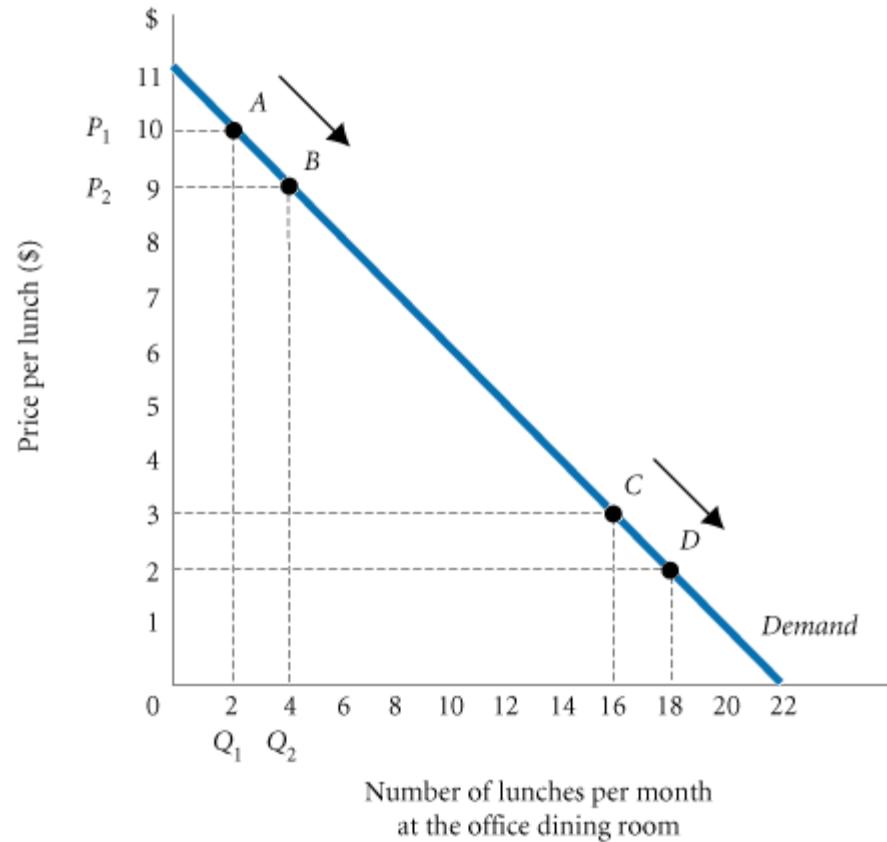


FIGURE 5.3 Demand Curve for Lunch at the Office Dining Room

ELASTICITY CHANGES ALONG A STRAIGHT-LINE DEMAND CURVE

- An interesting and important point is that elasticity changes from point to point along a demand curve even when the slope of that demand curve does not change — that is, even along a straight line demand curve.

Why Elasticity changes:

Why elasticity might change as we vary price.

- Example:
 - Consider again McDonald's decision to reduce the price of a Big Mac.
 - Suppose McDonald's found that at the current price of \$3, a small price cut would generate a large number of new customers who wanted burgers.
 - Demand, in short, was relatively elastic.
 - What happens as McDonald's continues to cut its price?
 - As the price moves from \$2.50 to \$2.00, for example, new customers lured in by the price cuts are likely to decrease; in some sense, McDonald's will be running out of customers who are interested in its burgers at any price.
 - It should come as no surprise that as we move down a typical straight-line demand curve, price elasticity falls.
 - Demand becomes less elastic as price is reduced.
 - Consider the **demand schedule** shown in Table 5.2 and the **demand curve** in Figure 5.3

CHAPTER 5: Elasticity

CALCULATING ELASTICITIES

ELASTICITY CHANGES ALONG A STRAIGHT-LINE DEMAND CURVE

TABLE 5.3 Demand Schedule for Office Dining Room Lunches

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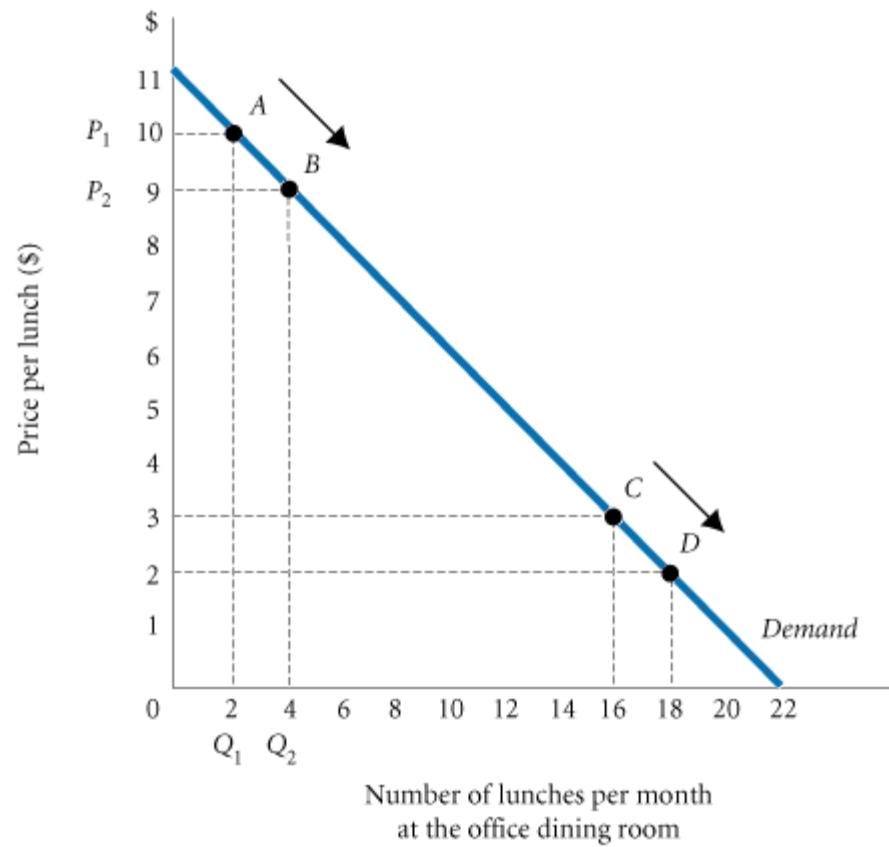


FIGURE 5.3 Demand Curve for Lunch at the Office Dining Room

- **Price elasticity of demand between points A and B on the demand curve**
- Let us calculate **price elasticity of demand between points A and B on the demand curve** in Figure 5.3.
 - Moving from *A* to *B*, the price of a lunch drops from \$10 to \$9 (a decrease of \$1) and the number of dining room lunches that Herb eats per month increases from two to four (an increase of two).
 - First, we calculate the percentage change in quantity demanded:
 - $\% \text{ change in quantity demanded} = (Q_2 - Q_1) / \{(Q_1 + Q_2) / 2\} * 100 = 4 - 2 / \{(2 + 4) / 2\} * 100 = 66.7\%$
 - Next,
 - $\% \text{ change in price} = 9 - 10 / \{(10 + 9) / 2\} * 100\% = -10.5\%$
 - Finally,
 - **Elasticity of demand = 66.7% / -10.5% = -6.4**
 - The percentage change in quantity demanded is 6.4 times larger than the percentage change in price.
 - In other words, **Herb's demand between points A and B is quite responsive; his demand between points A and B is elastic.**

Price elasticity of demand between points C and D on the demand curve

- **Price elasticity of demand between points C and D on the demand curve**
- Now consider a different movement along the *same* demand curve in Figure 5.3.
 - Moving from point **C** to point **D**, the graph indicates that at a price of \$3, Herb eats in the office dining room 16 times per month.
 - If the price drops to \$2, he will eat there 18 times per month.
 - These changes expressed in numerical terms are exactly the same as the price and quantity changes between points A and B in the figure — price falls \$1, and quantity demanded increases by two meals.
 - Expressed in *percentage* terms, however, these changes are very different
 - **The elasticity of demand between points C and D** is thus 11.76 percent divided by -40 percent, or **-0.294**.
 - Change in Price = -40%
 - Change in Quantity = 11.76%
 - Elasticity of Demand = $(11.76\% / -40\%) = -0.294$

A&B vs C&D [NA]

- By using the midpoints as the base, the \$1 price decline is only a 10.5 percent reduction when price is around \$9.50, between points A and B.
 - Between A & B: $\{(9-10) / 9.5\} * 100 = -10.5\%$
- The same \$1 price decline is a 40 percent reduction when price is around \$2.50, between points C and D.
 - Between C & D: $\{(2-3) / 2.5\} * 100 = -40\%$
- The two-meal increase in quantity demanded is a 66.7 percent increase when Herb averages only 3 meals per month, but it is only an 11.76 percent increase when he averages 17 meals per month.
 - Between A & B: $\{(4-2) / 3\} * 100 = 66.7\%$
 - Between C & D: $\{(18-16) / 17\} * 100 = 11.76\%$

CHAPTER 5: Elasticity

CALCULATING ELASTICITIES

ELASTICITY CHANGES ALONG A STRAIGHT-LINE DEMAND CURVE

TABLE 5.3 Demand Schedule for Office Dining Room Lunches

PRICE (PER LUNCH)	QUANTITY DEMANDED (LUNCHES PER MONTH)
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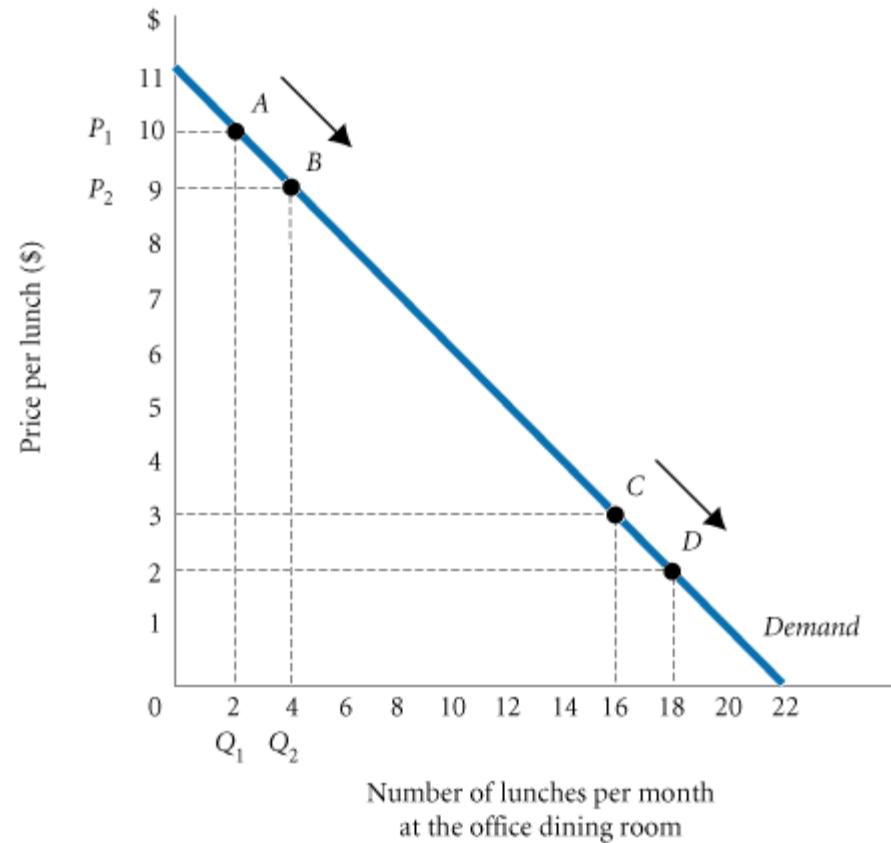


FIGURE 5.3 Demand Curve for Lunch at the Office Dining Room

A&B vs C&D [Summary]

- The percentage changes between *A* and *B* are very different from those between *C* and *D*, and so are the elasticities.
 - Herb's demand is quite elastic (-6.4) between points A and B; a 10.5 percent reduction in price caused a 66.7 percent increase in quantity demanded.
 - However, his demand is inelastic (-0.294) between points C and D; a 40 percent decrease in price caused only an 11.76 percent increase in quantity demanded.
- IMP (Underlying Economics)
 - Again, it is useful to keep in mind the underlying economics as well as the mathematics.
 - At high prices, there is a great deal of potential demand for the dining room to capture.
 - Hence, quantity is likely to respond well to price cuts.
 - At low prices, everyone who is likely to come to the dining room already has.

CALCULATING ELASTICITIES: ELASTICITY AND TOTAL REVENUE

ELASTICITY AND TOTAL REVENUE

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

$$TR = P \times Q$$

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

$$P \downarrow \rightarrow Q_D \uparrow$$

OPEC vs OBEC

- We have seen that oil-producing countries often can increase their revenues by restricting supply and pushing up the market price of crude oil.[OPEC]
 - We also argued that a similar strategy by banana-producing countries would probably fail. [organization of banana-exporting countries (OBEC)]
- Why?
 - The quantity of oil demanded is not as responsive to a change in price as is the quantity of bananas demanded.
 - In other words, the demand for oil is more inelastic than is the demand for bananas.
- One of the very useful features of elasticity is that knowing the value of price elasticity allows us to quickly see what happens to a firm's revenue as it raises and cuts its prices.
 - When demand is inelastic, raising prices will raise revenues; when (as in the banana case) demand is elastic, price increases reduce revenues.

Effects of price increase on a product with inelastic & elastic demand

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. **If the percentage decrease in quantity demanded is smaller than the percentage increase in price, total revenue will rise**

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. This occurs when demand is *elastic*. The percentage price increase is outweighed by the percentage quantity decline:

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

Effects of price cut on a product with inelastic & elastic demand

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:

$$\downarrow P \times Q_D \uparrow = TR \downarrow$$

To increase revenue: Options for firms (depend on elasticity)

- If market is elastic:
 - Having a responsive (or elastic) market is good when we are lowering price because it means that we are dramatically increasing our units sold.
 - But that same responsiveness is unattractive as we contemplate raising prices because now it means that we are losing customers.
- And, of course, the reverse logic works in the inelastic market.
- Imp:
 - Note that if there is unitary elasticity, total revenue is unchanged if the price changes.

OPEC vs OBEC

- With this knowledge, we can now see why reducing supply by the oil-producing countries was so effective.
 - The demand for oil is inelastic.
 - Restricting the quantity of oil available led to a huge increase in the price of oil—the percentage increase was larger in absolute value than the percentage decrease in the quantity of oil demanded.
 - Hence, oil producers' total revenues went up.
- In contrast, a banana cartel would not be effective because the demand for bananas is elastic.
 - A small increase in the price of bananas results in a large decrease in the quantity of bananas demanded and thus causes total revenues to fall.

THE DETERMINANTS OF DEMAND ELASTICITY

- **Elasticity of demand is a way of measuring the responsiveness of consumers' demand to changes in price.**
- As a measure of behavior, it can be applied to individual households or to market demand as a whole.
 - You love peaches, and you would hate to give them up. Your demand for peaches is therefore inelastic.
 - However, not everyone is crazy about peaches; in fact, the market demand for peaches is relatively elastic.
- Because no two people have exactly the same preferences, reactions to price changes will be different for different people, which makes generalizations risky.
 - Nonetheless, **a few principles do seem to hold.**

1. AVAILABILITY OF SUBSTITUTES

- Perhaps the most obvious factor affecting demand elasticity is the availability of substitutes.
 - In the oil versus banana example, the demand for oil is inelastic in large measure due to the lack of substitutes.
 - When the oil producing countries (OPEC) cut production, the price of oil rose sharply.
 - Quantity demanded fell somewhat, but price increased over 400 percent.
 - What makes the cases of OPEC and OBEC different is the magnitude of the response in the quantity demanded to a change of price.
 - If Substitutes available – **elastic (Banana)**
 - If substitutes not available – **Inelastic (Oil)**

2. 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.
 - For example, if you pick up a pack of mints once in a while, you might not notice an increase in price from 25 cents to 35 cents.
 - Yet this is a 40 percent increase in price (33.3 percent using the midpoint formula).
 - In cases such as these, we are not likely to respond very much to changes in price and demand is likely to be inelastic.
 - Example – Mint etc

3. 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.
- Example – Oil prices (people will buy more car pooling, fuel efficient car, public transport etc)

4. Luxuries versus Necessities

Luxury goods (e.g., yachts) tend to have relatively elastic demand, and necessities (e.g., food) have inelastic demand.

OTHER IMPORTANT ELASTICITIES

INCOME ELASTICITY OF DEMAND

income elasticity of demand Measures the responsiveness of demand to changes in income.

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

Why Income Elasticity?

- **Measuring income elasticity is important for many reasons.**
 - Government policy makers spend a great deal of time and money weighing the relative merits of different policies.
 - During the 1970s, for example, the Department of Housing and Urban Development (HUD) conducted a huge experiment in four cities to estimate the income elasticity of housing demand.
 - In this “housing allowance demand experiment,” low-income families received housing vouchers over an extended period of time and researchers watched their housing consumption for several years.
 - Most estimates, including the ones from the HUD study, put the income elasticity of housing demand between 0.5 and 0.8.
 - That is, a 10 percent increase in income can be expected to raise the quantity of housing demanded by a household by 5 percent to 8 percent

Price elasticity of DD negative (till now) but Income elasticity can be positive or negative

- Income elasticities can be positive or negative.
 - During periods of rising income, people increase their spending on some goods (positive income elasticity) but reduce their spending on other goods (negative income elasticity).
 - UBER vs Bus No. 212
 - The income elasticity of demand for jewelry is positive, while the income elasticity of demand for low-quality beef is negative.
 - As incomes rise in many low-income countries, the birth rate falls, implying a negative income elasticity of demand for children.
 - Also, as incomes rise in most countries, the demand for education and health care rises, a positive income elasticity.

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.

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

Cross-price elasticity can be positive or negative

- Like income elasticity, cross-price elasticity can be either positive or negative.
 - A *positive* cross-price elasticity indicates that an increase in the price of X causes the demand for Y to rise.
 - **This implies that the goods are substitutes.**
 - For McDonald's, Big Macs and Chicken McNuggets are substitutes with a positive cross-price elasticity.
 - In our earlier example, as McDonald's lowered the price of Big Macs, it saw a decline in the quantity of McNuggets sold as consumers substituted between the two meals.
 - If cross-price elasticity turns out to be *negative*, an increase in the price of X causes a decrease in the demand for Y.
 - **This implies that the goods are complements.**
 - Printers & Ink Cartridges

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.

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

Elasticity of supply- Output market

- **In output markets, the elasticity of supply is likely to be a positive number—**
 - **that is, a higher price leads to an increase in the quantity supplied, ceteris paribus.**
- **The elasticity of supply is a measure of how easily producers can adapt to a price increase and bring increased quantities to market.**
 - **In some industries, it is relatively easy for firms to increase their output.**
 - Ballpoint pens fall into this category, as does most software that has already been developed. For these products, the elasticity of supply is very high.
 - **In the oil industry, supply is inelastic, much like demand**

Elasticity of supply- Input market

- In input markets, however, some interesting problems arise in looking at elasticity.
- Perhaps the most studied elasticity of all is the **elasticity of labor supply**, which measures the response of labor supplied to a change in the price of labor.
 - Economists have examined household labor supply responses to government programs such as welfare, Social Security, the income tax system, need-based student aid, and unemployment insurance.

OTHER IMPORTANT ELASTICITIES

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

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

Why ELS can be negative?

- It seems reasonable at first glance to assume that an increase in wages increases the quantity of labor supplied.
 - That would imply an upward-sloping supply curve and a positive labor supply elasticity, but this is not necessarily so.
- Why ELS can be negative:
 - An increase in wages makes workers better off:
 - They can work the same number of hours and have higher incomes.
 - One of the things workers might like to “buy” with that higher income is more leisure time.
 - “Buying” leisure simply means working fewer hours, and the “price” of leisure is the lost wages.
 - Thus, it is quite possible that to some groups, an increase in wages above some level will lead to a reduction in the quantity of labor supplied.

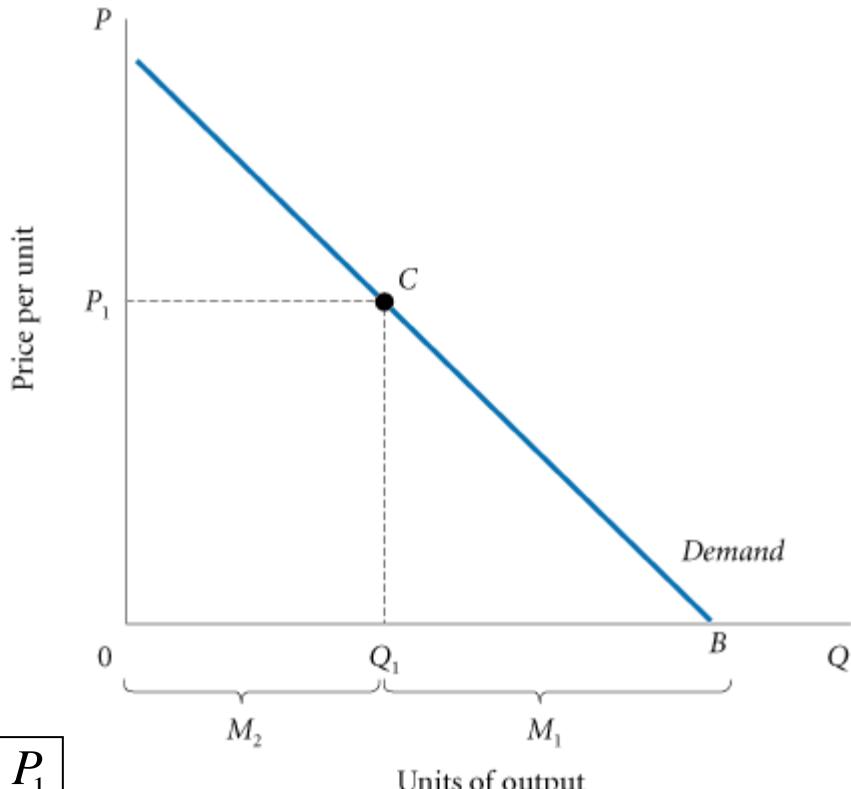
Appendix

POINT ELASTICITY

FIGURE 5A.1 Elasticity at a Point Along a Demand Curve

Consider the straight-line demand curve in Figure 5A.1. We can write an expression for elasticity at point C as follows:

$$\text{elasticity} = \frac{\% \Delta Q}{\% \Delta P} = \frac{\frac{\Delta Q}{Q} \cdot 100}{\frac{\Delta P}{P} \cdot 100} = \frac{\frac{\Delta Q}{Q}}{\frac{\Delta P}{P}} = \boxed{\frac{\Delta Q}{P} \cdot \frac{P}{Q}}$$



Appendix

$\Delta Q/\Delta P$ is the reciprocal of the slope of the curve. To calculate the reciprocal of the slope to plug into the elasticity equation, we take Q_1B , or M_1 , and divide by minus the length of line segment CQ_1 . Thus,

$$\frac{\Delta Q}{\Delta P} = \frac{M_1}{CQ_1}$$

Since the length of CQ_1 is equal to P_1 , we can write:

$$\frac{\Delta Q}{\Delta P} = \frac{M_1}{P_1}$$

By substituting we get:

$$\text{elasticity} = \frac{M_1}{P_1} \cdot \frac{P_1}{Q_1} = \frac{M_1}{P_1} \cdot \frac{P_1}{M_2} = \boxed{\frac{M_1}{M_2}}$$

CHAPTER 5: Elasticity

Appendix

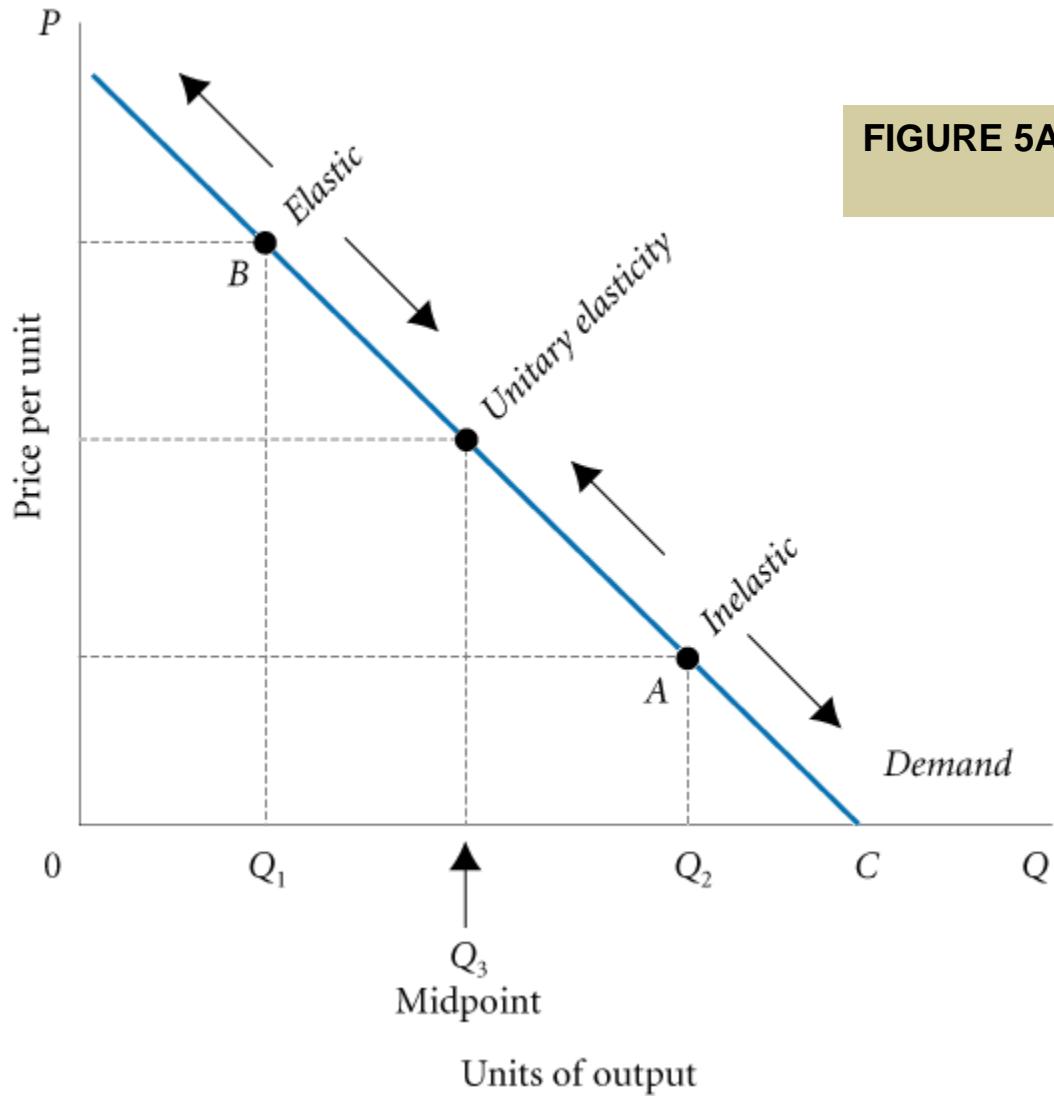


FIGURE 5A.2 Point Elasticity Changes Along a Demand Curve

Elasticity = M_1 / M_2

- Elasticity at point C is simply the ratio of line segment M_1 to line segment M_2 .
 - **It is easy to see that if we had chosen a point to the left of Q_1 , M_1 would have been larger and M_2 would have been smaller, indicating a higher elasticity.**
 - **If we had chosen a point to the right of Q_1 , M_1 would have been smaller and M_2 would have been larger, indicating a lower elasticity.**
- In Figure 5A.2, **you can see that elasticity is unitary (equal to -1) at the midpoint of the demand curve, Q_3 .**
 - **At points to the right**, such as Q_2 , segment Q_2C (M_1 from Figure 5A.1) is smaller than segment $0Q_1$ (M_2 from Figure 5A.1).
 - This means that the absolute size of the ratio is less than 1 and that demand is inelastic at point A.
 - **At points to the left**, such as Q_1 , segment Q_1C (M_1) is larger than segment $0Q_1$ (M_2).
 - This means that the absolute size of the ratio is greater than 1 and that demand is elastic at point B

CHAPTER 5: Elasticity

Appendix

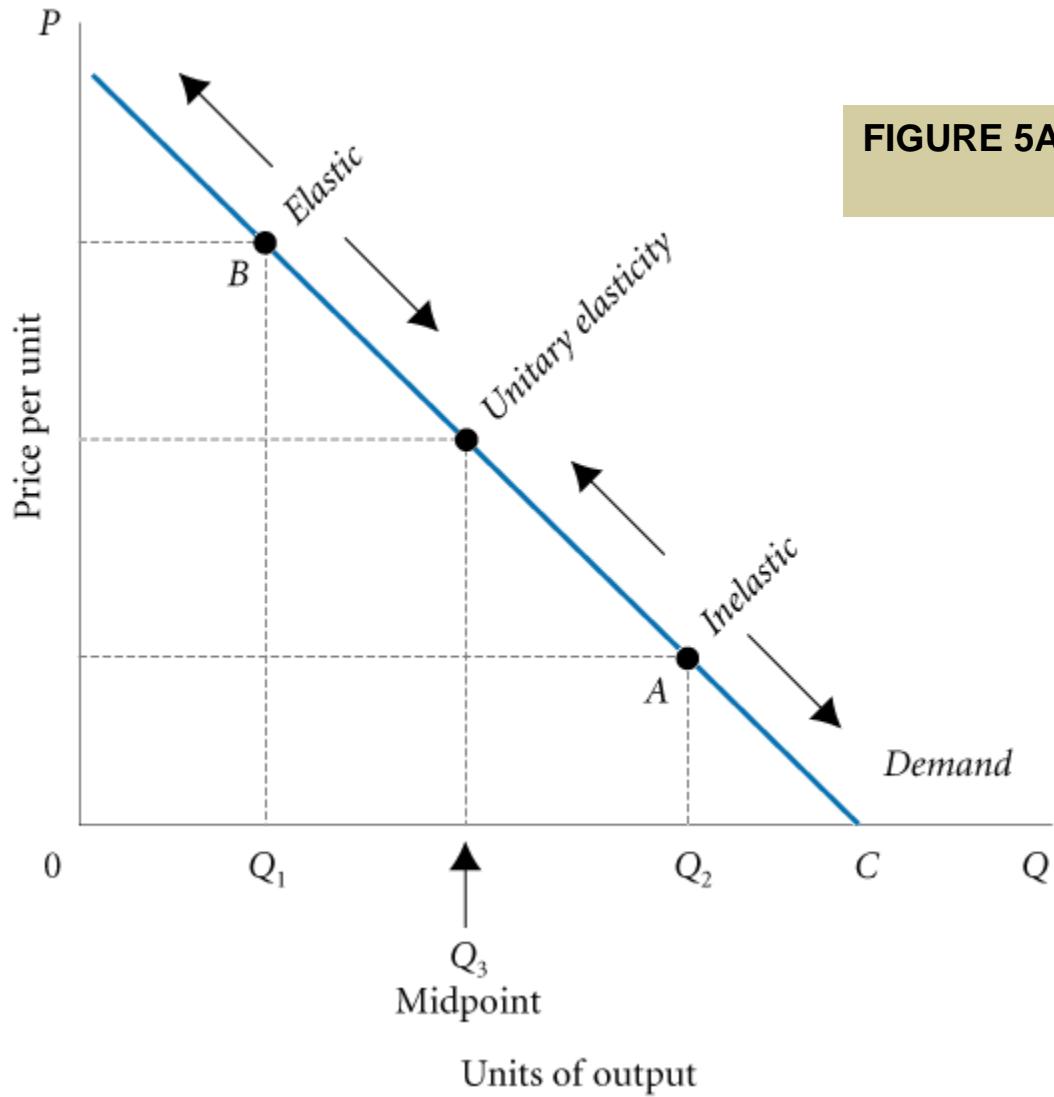
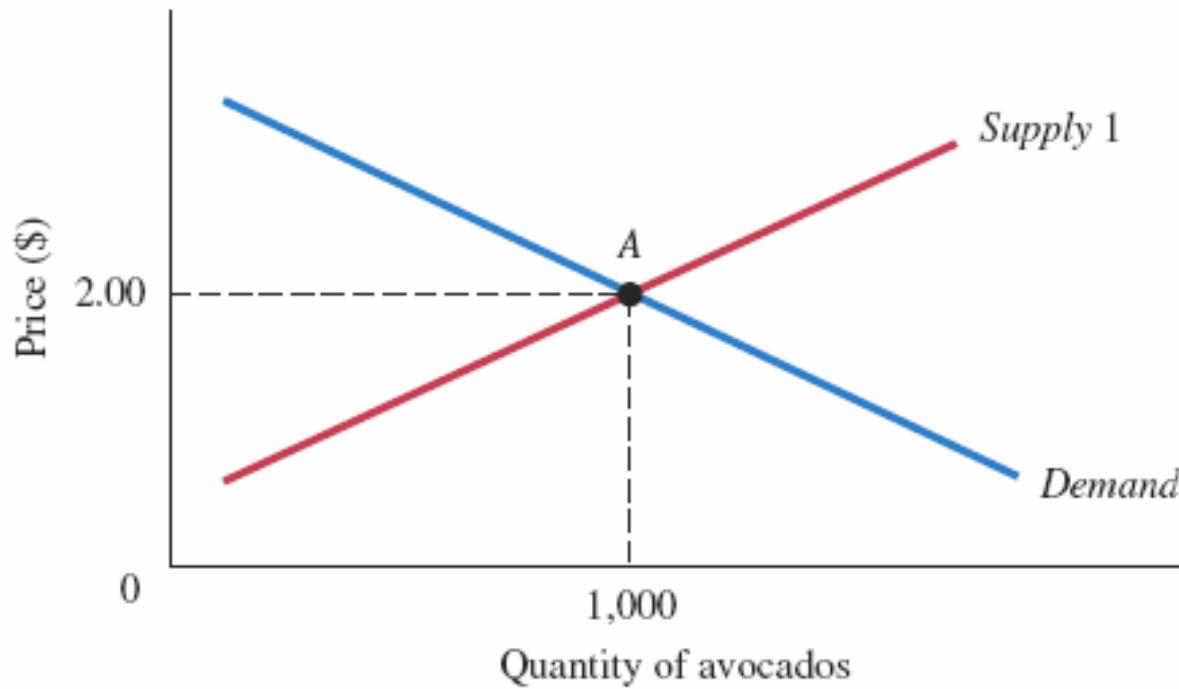


FIGURE 5A.2 Point Elasticity Changes Along a Demand Curve

What Happens When We Raise Taxes: Using Elasticity

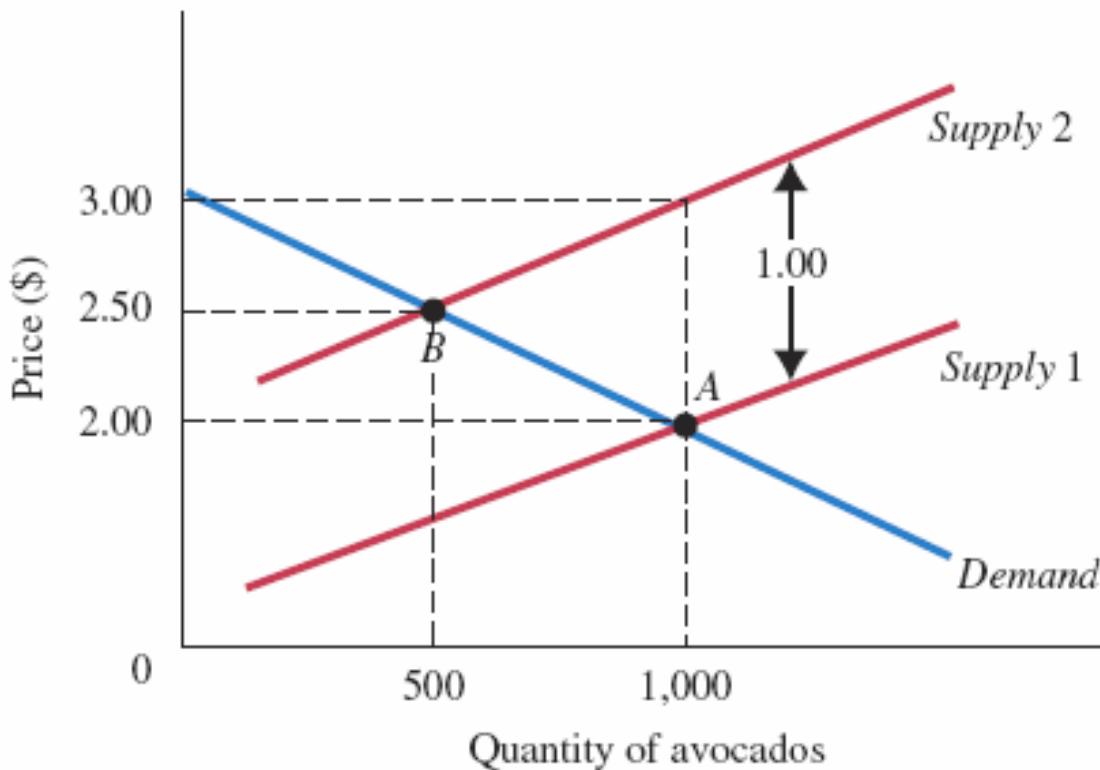
- **excise tax** A per-unit tax on a specific good.
- In the United States, we have excise taxes on gasoline and cigarettes.
- Example: A mayor of a city imposes a tax of \$1.00 per avocado in a city where 1,000 avocados are sold per day. Will the city add \$365,000 per year in taxes?

FIGURE 5.5 Original Equilibrium in the Avocado Market



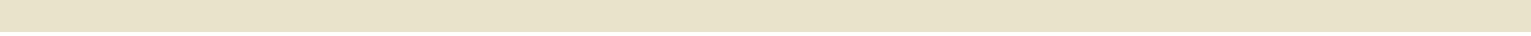
Store owners in the city sells 1,000 avocados per day at the market price of \$2.00.

FIGURE 5.6 Equilibrium in the Avocado Market after the \$1.00 Tax



After the mayor imposes a tax of \$1.00 per avocado, the supply curve shifts up by \$1.00, and there is a new equilibrium where supply equals demand at point B.

At the new equilibrium, 500 avocados are sold; the equilibrium price rises to \$2.50, and storeowners receive \$1.50 per avocado.



THANK YOU



Household Behavior and Consumer Choice

Prepared by:

Fernando & Yvonn Quijano

Household Behavior and Consumer Choice



6

Chapter Outline

Household Choice in Output Markets

The Determinants of Household Demand
The Budget Constraint

The Basis of Choice: Utility

Diminishing Marginal Utility
Allocating Income to Maximize Utility
The Utility-Maximizing Rule
Diminishing Marginal Utility and Downward-Sloping Demand

Income and Substitution Effects

The Income Effect
The Substitution Effect

Consumer Surplus

Household Choice in Input Markets

The Labor Supply Decision
The Price of Leisure
Income and Substitution Effects of a Wage Change
Saving and Borrowing: Present versus Future Consumption

A Review: Households in Output and Input Markets

Appendix: Indifference Curves

CHAPTER 6: Household Behavior and Consumer Choice

HOUSEHOLD BEHAVIOR AND CONSUMER CHOICE

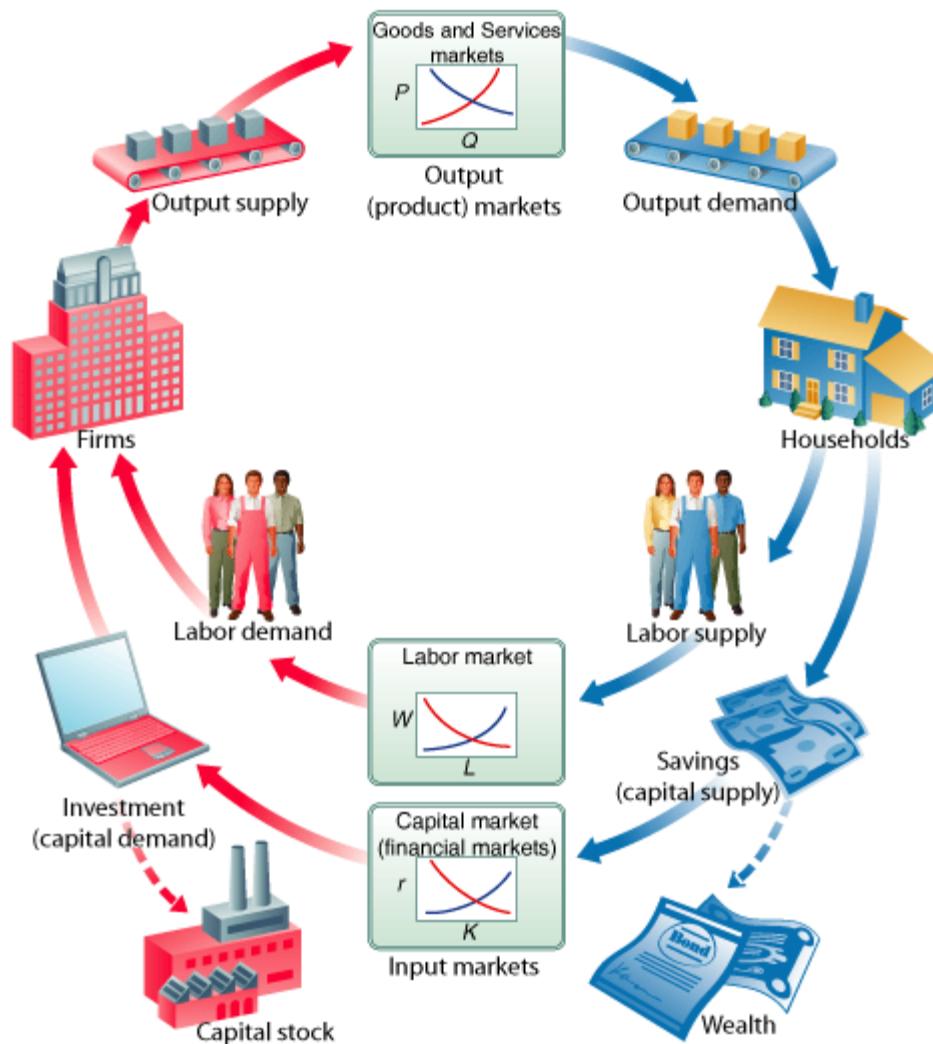


FIGURE 6.1 Firm and Household Decisions

Fig 6.1: Firm and Household Decisions

- Recall that households and firms interact in two kinds of markets: **output (product) markets**, shown at the top of Figure II.1, and **input (factor) markets**, shown at the bottom.
 - Households demand outputs and supply inputs.
 - In contrast, firms supply outputs and demand inputs.

CHAPTER 6: Household Behavior and Consumer Choice

To understand how the economy works: Way Ahead

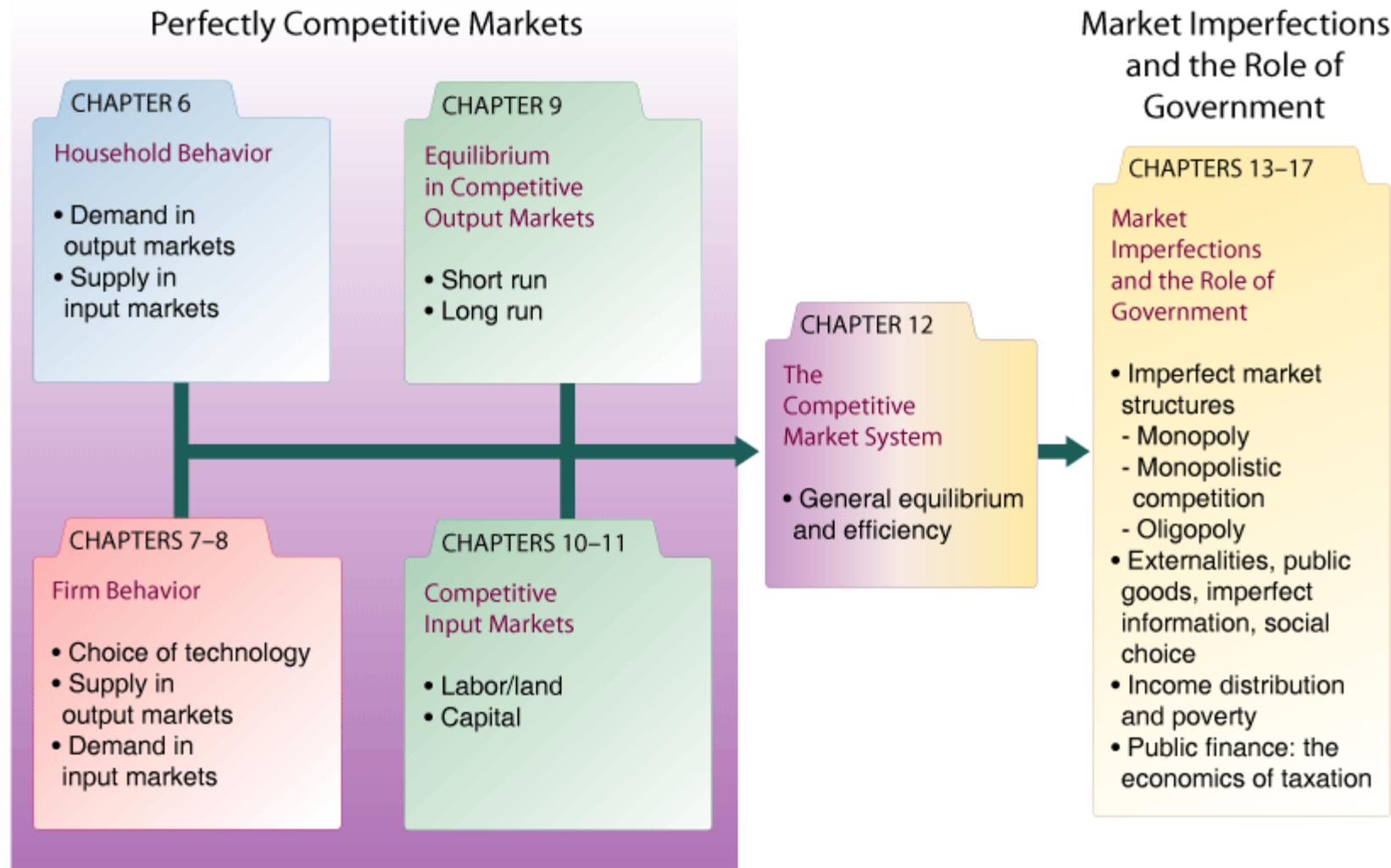


FIGURE 6.2 Understanding the Microeconomy and the Role of Government

To understand how the economy works: Way Ahead

- To understand how the economy works, it helps to build from the ground up.
 - We start in Chapters 6–8 with an overview of **household** and **firm** decision making in simple perfectly competitive markets.
 - In Chapters 9–11, we see how firms and households interact in **output markets** (product markets) and **input markets** (labor/land and capital) to determine prices, wages, and profits.
 - Once we have a picture of how a simple perfectly competitive economy works, we begin to relax assumptions.
 - Chapter 12 is a pivotal chapter that links perfectly competitive markets with a discussion of market imperfections and the role of government.
 - In Chapters 13–19, we cover the three noncompetitive market structures (**monopoly**, **monopolistic competition**, and **oligopoly**), externalities, public goods, uncertainty and asymmetric information, and income distribution as well as taxation and government finance

Few Basic Assumptions:

First Assumption (Perfect Knowledge)

- Before we proceed with our **discussion of household choice**, **we need to make a few basic assumptions.**
- **First Assumption (Perfect Knowledge):**
 - We first assume that **households and firms possess all the information they need to make market choices.**
 - Specifically, we assume that **households possess knowledge** of the qualities and prices of everything available in the market.
 - **Firms know** all that there is to know about wage rates, capital costs, and output prices.
 - This assumption is often called the assumption of **perfect knowledge.**

Second Assumption (Perfect Competition)

- The next assumption is perfect competition (form of Industry structure).
 - In a perfectly competitive industry, no single firm has control over prices.
 - That is, no single firm is large enough to affect the market price of its product or the prices of the inputs that it buys.
- How?
 - This follows from two characteristics of competitive industries.
 - First, a competitive industry is composed of many firms, each one small relative to the size of the industry.
 - Second, every firm in a perfectly competitive industry produces exactly the same product; the output of one firm cannot be distinguished from the output of the others [Products in a perfectly competitive industry are said to be **homogeneous**]

Perfect Competition Example

- **Agriculture-** The classic example of a perfectly competitive industry.
 - A wheat farmer in Karimnagar has absolutely no control over the price of wheat.
 - **Prices are determined not by the individual farmers, but by the interaction of many suppliers and many demanders.**
 - **The only decisions left to the wheat farmer are how much wheat to plant and when and how to produce the crop.**

Third Assumption (HH-No control over price)

- We finally assume that each household is small relative to the size of the market.
 - **Households face a set of product prices that they individually cannot control.**
 - **Prices again are set by the interaction of many suppliers and many demanders**

Why these assumptions

- At first, this may seem unrealistic to you, but keep the following in mind.
 - Much of the economic analysis in the chapters that follow applies to all forms of market structure.
 - Indeed, much of the power of economic reasoning is that it is quite general.
- Because monopolists, oligopolists, monopolistic competitors, and perfect competitors share the objective of maximizing profits, it should not be surprising that their behavior is in many ways similar.
- But why start with Perfect Competition
 - Perfect competition because many of these basic principles are easier to learn using the simplest of cases.

HOUSEHOLD BEHAVIOR & CONSUMER CHOICE: Assumptions

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 BEHAVIOR & CONSUMER CHOICE: 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.

HH Decisions: Three basic decisions

Every household must make three basic decisions:

- 1. How much of each product, or output, to demand**
- 2. How much labor to supply**
- 3. How much to spend today and how much to save for the future**

THE DETERMINANTS OF HOUSEHOLD DEMAND

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

THE BUDGET CONSTRAINT

THE BUDGET CONSTRAINT

Information on household income and wealth, together with information on product prices, makes it possible to distinguish those **combinations of goods and services that are affordable from those that are not.**

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

Why BUDGET CONSTRAINT & Constraint in Labor Market

- Why budget constraint:
 - **HH can't control price**
 - In competitive markets, for example, households cannot control prices; they must buy goods and services at market-determined prices.
 - **HH has some control over its income (but we will take it as given)**
 - Its members can choose whether to work, and they can sometimes decide how many hours to work and how many jobs to hold.
 - **Constraints in the labor market:**
 - The amount that household members are paid is limited by current market wage rates.
 - Whether they can get a job is determined by the availability of jobs.
 - **Although income does depend, at least in part, on the choices that households make, we will treat it as a given for now.**

THE BUDGET CONSTRAINT: Example

- The income, wealth, and price constraints that surround choice are best illustrated with an example:
 - Consider Barbara, a recent graduate of a midwestern university who takes a job as an account manager at a public relations firm.
 - Let us assume that she receives a salary of \$1,000 per month (after taxes) and that she has **no wealth and no credit**.
 - **Barbara's monthly expenditures are limited to her flow of income.**
- Table 6.1 summarizes some of the choices open to her

THE BUDGET CONSTRAINT & Choice set or Opportunity set

TABLE 6.1 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.

Choice set or Opportunity set

- Notice that we have used the information that we have on income and prices to identify different combinations of housing, food, and other items that are available to a single-person household with an income of \$1,000 per month.
 - We have said nothing about the process of choosing.
- Instead, we have carved out what is called a choice set or opportunity set, the set of options that is defined and limited by Barbara's budget constraint

Preferences, Tastes, Trade-Offs, and Opportunity Cost

Preferences, Tastes, Trade-Offs, and Opportunity Cost



Preferences play a key role in determining demand. Some people like the blues or jazz, some like classical, while others love country music.

Preferences, Tastes, Trade-Offs, & Opportunity Cost: Imp Slide

- So far, we have identified only the combinations of goods and services **that are and are not available to Barbara.**
 - Within the constraints imposed by limited incomes and fixed prices, however, **households are free to choose what they will and will not buy.**
- **Their ultimate choices are governed by their individual preferences and tastes.**
- Final demand of a household for any single product is just **one of many outcomes that result from the decision-making process.**

Preferences, Tastes, Trade-Offs, & Opportunity Cost: Imp Slide

- A change in the price of a single good **changes the constraints within which households choose, and this may change the entire allocation of income.**
 - Demand for some goods and services may rise while demand for others falls.
- **A complicated set of trade-offs lies** behind the **shape and position of a household demand curve for a single good.**
 - Whenever a household makes a choice, it is weighing the good or service that it chooses against all the other things that the same money could buy.

Choice given the budget constraint: Barbara example

- Consider again our young account manager and her options listed in Table 6.1.
 - If she hates to cook, likes to eat at restaurants, and goes out three nights a week, she will probably trade off some housing for dinners out and money to spend on clothes and other things.
 - She will probably rent the studio for \$400 [Option A]
 - She may, however, love to spend long evenings at home reading, listening to classical music, and sipping tea while watching the sunset.
 - In that case, she will probably trade off some restaurant meals, evenings out, and travel expenses for the added comfort of the larger apartment with the balcony and the view [Option C]

TABLE 6.1 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

Please Note:

Real cost = Opportunity cost (determined by relative prices)

- As long as a **household faces a limited budget** — and all households ultimately do — **the real cost of any good or service is the value of the other goods and services that could have been purchased with the same amount of money.**
- **The real cost of a good or service is its opportunity cost, and opportunity cost is determined by relative prices.**

The Budget Constraint More Formally

The Budget Constraint More Formally

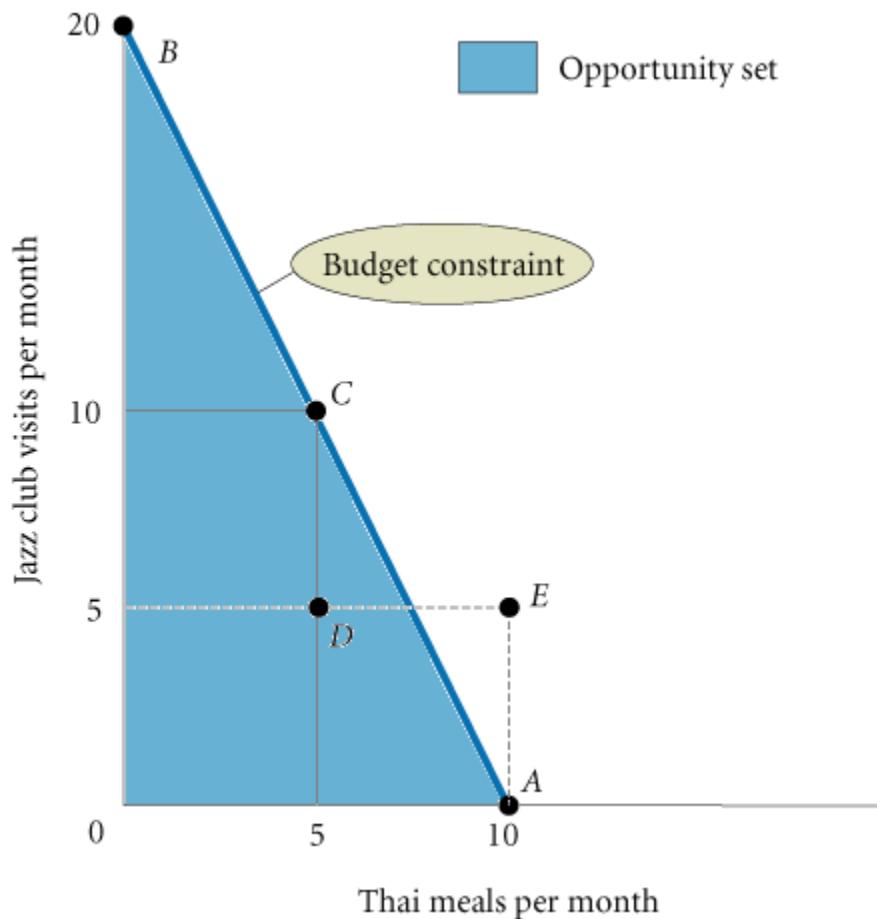


FIGURE 6.3 Budget Constraint and Opportunity Set for Ann and Tom

The Budget Constraint More Formally: Ann & Tom Example

- Ann and Tom are struggling graduate students in economics at the University of Virginia.
 - Their tuition is paid by graduate fellowships.
 - They live as resident advisers in a first-year dormitory, in return for which they receive an apartment and meals.
 - Their fellowships also give them \$200 each month to cover all their other expenses [**\$200 for both students**]
- To simplify things, let us assume that Ann and Tom spend their money on only two things: meals at a local Thai restaurant and nights at a local jazz club, The Hungry Ear.
 - Thai meals go for a fixed price of \$20 per couple.
 - Two tickets to the jazz club, including espresso, are \$10.

The Budget Constraint More Formally: Ann & Tom Example

- As Figure 6.3 shows, we can graphically depict the choices that are available to our dynamic duo.
- **Axes:**
 - The axes measure the quantities of the two goods that Ann and Tom buy.
- **The Horizontal axis:**
 - The horizontal axis measures the number of Thai meals consumed per month
- **The Vertical axis:**
 - The vertical axis measures the number of trips to The Hungry Ear.
- Every point in the space between the axes represents some combination of Thai meals and nights at the jazz club.
- The question is this: Which of these points can Ann and Tom purchase with a fixed budget of \$200 per month?
 - That is, which points are in the opportunity set and which are not? [Blue Area]

Budget Constraint and Opportunity Set for Ann and Tom

The Budget Constraint More Formally

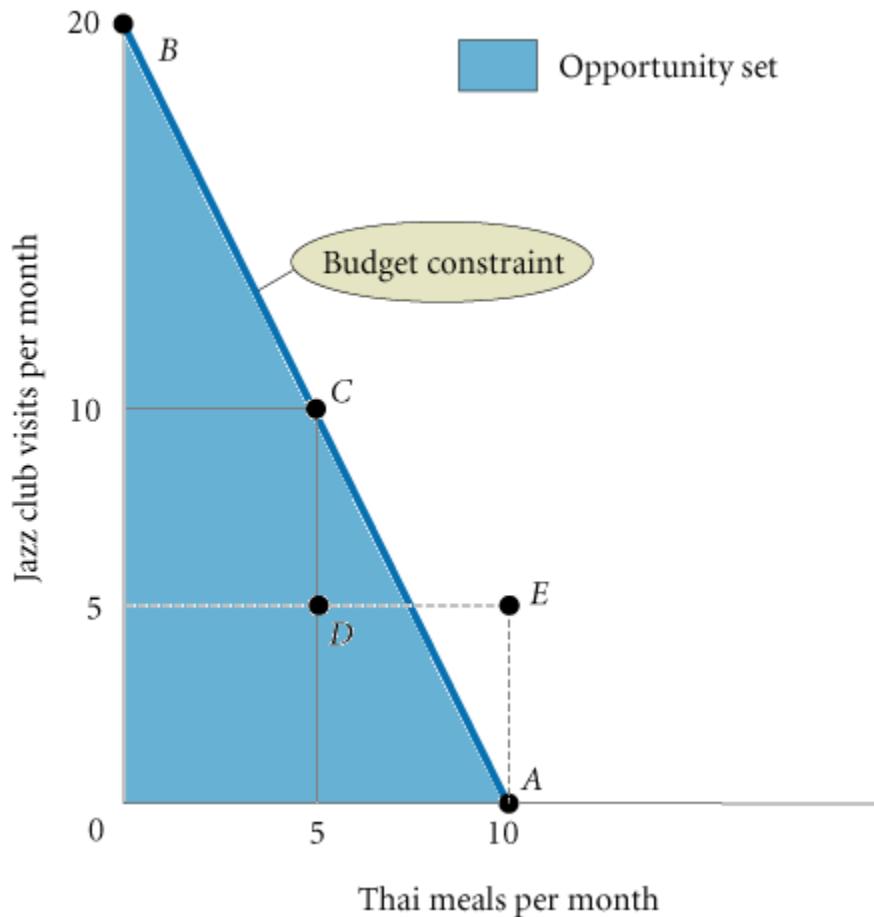


FIGURE 6.3 Budget Constraint and Opportunity Set for Ann and Tom

Given the opportunity set, which point they will choose?

Case I-Point A

- One possibility is that the **students in the dorm are driving Ann and Tom crazy.**
 - The two grad students want to avoid the dining hall at all costs.
 - **Thus, they might decide to spend all their money on Thai food and none of it on jazz.**
 - **This decision would be represented by a point on the horizontal axis because all the points on that axis are points at which Ann and Tom make no jazz club visits.**
- How many meals can Ann and Tom afford?
 - The answer is simple: **When income is \$200 and the price of Thai meals is \$20, they can afford $\$200/\$20 = 10$ meals.**
 - **This point is labeled A on the budget constraint in Figure 6.1.**

Budget Constraint and Opportunity Set for Ann and Tom

The Budget Constraint More Formally

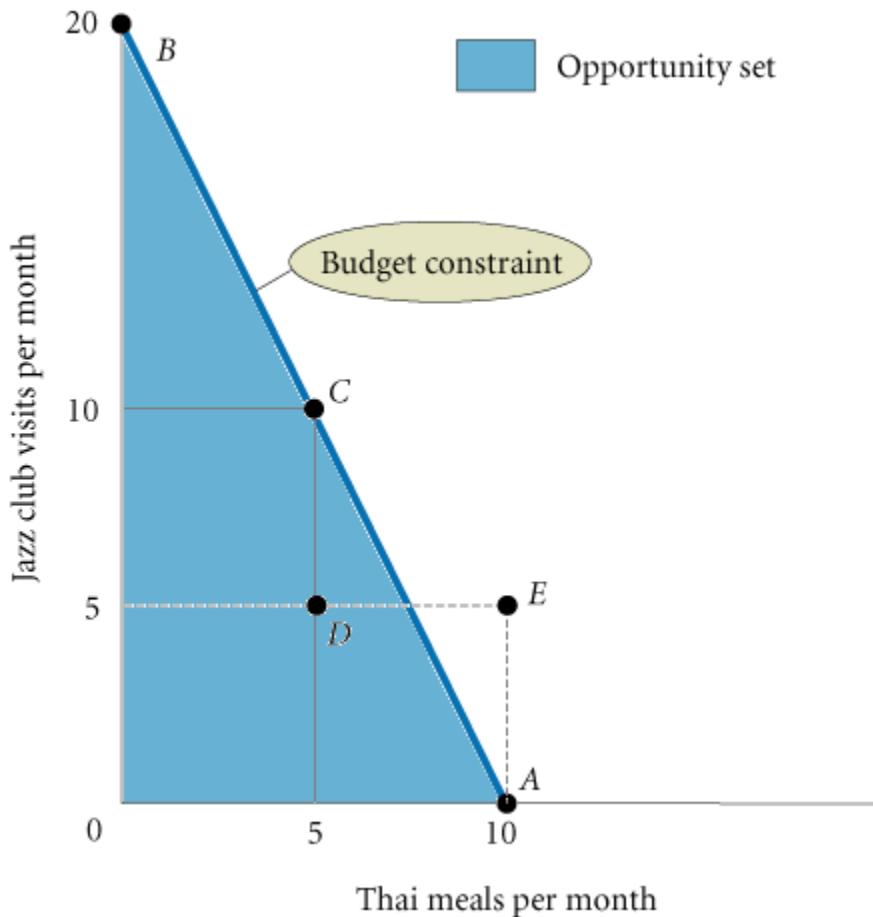


FIGURE 6.3 Budget Constraint and Opportunity Set for Ann and Tom

Given the opportunity set, which point they will choose?

Case II-Point B

- Another possibility is that general exams are coming up and Ann and Tom decide to relax at The Hungry Ear to relieve stress.
 - Suppose they choose to spend all their money on jazz and none of it on Thai food.
 - This decision would be represented by a point on the vertical axis because all the points on this axis are points at which Ann and Tom eat no Thai meals.
- How many jazz club visits can they afford?
 - Again, the answer is simple: With an income of \$200 and with the price of jazz/espresso at \$10, they can go to The Hungry Ear $\$200/\$10 = \underline{20 \text{ times}}$.
 - This is the point labeled B in Figure 6.3.

Imp:

The line connecting points A and B is Ann and Tom's **budget constraint.**

Given the opportunity set, which point they will choose?

Case III-Point between A & B

- What about all the points between A and B on the budget constraint?
 - Starting from point B, suppose Ann and Tom give up trips to the jazz club to buy more Thai meals.
 - Each additional Thai meal “costs” two trips to The Hungry Ear.
 - The opportunity cost of a Thai meal is two jazz club trips.
 - Point C on the budget constraint represents a compromise.
 - Here Ann and Tom go to the club 10 times and eat at the Thai restaurant 5 times.
 - To verify that point C is on the budget constraint, price it out: 10 jazz club trips cost a total of $\$10 * 10 = \100 , and 5 Thai meals cost a total of $\$20 * 5 = \100 .
 - The total is $\$100 + \$100 = \$200$

Budget Constraint and Opportunity Set for Ann and Tom

The Budget Constraint More Formally

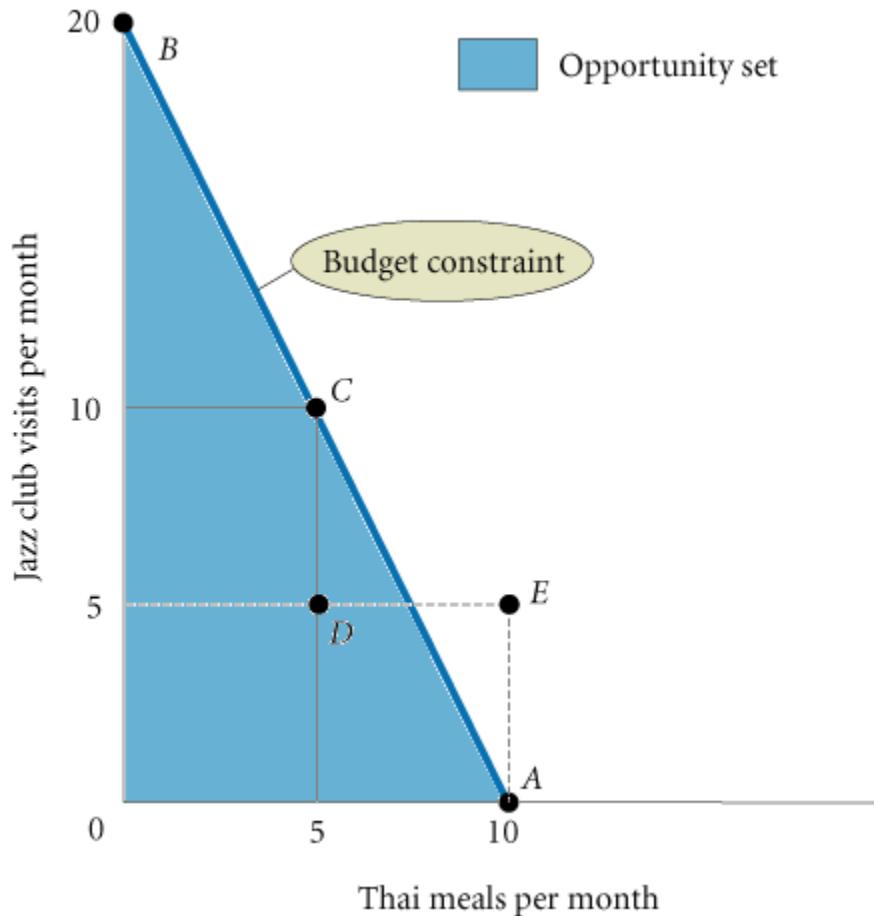


FIGURE 6.3 Budget Constraint and Opportunity Set for Ann and Tom

Opportunity Set & Budget Constraint

- **The budget constraint divides all the points between the axes into two groups: those that can be purchased for \$200 or less (the opportunity set) and those that are unavailable.**
 - Point *D* on the diagram costs less than \$200; point *E* costs more than \$200.
- **The opportunity set is the shaded area in Figure 6.3.**

Budget Constraint and Opportunity Set for Ann and Tom

CHAPTER 6: Household Behavior and Consumer Choice

The Budget Constraint More Formally

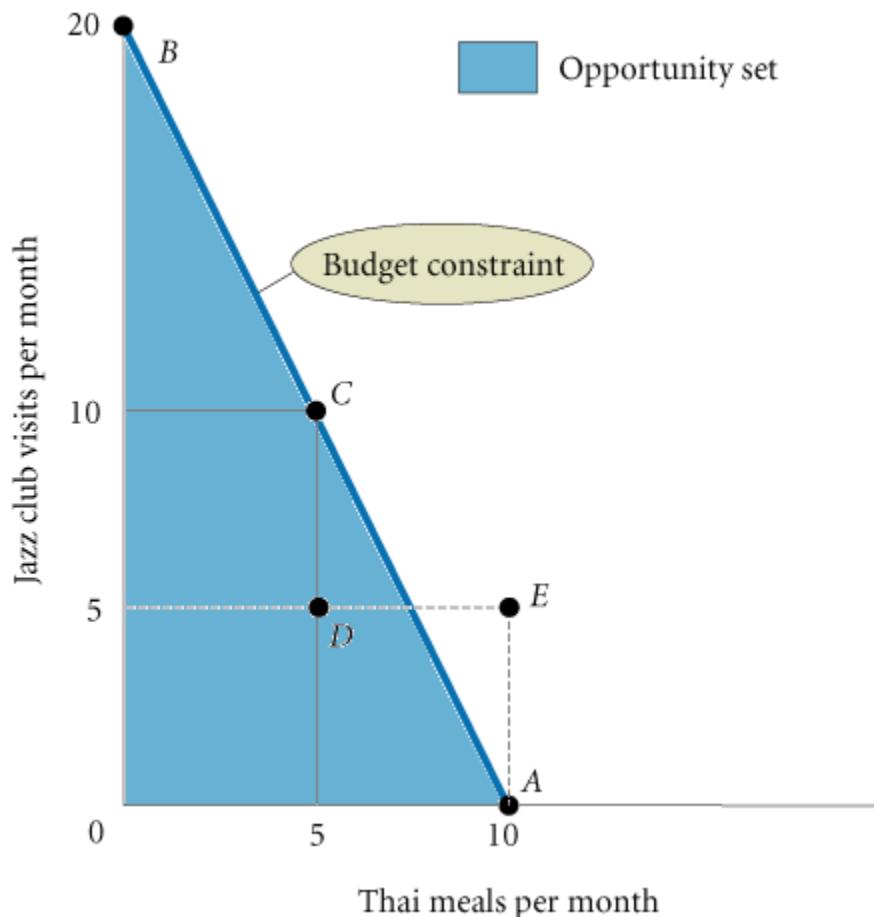


FIGURE 6.3 Budget Constraint and Opportunity Set for Ann and Tom

Opportunity Set: Price & Income and Real Income

- Clearly, both prices and incomes affect the size of a household's opportunity set.
 - If a price or a set of prices falls but income stays the same, the opportunity set gets bigger and the household is better off.
- If we define real income as the set of opportunities to purchase real goods and services, “real income” will have gone up in this case even if the household’s money income has not.
 - A consumer’s opportunity set expands as the result of a price decrease.
- On the other hand, when money income increases and prices go up even more, we say that the household’s “real income” has fallen.

Real income

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

THE EQUATION OF THE BUDGET CONSTRAINT

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.

THE EQUATION OF THE BUDGET CONSTRAINT:

Example

- In the previous example, the constraint is that total expenditure on Thai meals plus total expenditure on jazz club visits must be less than or equal to Ann and Tom's income.
 - Total expenditure on Thai meals is equal to the *price* of Thai meals times the number, or *quantity*, of meals consumed.
 - Total expenditure on jazz club visits is equal to the *price* of a visit times the number, or *quantity*, of visits.
 - That is,
 $\$20 * \text{Thai meals} + \$10 * \text{jazz visits} \leq \200
- If we let X represent the number of Thai meals and we let Y represent the number of jazz club visits and we assume that Ann and Tom spend their entire income on either X or Y, this can be written as follows:
 $20X + 10Y = \$200$
 - This is the equation of the budget constraint — the line connecting points A and B in Figure 6.3.

THE EQUATION OF THE BUDGET CONSTRAINT: Example (Two cases)

- Notice that **when Ann and Tom spend nothing at the jazz club, $Y=0$.**
 - When you plug $Y=0$ into the equation of the budget constraint, $20X = 200$ and $X = 10$.
 - Since X is the number of Thai meals, **Ann and Tom eat Thai food 10 times.**
- Similarly, **when $X=0$, you can solve for Y , which equals 20.**
 - When Ann and Tom eat no Thai food, they can go to the jazz club 20 times.

Slope of the budget constraint

- **Budget Constraint:**

$$P_X X + P_Y Y = I$$

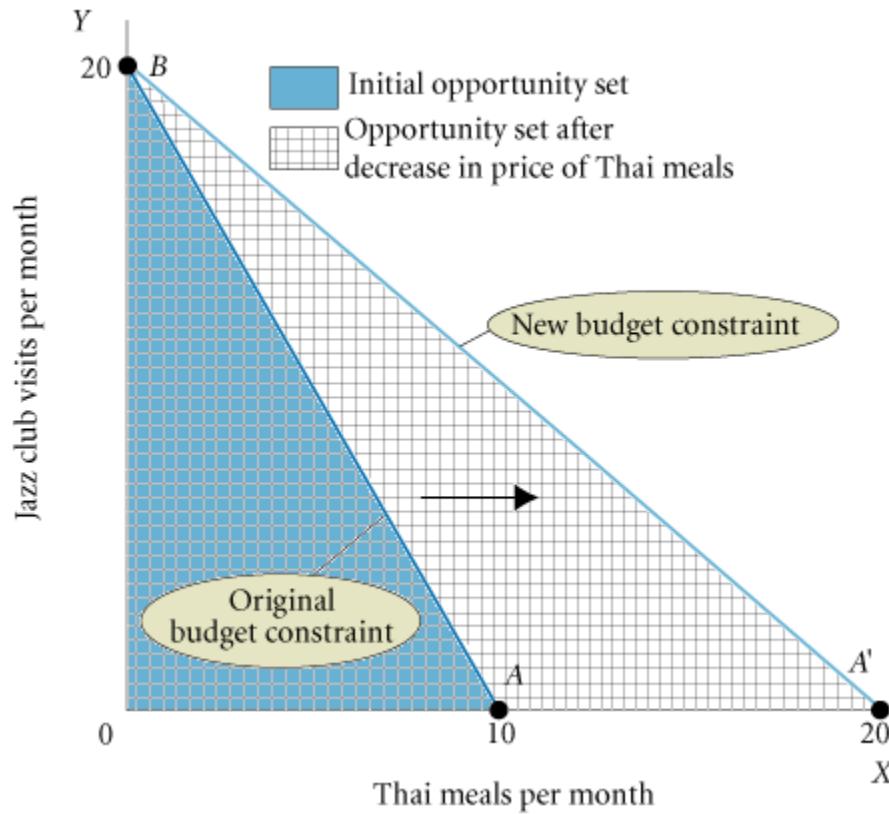
- You can calculate the **slope of the budget constraint** as $-P_X/P_Y$, the ratio of the price of X to the price of Y.
- This gives the tradeoff that consumers face.
 - In the example, $-P_X/P_Y = -2$, meaning to get another Thai meal, Ann and Tom must give up two trips to the jazz club.

Budget Constraints Change When Prices Rise or Fall: Decrease in price of Thai meals

- Now suppose the Thai restaurant is offering two-for-one certificates good during the month of November.
 - In effect, this means that the price of Thai meals drops to \$10 for Ann and Tom.
- How would the budget constraint in Figure 6.1 change?
 - First, point *B* would not change.
 - If Ann and Tom spend all their money on jazz, the price of Thai meals is irrelevant. Ann and Tom can still afford only 20 trips to the jazz club.
 - What has changed is point *A*, which moves to point *A'* in Figure 6.2.
 - At the new lower price of \$10, if Ann and Tom spent all their money on Thai meals, they could buy twice as many, $\$200 / \$10 = 20$.
- The budget constraint swivels, as shown in Figure 6.4.

Budget Constraints Change When Prices Rise or Fall: Decrease in price of Thai meals

FIGURE 6.4 The Effect of a Decrease in Price on Ann and Tom's Budget Constraint



The budget constraint is defined by income, wealth, and prices. Within those limits, households are free to choose, and the household's ultimate choice depends on its own likes and dislikes.

Budget Constraints Change When Prices Rise or Fall: Decrease in price of Thai meals

- Figure 6.4 thus illustrates a very important point.
 - When the price of a single good changes, **more than just the quantity demanded of that good may be affected.**
 - **The household now faces an entirely different problem with regard to choice—the opportunity set has expanded.**
 - **At the same income of \$200, the new lower price means that Ann and Tom might choose more Thai meals, more jazz club visits, or more of both.**
 - They are clearly better off.
- Notice that when the price of meals falls to \$10, the equation of the budget constraint changes to **$10X + 10Y = 200$** , which is the equation of the line connecting points A' and B in Figure 6.4.

THE BASIS OF CHOICE: UTILITY

- Somehow, **from the millions of things that are available, each of us manages to sort out a set of goods and services to buy.**
 - When we make our choices, we make specific judgments about the relative worth of things that are very different.
- **How to measure the worth of things:**
 - During the nineteenth century, **the weighing of values was formalized into a concept called utility.**
 - Whether one item is preferable to another depends on how much utility, or satisfaction, it yields relative to its alternatives.
 - As we make our choices, we are effectively weighing the utilities we would receive from all the possible available goods.

Shortcomings of Utility... but still ...

- Certain **problems** are implicit in the **concept of utility**.
 - **First**, it is impossible to measure utility.
 - **Second**, it is impossible to compare the utilities of different people — that is, we cannot say whether person A or person B has a higher level of utility.
- Imp:
 - Despite these problems, **however, the idea of utility helps us better understand the process of choice.**

THE BASIS OF CHOICE: UTILITY

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

DIMINISHING MARGINAL UTILITY and MU & TU

- **DMU:**
 - In making their choices, **most people spread their incomes over many different kinds of goods.**
 - **One reason people prefer variety** is that consuming more and more of any one good reduces the marginal, or extra, satisfaction they get from further consumption of the same good.
- **MU & TU:**
 - Formally, **marginal utility (MU)** is the **additional satisfaction gained by the consumption or use of *one more* unit of a good or service.**
 - **Total utility** is the **total amount of satisfaction obtained from consumption of a good or service.**
- **Imp:**
 - **Marginal utility comes only from the *last unit consumed*; total utility comes from *all units consumed***

UTILITY: Summary

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.

DIMINISHING MARGINAL UTILITY and MU & TU: Club Example

- Consider this simple **example**.

- Frank loves country music, and a country band is playing seven nights a week at a club near his house.
- Table 6.2 shows how the utility he derives from the band might change as he goes to the club more frequently.

TABLE 6.2 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

- Figure 6.3 graphs **total and marginal utility** using the data in Table 6.2.

- Total utility increases up through Frank's fifth trip to the club but levels off on the sixth night. Marginal utility, which has declined from the beginning, is now at zero.

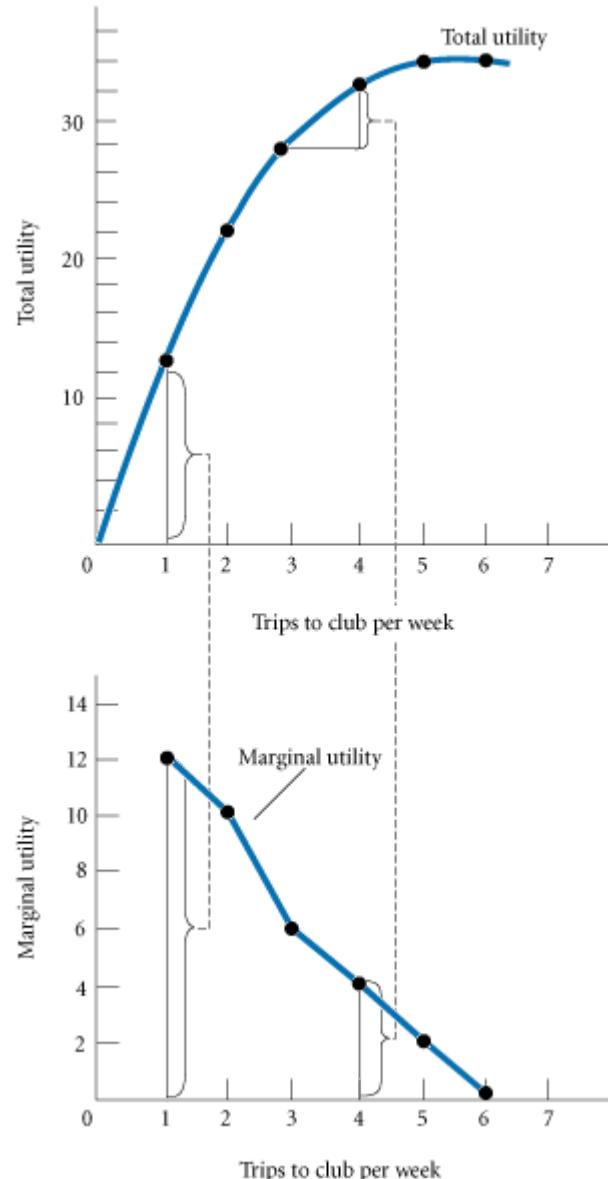
CHAPTER 6: Household Behavior and Consumer Choice

Graphs of Frank's Total and Marginal Utility

TABLE 6.2 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

FIGURE 6.5 Graphs of Frank's Total and Marginal Utility



Diminishing marginal utility helps explain the reason most sports have limited seasons.

ALLOCATING INCOME TO MAXIMIZE UTILITY: Club Example (Price = 0 & No Alternative)

- How many times in one week would Frank go to the club to hear his favorite band?
- The answer depends on three things:
 - Frank's income,
 - The price of admission to the club, and
 - The alternatives available.
- If the price of admission was zero and no alternatives existed,
 - **He would probably go to the club five nights a week.**
 - Why - Remember, the sixth night does not increase his utility, so why should he bother to go?

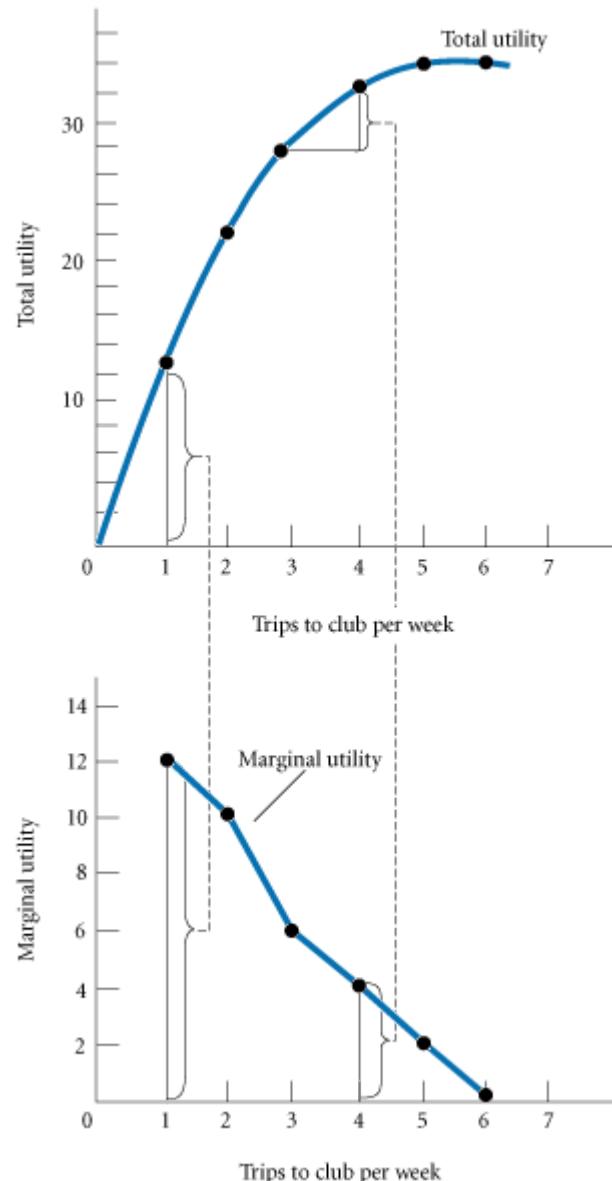
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THE BASIS OF CHOICE: UTILITY

TABLE 6.2 Total Utility and Marginal Utility of Trips to the Club Per Week

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FIGURE 6.5 Graphs of Frank's Total and Marginal Utility



ALLOCATING INCOME TO MAXIMIZE UTILITY: Club & Game Example (Price = 0 but time constraint)

- However, Frank is also a basketball fan.
 - His city has many good high school and college teams, and **he can go to games six nights a week** if he so chooses
- Price = 0 but time constraint:
 - Let us say for now that admission to both the country music club and the basketball games is free — that is, **there is no price/income constraint.**
 - **There is a time constraint**, however, because there are only seven nights in a week.
- **Table 6.3 lists Frank's total and marginal utilities from attending basketball games and going to country music clubs.**

ALLOCATING INCOME TO MAXIMIZE UTILITY:

Club & Game Example (Price = 0 but time constraint)

ALLOCATING INCOME TO MAXIMIZE UTILITY

TABLE 6.3 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

ALLOCATING INCOME TO MAXIMIZE UTILITY:

Club & Game Example (Price = 0 but time constraint)

- **How Frank will maximize Utility:**

- **First Night:**

- From column 3 of the table, we can conclude that on the **first night**, **Frank will go to a basketball game**.
 - The game is worth far more to him (21 utils) than a trip to the club (12 utils)

- **Second & Third Night:**

- On the second night, Frank's decision is not so easy.
 - Because he has been to one basketball game this week, the second game is worth less (12 utils as compared to 21 for the first basketball game).
 - In fact, **because it is worth the same as a first trip to the club, he is indifferent as to whether he goes to the game or the club.**
 - **So he splits the next two nights:** One night he sees ball game number two (12 utils); the other night he spends at the club (12 utils).

- **Fourth Night:**
 - At this point, Frank has been to two ball games and has spent one night at the club. Where will Frank go on evening four?
 - He will go to the club again because the marginal utility from a second trip to the club (10 utils) is greater than the marginal utility from attending a third basketball game (9 utils).
- **How Frank is maximizing Utility**
 - Frank is splitting his time between the two activities to maximize total utility.
 - At each successive step, he chooses the activity that yields the most marginal utility.
- **What is the maximum utility produce:**
 - Continuing with this logic, you can see that spending three nights at the club and four nights watching basketball produces total utility of 76 utils each week (28 plus 48).
 - No other combination of games and club trips can produce as much utility

ALLOCATING INCOME TO MAXIMIZE UTILITY:

Club & Game Example (Price = 0 but time constraint)

ALLOCATING INCOME TO MAXIMIZE UTILITY

TABLE 6.3 Allocation of Fixed Expenditure per Week Between Two Alternatives

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ALLOCATING INCOME TO MAXIMIZE UTILITY:

Club & Game Example ($P_{\text{club}} = \$3$ & $P_{\text{game}} = \$6$ & income constraint)

- **Price & Income constraint:**
 - Now let us suppose that **it costs \$3 to get into the club and \$6 to go to a basketball game.**
 - Suppose further that after paying rent and taking care of other expenses, **Frank has only \$21 left to spend on entertainment.**
- **Frank Choice & Budget Constraint:**
 - Typically, consumers allocate limited incomes, or budgets, over a large set of goods and services.
 - Here we have a **limited income (\$21) being allocated between only two goods**, but the **principle is the same.**
 - Income (\$21) and prices (\$3 and \$6) define **Frank's budget constraint.**
 - Within that constraint, Frank chooses to maximize utility.

ALLOCATING INCOME TO MAXIMIZE UTILITY:

Club & Game Example ($P_{\text{club}} = \$3$ & $P_{\text{game}} = \$6$ & income constraint)

- ### How Frank will maximize Utility

- **By using Marginal utility per dollar**
 - Because the two activities now cost different amounts, we need to find the marginal utility per dollar spent on each activity.
 - If Frank is to spend his money on the combination of activities lying within his budget constraint that gives him the most total utility, each night he must choose the activity that gives him the most utility per dollar spent.
- **First Night:**
 - As you can see from column 5 in Table 6.3, Frank gets 4 utils per dollar on the first night he goes to the club ($12 \text{ utils} / \$3 = 4 \text{ utils per dollar}$).
- **Second Night:**
 - On night two, he goes to a game and gets 3.5 utils per dollar ($21 \text{ utils} / \$6 = 3.5 \text{ utils per dollar}$).
- **Third Night:**
 - On night three, it is back to the club and so on.

ALLOCATING INCOME TO MAXIMIZE UTILITY:

Club & Game Example ($P_{\text{club}} = \$3$ & $P_{\text{game}} = \$6$ & income constraint)

ALLOCATING INCOME TO MAXIMIZE UTILITY

TABLE 6.3 Allocation of Fixed Expenditure per Week Between Two Alternatives

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6	51	0	6.00	0

ALLOCATING INCOME TO MAXIMIZE UTILITY: Club & Game Example ($P_{\text{club}} = \$3$ & $P_{\text{game}} = \$6$ & income constraint)

- In the end, Frank ends up going to two games and spending three nights at the club.
 - No other combination of activities that \$21 will buy yields more utility.

THE UTILITY-MAXIMIZING RULE

THE UTILITY-MAXIMIZING RULE

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

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

where MU_X is the marginal utility derived from the last unit of X consumed, MU_Y is the marginal utility derived from the last unit of Y consumed, P_X is the price per unit of X , and P_Y is the price per unit of Y

Why this utility-maximizing rule is true?

- To see why this utility-maximizing rule is true, **think for a moment about what would happen if it were not true.**
 - For example, suppose MU_x/P_x was greater than MU_y/P_y ; that is, suppose a consumer purchased a bundle of goods so that the marginal utility from the last dollar spent on X was greater than the marginal utility from the last dollar spent on Y.
 - This would mean that the consumer could increase his or her utility by spending a dollar less on Y and a dollar more on X.
 - As the consumer shifts to buying more X and less Y, he or she runs into diminishing marginal utility.
 - Buying more units of X decreases the marginal utility derived from consuming additional units of X.
 - As a result, the marginal utility of another dollar spent on X falls.
 - Now less is being spent on Y, and that means its marginal utility increases.
 - **This process continues until $MU_x/P_x = MU_y/P_y$**
 - When this condition holds, there is no way for the consumer to increase his or her utility by changing the bundle of goods purchased

DIMINISHING MARGINAL UTILITY AND DOWNWARD-SLOPING DEMAND

- Why DD slopes downward:
 - The concept of diminishing marginal utility offers one **reason people spread their incomes over a variety of goods and services instead of spending all income on one or two items.**
 - It also leads us to conclude that demand curves slope downward

Diminishing marginal utility and Downward-sloping demand: Example (Ann & Tom)

- Ann and Tom, the struggling graduate students
 - They chose between meals at a Thai restaurant and trips to a jazz club.
- Their demand curve for Thai meals, shown in Figure 6.4.
 - When the price of a meal is \$40, they decide not to buy any Thai meals.
 - What they are really deciding is that the utility gained from even that first meal each month is not worth the utility that would come from the other things that \$40 can buy.
 - Now consider a price of \$25.
 - At this price, Ann and Tom buy five Thai meals.
 - The first, second, third, fourth, and fifth meals each generate enough utility to justify the price.
 - Tom and Ann “reveal” this by buying five meals.
 - After the fifth meal, the utility gained from the next meal is not worth \$25.

DIMINISHING MARGINAL UTILITY AND DOWNWARD-SLOPING DEMAND

CHAPTER 6: Household Behavior and Consumer Choice

DIMINISHING MARGINAL UTILITY AND DOWNWARD-SLOPING DEMAND

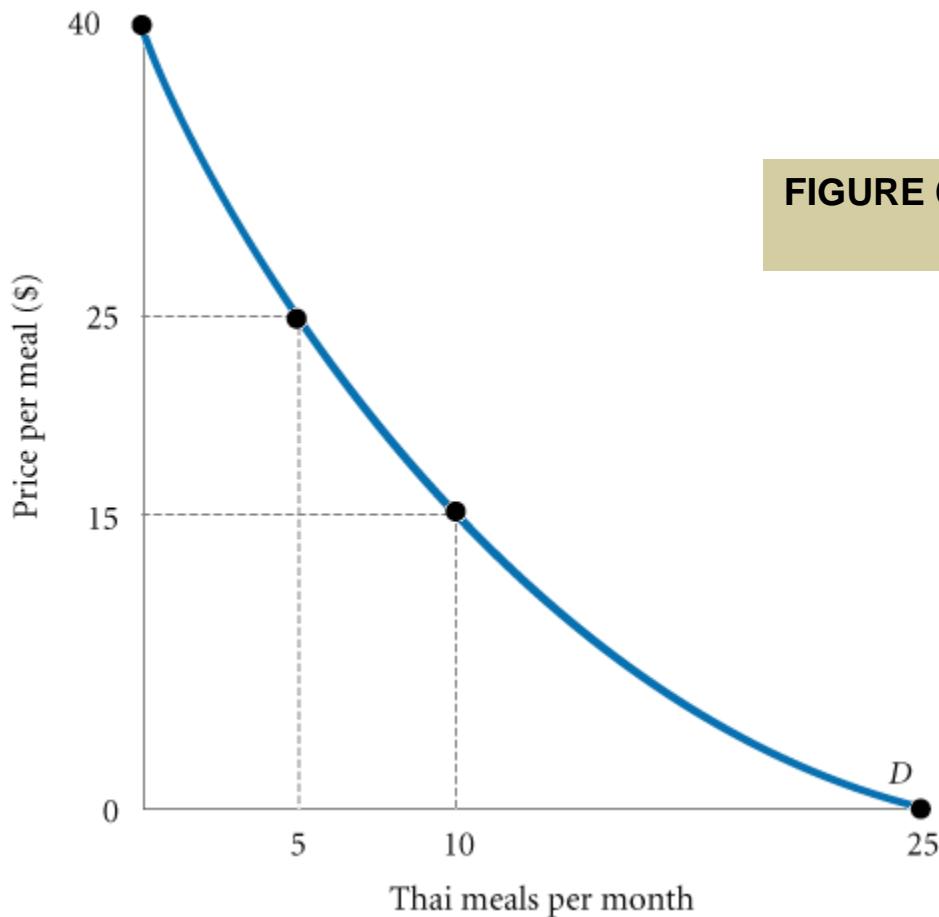


FIGURE 6.6 Diminishing Marginal Utility and Downward-Sloping Demand

Diminishing marginal utility and Downward-sloping demand: Example (Ann & Tom)

- **Why DD hits the quantity axis:**
 - Ultimately, every demand curve hits the quantity (horizontal) axis as a result of diminishing marginal utility — in other words, demand curves slope downward.
- **How many times will Ann and Tom go to the Thai restaurant if meals are free?**
 - Twenty-five times is the answer; and after 25 times a month, they are so sick of Thai food that they will not eat any more even if it is free.
 - That is, marginal utility — the utility gained from the last meal — has dropped to zero.

INCOME AND SUBSTITUTION EFFECTS

- There is an explanation for downward-sloping demand curves that does not rely on the concept of utility or the assumption of diminishing marginal utility.
 - This explanation centers on **income and substitution effects.**

Why DD curve slopes downward: Explain with Income & Substitution effect

- Keeping in mind that consumers face constrained choices, consider the **probable response of a household to a decline in the price of some heavily used product, ceteris paribus.**
 - How might a household currently consuming many goods be likely to respond to a fall in the price of one of those goods if the household's income, its preferences, and all other prices remained unchanged?
- **The household would face a new budget constraint, and its final choice of all goods and services might change.**
 - **A decline in the price of gasoline**, for example, may affect not only how much gasoline you purchase but also what kind of car you buy, when and how much you travel, where you go, and (not so directly) how many movies you see this month and how many projects around the house you get done.

Price changes affect households in two ways

(IE & SE):

The Income Effect

- If P decreases -
 - 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 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.
 - What to do with the income left over:
 - That extra income may be spent on the product whose price has declined, hereafter called good X, or on other products.
- Imp:
 - The change in consumption of X due to this improvement in wellbeing is called the **income effect of a price change**

The Income Effect (Airline Example)

- **Airline Example:**
 - Suppose you live in Florida and four times a year you fly to Nashville to visit your mother. Suppose further that last year a round-trip ticket to Nashville cost \$400.
 - Thus, you spend a total of \$1,600 per year on trips to visit Mom.
 - This year, however, increased competition among the airlines has led one airline to offer round-trip tickets to Nashville for \$200.
 - Assuming the price remains \$200 all year, you can now fly home the same number of times and you will have spent \$800 less for airline tickets than you did last year.
- **Now that you are better off, you have additional opportunities.**
 - You can fly home a fifth time this year, leaving \$600 (\$800 - \$200) to spend on other things, or you can fly home the same number of times (four) and spend the extra \$800 on other things.

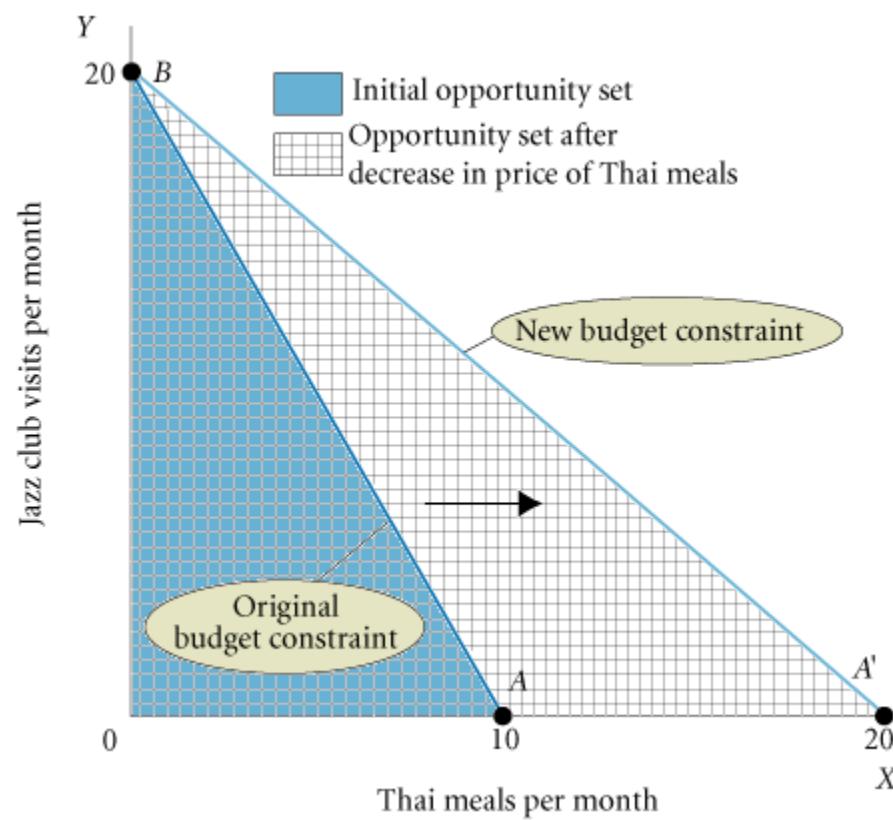
The Income Effect (Tom & Ann Example)

- Look back at Figure 6.2 (If $P_{\text{Thai Meal}}$ decrease):
 - When the price of Thai meals fell, **the opportunity set facing Tom and Ann expanded — they were able to afford more Thai meals, more jazz club trips, or more of both.**
 - They were unequivocally better off because of the price decline.
 - In a sense, **their “real” income was higher.**
 - Because of the price decline, **Tom and Ann can afford to buy more.**
 - **In summary:**
 - If Thai food is a normal good, a decline in the price of Thai food should lead to an increase in the quantity demanded of Thai food.

The Income Effect (Tom & Ann Example)

Budget Constraints Change When Prices Rise or Fall

FIGURE 6.2 The Effect of a Decrease in Price on Ann and Tom's Budget Constraint



The Income Effect: Summary

- When the price of something we buy falls, we are **better off.**
- When the price of something we buy rises, we are **worse off**

The Substitution Effect

- The fact that a price decline leaves households better off is only part of the story.
 - When the price of a product falls, **that product also becomes relatively cheaper.**
 - That is, it becomes more attractive relative to potential substitutes.
 - Imp:
 - 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.
 - Please Note:
 - The “real” cost or price of a good is **what one must sacrifice to consume it.**
 - This opportunity cost is determined by relative prices.

The Substitution Effect (Airline Example)

- To see why this is so, **consider again the choice that you face when a round-trip ticket to Nashville costs \$400.**
 - Each trip that you take requires a sacrifice of \$400 worth of other goods and services.
- When the price drops to \$200, the opportunity cost of a ticket has dropped by \$200.
- In other words, after the price decline, you have to sacrifice only \$200 (instead of \$400) worth of other goods and services to visit Mom

Difference between Income & substitution effect

- To clarify the distinction between the income and substitution, imagine how you would be affected if two things happened to you at the same time.
 - First, the price of round-trip air travel between Florida and Nashville drops from \$400 to \$200.
 - Second, your income is reduced by \$800.
- You are now faced with new relative prices, but — assuming you flew home four times last year — you are no better off now than you were before the price of a ticket declined.
 - The decrease in the price of air travel has offset your decrease in income.
- You are still likely to take more trips home.
 - The opportunity cost of a trip home is now lower, *ceteris paribus*, assuming no change in the prices of other goods and services.
 - A trip to Nashville now requires a sacrifice of only \$200 worth of other goods and services, not the \$400 worth that it did before.
 - Thus, you will substitute away from other goods toward trips to see your mother.

Why a price increase makes hh worse off

- A price increase makes households worse off.
 - If income and other prices do not change, spending the same amount of money buys less and households will be forced to buy less.
 - **This is the income effect.**
 - In addition, 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.
 - **This is the substitution effect.**

Income & substitution effect and the DD curve

- What do the income and substitution effects tell us about the demand curve?
 - Both the income and the substitution effects imply a negative relationship between price and quantity demanded — in other words, **downward-sloping demand**.
- If Price decreases
 - When the price of something falls, *ceteris paribus*, we are better off and we are likely to buy more of that good and other goods (**income effect**).
 - Because lower price also means “less expensive relative to substitutes,” we are likely to buy more of the good (**substitution effect**).
- If Price increases
 - When the price of something rises, we are worse off and we will buy less of it (**income effect**).
 - Higher price also means “more expensive relative to substitutes,” and we are likely to buy less of it and more of other goods (**substitution effect**)

INCOME AND SUBSTITUTION EFFECTS

[NN]

THE INCOME EFFECT

When the price of something we buy falls, we are *better off*. When the price of something we buy rises, we are *worse off*.



INCOME AND SUBSTITUTION EFFECTS

[NN]

THE SUBSTITUTION EFFECT

Both the income and the substitution effects imply a negative relationship between price and quantity demanded—in other words, downward-sloping demand.

When the price of something falls, *ceteris paribus*, we are better off, and we are likely to buy more of that good and other goods (income effect).

Because lower price also means “less expensive relative to substitutes,” we are likely to buy more of the good (substitution effect).

When the price of something rises, we are worse off, and we will buy less of it (income effect). Higher price also means “more expensive relative to substitutes,” and we are likely to buy less of it and more of other goods (substitution effect).

CHAPTER 6: Household Behavior and Consumer Choice

Income and Substitution Effects of a Price Change [NN]

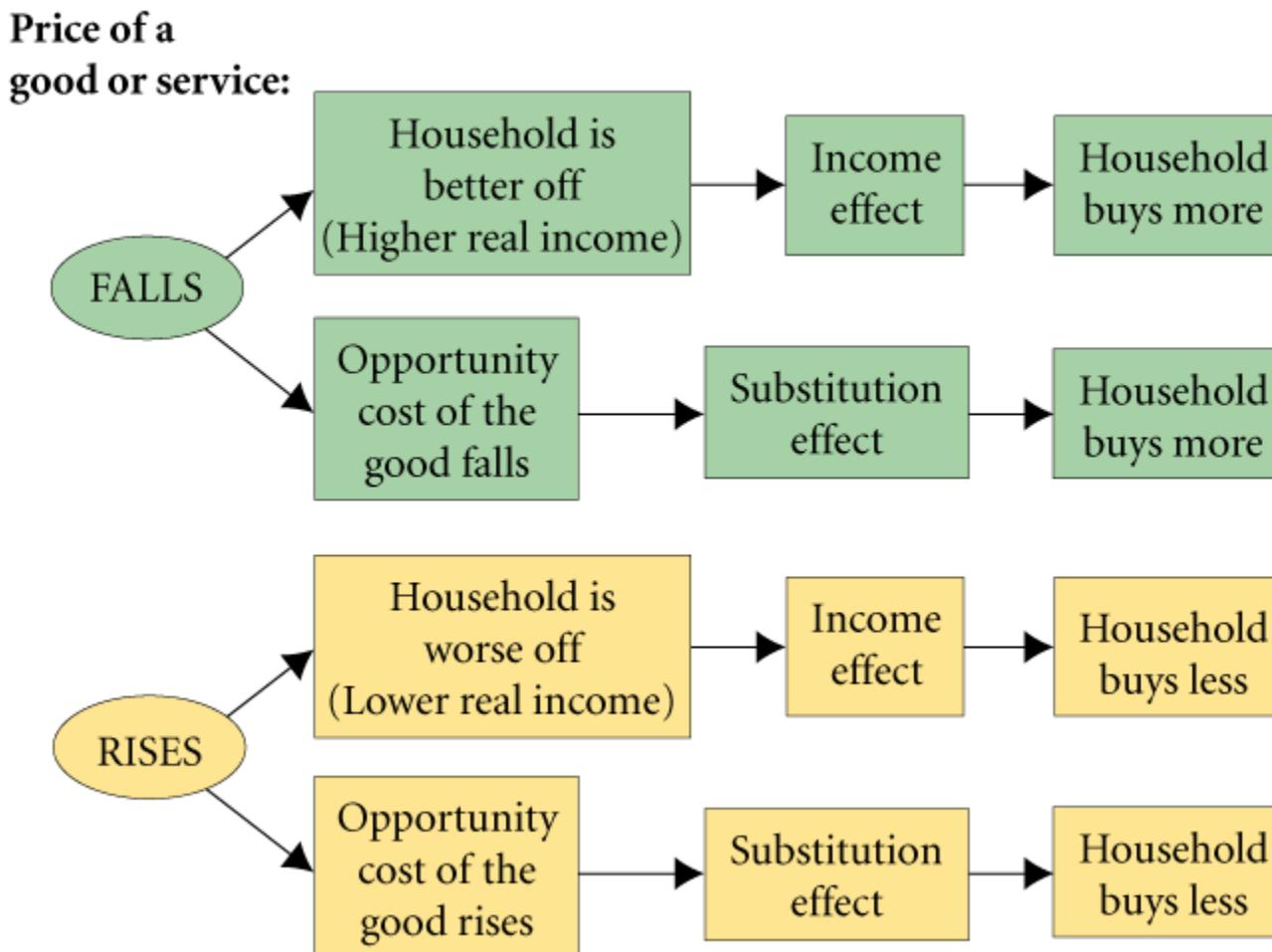


FIGURE 6.7 Income and Substitution Effects of a Price Change

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

Trade-Offs in Labor Market

[Working vs Not working & Unpaid work]

- As with decisions in output markets, the labor supply decision involves a set of trade-offs.
- There are basically **two alternatives** to working for a wage:
 - **(1) not working and**
 - **(2) doing unpaid work**
 - If you do not work, you sacrifice income for the benefits of staying home and reading, watching TV, swimming, or sleeping.
 - Another option is to work, but not for a money wage. In this case, you sacrifice money income for the benefits of growing your own food, raising your children, or taking care of your house

Trade-Offs in Labor Market

[Final choice]

- As with the trade-offs in output markets, your final choice depends on how you value the alternatives available.
 - If you work, you earn a wage that you can use to buy things.
- Thus, the **trade-off is between**
 - the **value of the goods and services you can buy with the wages you earn** versus
 - the value of things you can produce at home—home-grown food, manageable children, clean clothes, and so on—or
 - **the value you place on leisure.**
- This choice is illustrated in Figure 6.9

CHAPTER 6: Household Behavior and Consumer Choice

The Trade-Off Facing Households

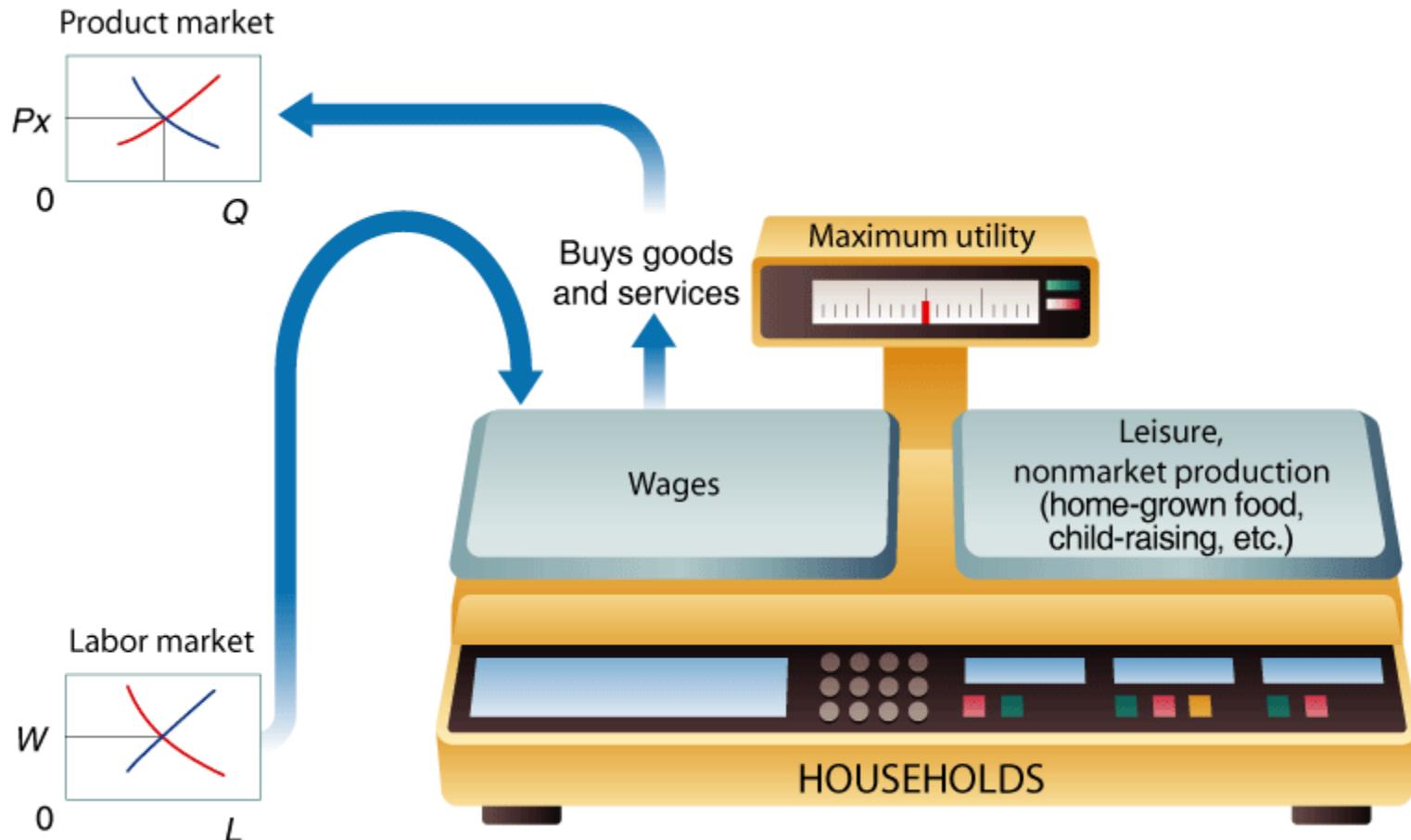


FIGURE 6.9 The Trade-Off Facing Households

The price of leisure (Wage Rate)

- In general, the wage rate can be thought of as the price — or the opportunity cost — of the **benefits of either unpaid work or leisure.**
 - Just as you choose among different goods by comparing the marginal utility of each relative to its price, **you also choose between leisure and other goods by comparing the marginal utility of leisure relative to its price (the wage rate) with the marginal utility of other goods relative to their prices.**
 - $MU_{Leisure} / \text{Wage Rate} = MU_{Other Goods} / P_{Other Goods}$

THE PRICE OF LEISURE

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*.**

Income and Substitution effects of a wage change

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

Income and Substitution effects of a wage change

- Consider an increase in wages:
- Income Effect:
 - First, an increase in wages makes households better off.
 - If they work the same number of hours — that is, if they supply the same amount of labor — **they will earn higher incomes and be able to buy more goods and services.**
 - They can also buy more leisure.
 - **If leisure is a normal good** — that is, a good for which demand increases as income increases — **an increase in income will lead to a higher demand for leisure and a lower labor supply.**
 - **This is the income effect of a wage increase**

Income and Substitution effects of a wage change

- **Substitution Effects:**

- However, **there is also a potential substitution effect of a wage increase.**
 - A higher wage rate means that leisure is more expensive.
 - If you think of the wage rate as the price of leisure, each individual hour of leisure consumed at a higher wage costs more in forgone wages.
 - As a result, **we would expect households to substitute other goods for leisure.**
 - **This means working more, or a lower quantity demanded of leisure and a higher quantity supplied of labor**

IMP:**Income and substitution effects work in opposite directions**

- Note that in the labor market, the income and substitution effects work in opposite directions when leisure is a normal good.
 - The income effect of a wage increase implies buying more leisure and working less; the substitution effect implies buying less leisure and working more.
- Whether households will supply more labor overall or less labor overall when wages rise depends on the relative strength of both the income and the substitution effects.
 - If the substitution effect is greater than the income effect, the wage increase will increase labor supply.
 - This suggests that the labor supply curve slopes upward, or has a positive slope, like the one in Figure 6.7(a).
 - If the income effect outweighs the substitution effect, however, a higher wage will lead to added consumption of leisure and labor supply will decrease.
 - This implies that the labor supply curve “bends back”, as the one in Figure 6.7(b) does.

HOUSEHOLD CHOICE IN INPUT MARKETS

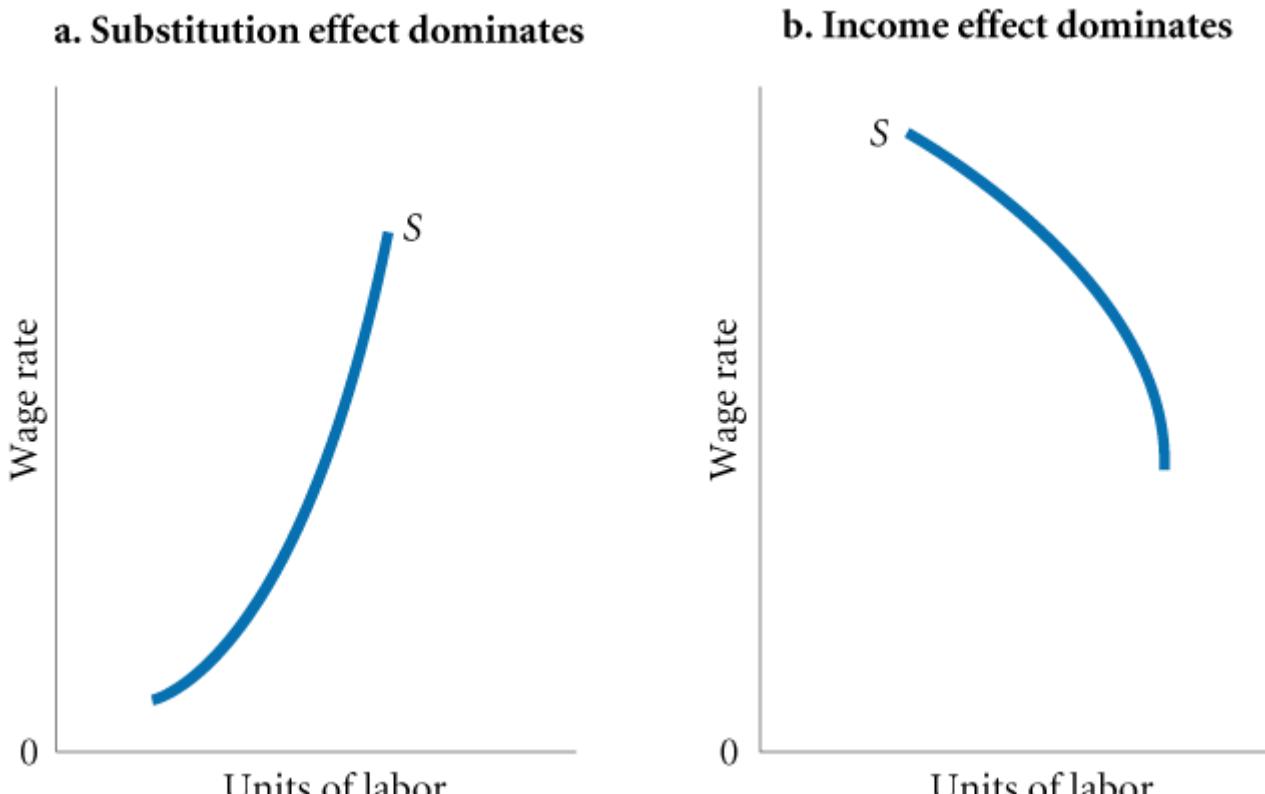


FIGURE 6.10 Two Labor Supply Curves

HOUSEHOLD CHOICE IN INPUT MARKETS

SAVING AND BORROWING: PRESENT VERSUS FUTURE CONSUMPTION

- We have talked about only the current period —
 - The allocation of current income among alternative uses and the work/leisure choice today.
- Households can also
 - (1) Use present income to finance future spending — they can save — or
 - (2) Use future income to finance present spending — they can borrow.

HH can save ...

- When a household decides to save, it is using current income to finance future consumption.
 - That future consumption may come in 3 years, when you use your savings to buy a car; in 10 years, when you sell stock to put a deposit on a house; or in 45 years, when you retire and begin to receive money from your pension plan.
- When a household saves, it usually puts the money into something that will generate income.
 - There is no sense in putting money under your mattress when you can make it work in so many ways: savings accounts, stocks, corporate bonds, and so on— many of which are virtually risk-free.
 - When you put your money in any of these places, you are actually lending it out and the borrower pays you a fee for its use.
 - This fee usually takes the form of *interest*.
- Imp:
 - The interest paid is the possible benefit you will get from forgoing current consumption

HH can borrow ...

- **Most people cannot finance large purchases — a house or condominium, for example — out of current income and savings.**
 - **They almost always borrow money and sign a mortgage.**
- **When a household borrows, it is in essence financing a current purchase with future income.**
 - **It pays back the loan out of future income.**

Change in Interest Rate & Capital Market

- Just as changes in wage rates affect household behavior in the labor market, changes in interest rates affect household behavior in capital markets.
- If interest rate increases:
 - Higher interest rates mean that borrowing is more expensive
 - Required monthly payments on a newly purchased house or car will be higher.
 - Higher interest rates also mean that saving will earn a higher return:
 - \$1,000 invested in a 5 percent savings account or bond yields \$50 per year. If rates rise to 10 percent, the annual interest will rise to \$100.

Impact of IR on Saving Behavior

- **What impact do interest rates have on saving behavior?**
 - As with the effect of wage changes on labor supply, the effect of changes in interest rates on saving can best be understood in terms of **income and substitution effects.**
- **Suppose, for example, that I have been saving for a number of years for retirement.**
 - **Will an increase in interest rates lead to an increase or a decrease in my saving?**
 - The answer is not obvious.

Impact of IR on Saving Behavior: Increased Interest Rate (Substitution Effect)

- First, because each dollar saved will earn a higher rate of return, the “price” of spending today in terms of forgone future spending is higher.
 - That is, each dollar that I spend today (instead of saving) costs me more in terms of future consumption because my saving will now earn a higher return.
 - On this score, I will be led to save more, which is the substitution effect at work.

Impact of IR on Saving Behavior: Increases Interest Rate (Income Effect)

- However, higher interest rates mean more than that.
 - Higher interest rates mean that it will take less saving today to reach a specific target amount of savings tomorrow.
 - I will not need to save as much for retirement or future consumption as I did before.
 - One hundred dollars put into a savings account with 5 percent compound interest will double in 14 years. If interest was paid at a rate of 10 percent, I would have my \$200 in just 7 years.
 - Consequently, I may be led to save less, which is the income effect at work.
 - Higher interest rates mean savers are better off; so higher interest rates may lead to less saving.

Impact of IR on Saving Behavior: Increases Interest Rate (IE & SE together)

- **The final impact of a change in interest rates on saving depends on the relative size of the income and substitution effects.**
 - 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.**
- Saving and investment decisions involve a huge and complex set of institutions, the **financial capital market**, in which the **suppliers of capital (households that save) and the demand for capital (firms that want to invest) interact.**
- **Please Note:**
 - **The amount of capital investment in an economy is constrained in the long run by that economy's saving rate.**
 - You can think of **household saving as the economy's supply of capital.**
 - When a firm borrows to finance a capital acquisition, it is almost as if households have supplied the capital in exchange for the fee we call **interest**.

HOUSEHOLD CHOICE IN INPUT MARKETS

SAVING AND BORROWING: PRESENT VERSUS FUTURE CONSUMPTION

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.

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.

Appendix

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.

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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.

- When MU_X/MU_Y is equal to 4, for example, I would be willing to trade 4 units of Y for 1 additional unit of X.
- Imp:
 - We assume a diminishing marginal rate of substitution.
 - That is, as more of X and less of Y are consumed, MU_X/MU_Y declines.
 - As you consume more of X and less of Y, X becomes less valuable in terms of units of Y, or Y becomes more valuable in terms of X.
 - This is almost but not precisely equivalent to assuming **diminishing marginal utility**.

[A3-Completeness]: We assume that consumers have the ability to choose among the combinations of goods and services available

3. We assume that consumers have the ability to choose among the combinations of goods and services available.

- Confronted with the choice between two alternative combinations of goods and services, A and B, a consumer responds in one of three ways:
 - (1) **She prefers A over B**,
 - (2) **She prefers B over A**, or
 - (3) **She is indifferent between A and B**—that is, she likes A and B equally

[A4-Transitiveness]: We assume that consumer choices are consistent with a simple assumption of transitivity.

4. We assume that **consumer choices are consistent with a simple assumption of transitivity.**
 - If a consumer shows that he prefers *A* to *B* and subsequently shows that he prefers *B* to a third alternative, *C*, he should prefer *A* to *C* when confronted with a choice between the two.

Assumption 3 & 4 combined - Rationality

Assumptions 3- Completeness

Assumption 4- Transitivity

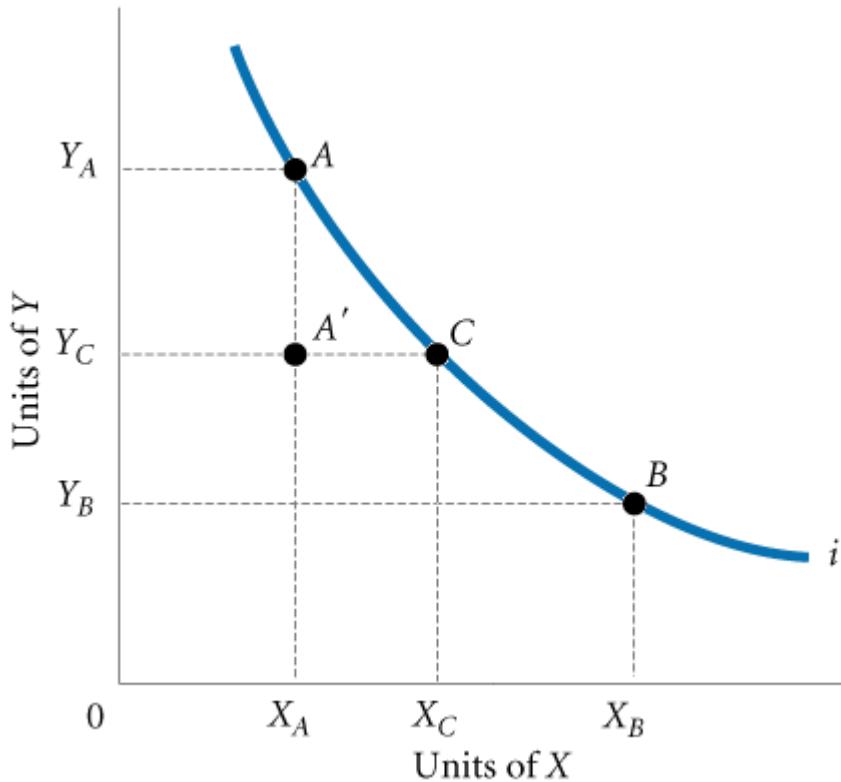
We assume that **consumer choices are consistent with the assumption of rationality.**

Deriving Indifference Curves

- If we accept these four assumptions, we can construct a “map” of a consumer’s preferences.
 - These preference maps are made up of indifference curves.
- An **indifference curve** is a set of points, each point representing a combination of goods X and Y, all of which yield the same total utility

Appendix

DERIVING INDIFFERENCE CURVES



An **indifference curve** is a set of points, each point representing a combination of goods X and Y , all of which yield the same total utility.

FIGURE 6A.1 An Indifference Curve

Deriving an Indifference Curve

- **Figure 6A.1 shows how we might go about deriving an indifference curve for a hypothetical consumer.**
- **Each point in the diagram represents some amount of X and some amount of Y.**
 - Point A in the diagram, for example, represents X_A units of X and Y_A units of Y
 - Now suppose we take some amount of Y away from our hypothetical consumer, moving him or her to A'. At A', the consumer has the same amount of X—that is, X_A units—but less Y and now has only Y_C units of Y.
 - Because “more is better,” our consumer is unequivocally worse off at A' than at A.

Deriving an Indifference Curve

- To compensate for the loss of Y , we begin giving our consumer some more X .
 - If we give the individual just a little, he or she will still be worse off than at A .
 - If we give this individual a great deal of X , he or she will be better off.
- There must be some quantity of X that will just compensate for the loss of Y .
 - **By giving the consumer that amount, we will have put together a bundle, Y_C and X_C that yields the same total utility as bundle A.**
 - This is bundle C in Figure 6A.1.
- If confronted with a choice between bundles A and C , our consumer will say, “Either one; I do not care.”
 - In other words, **the consumer is *indifferent* between A and C .**
 - When confronted with a choice between bundles C and B (which represent X_b and Y_b units of X and Y), this person is also indifferent.

CHAPTER 6: Household Behavior and Consumer Choice

Appendix

DERIVING INDIFFERENCE CURVES

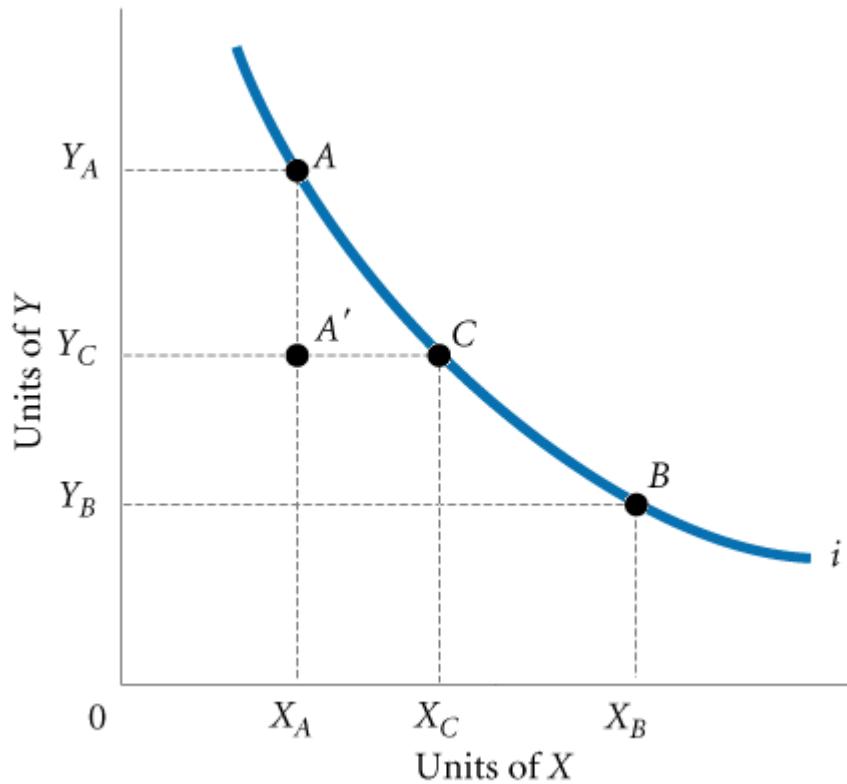


FIGURE 6A.1 An Indifference Curve

Indifference Curve (Summary)

- The points along the curve labeled i in Figure 6A.1 represent all the combinations of X and Y that yield the same total utility to our consumer.
 - **That curve is thus an indifference curve**

Set of Indifference Curves: Preference Map

- Each consumer has a whole set of indifference curves.
 - Starting at point A again, imagine that we give the consumer a tiny bit more X and a tiny bit more Y.
 - Because more is better, we know that the new bundle will yield a higher level of total utility and the consumer will be better off.
 - Now just as we constructed the first indifference curve, we can construct a second one.
 - What we get is an **indifference curve that is *higher* and to the *right* of the first curve**.
 - Because utility along an indifference curve is constant at all points, every point along the new curve represents a higher level of total utility than every point along the first

Set of Indifference Curves: Preference Map

- Figure 6A.2 shows a set of four indifference curves.
 - **The curve labeled i_4 represents the combinations of X and Y that yield the highest level of total utility among the four.**
 - Notice that as you move up and to the right, utility increases.

CHAPTER 6: Household Behavior and Consumer Choice

Appendix

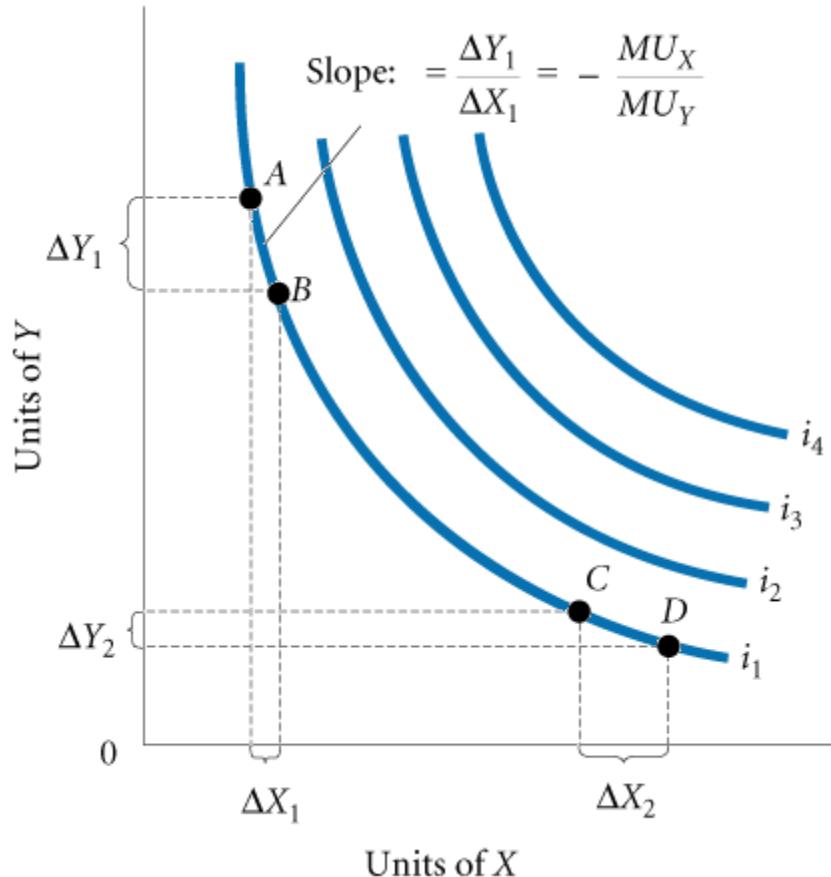


FIGURE 6A.2 A Preference Map: A Family of Indifference Curves

The shapes of the indifference curves depend on the preferences of the consumer, and the whole set of indifference curves is called a **preference map**.

Each consumer has a unique preference map.

Properties of Indifference Curves: Convex towards the origin

- **IC are convex towards the origin:**
 - The indifference curves shown in Figure 6A.2 are drawn bowing in toward the origin, or zero point, on the axes.
 - In other words, the absolute value of the slope of the indifference curves decreases, or the curves get flatter, as we move to the right.
 - Thus, we say that indifference curves are convex toward the origin.
- **Why:**
 - This shape follows directly from the assumption of diminishing marginal rate of substitution

CHAPTER 6: Household Behavior and Consumer Choice

Appendix

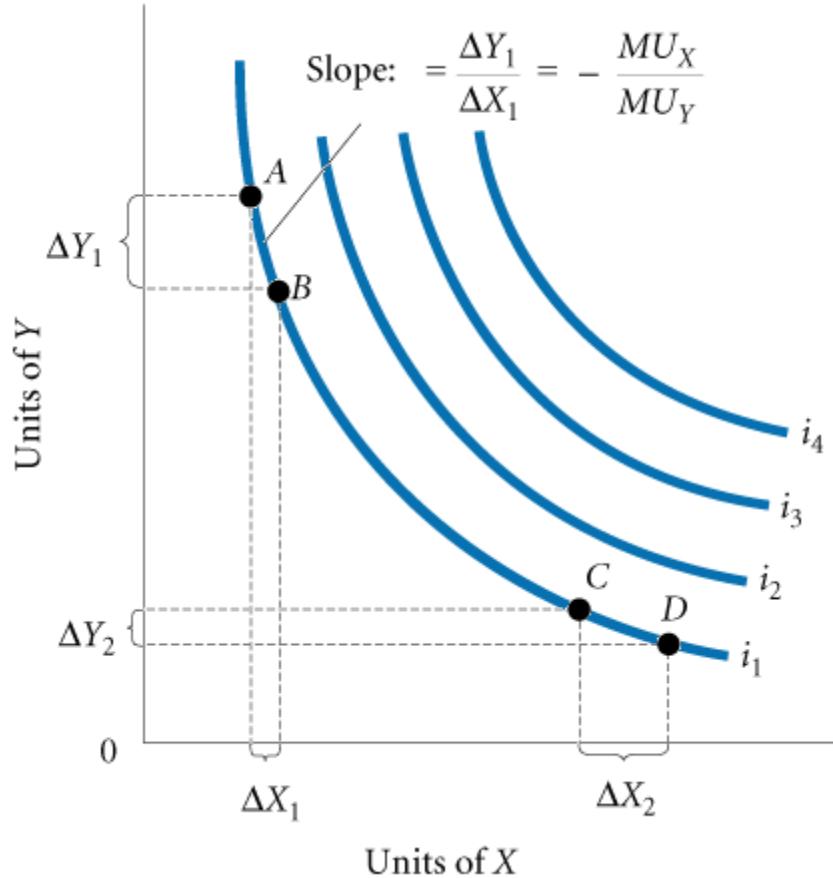


FIGURE 6A.2 A Preference Map: A Family of Indifference Curves

Why Convex towards the origin?

- To understand the convex shape, compare the segment of curve i_1 between A and B with the segment of the same curve between C and D.
 - Moving from A to B, the consumer is willing to give up a substantial amount of Y to get a small amount of X.
 - Moving from C and D, however, the consumer is willing to give up only a small amount of Y to get more X.
- This changing trade-off makes complete sense when you remember the law of diminishing marginal utility.
 - Notice that between A and B, a great deal of Y is consumed and the marginal utility derived from a unit of Y is likely to be small.
 - At the same time, though, only a little of X is being consumed; so the marginal utility derived from consuming a unit of X is likely to be high.
- Suppose, for example, that X is pizza and Y is soda.
 - Near A and B, a thirsty, hungry football player who has 10 sodas in front of him but only one slice of pizza will trade several sodas for another slice.
 - Down around C and D, however, he has 20 slices of pizza and a single soda. Now he will trade several slices of pizza to get an additional soda

Slope of an Indifference Curve

- We can show how the trade-off changes more formally by deriving an expression for the slope of an indifference curve.
 - Let us look at the arc (that is, the section of the curve) between A and B.
 - We know that in moving from A to B, total utility remains constant.
 - That means that the utility lost as a result of consuming less Y must be matched by the utility gained from consuming more X.
 - We can approximate the loss of utility by multiplying the marginal utility of Y (MU_Y) by the number of units by which consumption of Y is curtailed (ΔY).
 - Similarly, we can approximate the utility gained from consuming more X by multiplying the marginal utility of X (MU_X) by the number of additional units of X consumed (ΔX).

CHAPTER 6: Household Behavior and Consumer Choice

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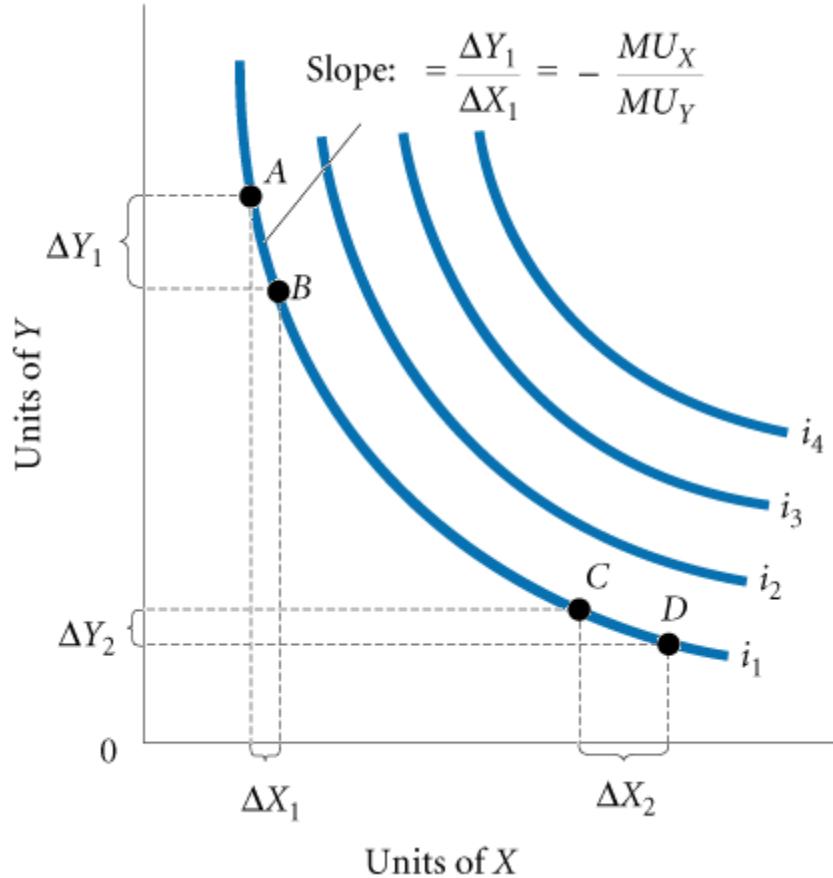


FIGURE 6A.2 A Preference Map: A Family of Indifference Curves

Slope of an Indifference Curve

- Because the consumer is indifferent between points A and B, total utility is the same at both points.
 - Thus, these two must be equal in magnitude — that is, the gain in utility from consuming more X must equal the loss in utility from consuming less Y.
- Because ΔY is a negative number (because consumption of Y decreases from A to B), it follows that

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

Slope of an Indifference Curve

PROPERTIES OF INDIFFERENCE CURVES

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

If we divide both sides by MU_Y and by ΔX , we obtain

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

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.

Why slope falls (Pizza & Soda example)

- Now let us return to our pizza (X) and soda (Y) example.
 - As we move down from the A:B area to the C:D area, our football player is consuming less soda and more pizza.
 - The marginal utility of pizza (MU_X) is falling, and the marginal utility of soda (MU_Y) is rising.
- That means that MU_X / MU_Y (the marginal rate of substitution) is falling and the absolute value of the slope of the indifference curve is declining.
 - Indeed, it does get flatter

Consumer Choice: Budget Constraint & Indifference Curve

- As you recall, demand depends on income, the prices of goods and services, and preferences or tastes.
 - We are now ready to see how preferences as embodied in indifference curves interact with budget constraints to determine how the final quantities of X and Y will be chosen.
- In Figure 6A.3, a set of indifference curves is superimposed on a consumer's budget constraint.
 - Recall that the budget constraint separates those combinations of X and Y that are available from those that are not.
 - The shaded area is the consumer's opportunity set.
 - The slope of a budget constraint is $-P_X / P_Y$

Appendix

CHAPTER 6: Household Behavior and Consumer Choice

CONSUMER CHOICE

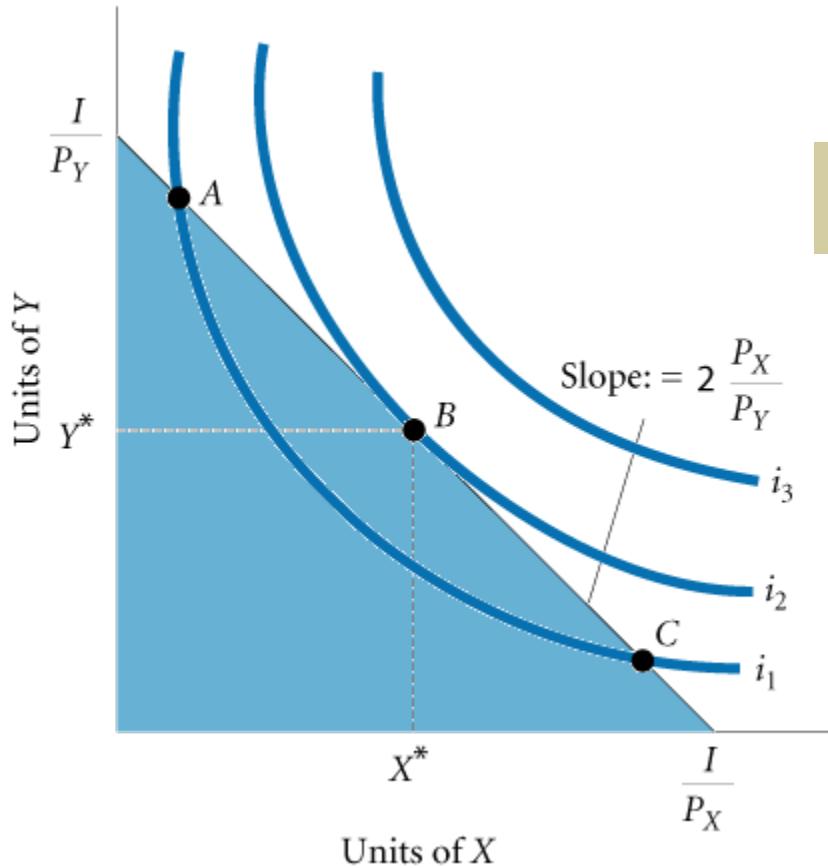


FIGURE 6A.3 Consumer Utility-Maximizing Equilibrium

Consumer Choice: Budget Constraint & Indifference Curve

- Consumers will choose from among available combinations of X and Y the one that maximizes utility.
 - In graphic terms, **a consumer will move along the budget constraint until he or she is on the highest possible indifference curve.**
 - Utility rises by moving from points such as A or C (which lie on i_1) toward B (which lies on i_2).
- Any movement away from point B moves the consumer to a lower indifference curve — a lower level of utility.
- In this case, utility is maximized when our consumer buys X^* units of X and Y^* units of Y .
 - At point B, the budget constraint is just tangent to — that is, just touches indifference curve i_2 .

Consumer Choice: Budget Constraint & Indifference Curve

- As long as indifference curves are convex to the origin, utility maximization will take place at that point at which the indifference curve is just tangent to the budget constraint
- The tangency condition has important implications.

Consumer Choice: Budget Constraint & Indifference Curve

Where two curves are tangent, they have the same slope, which implies that the slope of the indifference curve is exactly equal to the slope of the budget constraint at the point of tangency:

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

slope of indifference curve = slope of budget constraint

By multiplying both sides of this equation by MU_Y and dividing both sides by P_X , we can rewrite this utility-maximizing rule as

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

Consumer Choice & Utility Maximization Rule

- This is the same rule derived in our earlier discussion without using indifference curves.
 - We can describe this rule intuitively by saying that consumers maximize their total utility by equating the marginal utility per dollar spent on X with the marginal utility per dollar spent on Y.
- If this rule did not hold, utility could be increased by shifting money from one good to the other

Deriving a Demand Curve from Indifference Curves and Budget Constraints

- A demand curve shows the quantity of a single good, X in this case, that a consumer will demand at various prices.
- To derive the demand curve, we need to confront our consumer with several alternative prices for X while keeping other prices, income, and preferences constant
- Figure 6A.4 shows the derivation.
- We begin with price P_x^1
 - At that price, the utility-maximizing point is A , where the consumer demands X_1 units of X .
 - Therefore, in the right-hand diagram, we plot against X_1
 - This is the first point on our demand curve.

Appendix

DERIVING A DEMAND CURVE FROM INDIFFERENCE CURVES AND BUDGET CONSTRAINTS

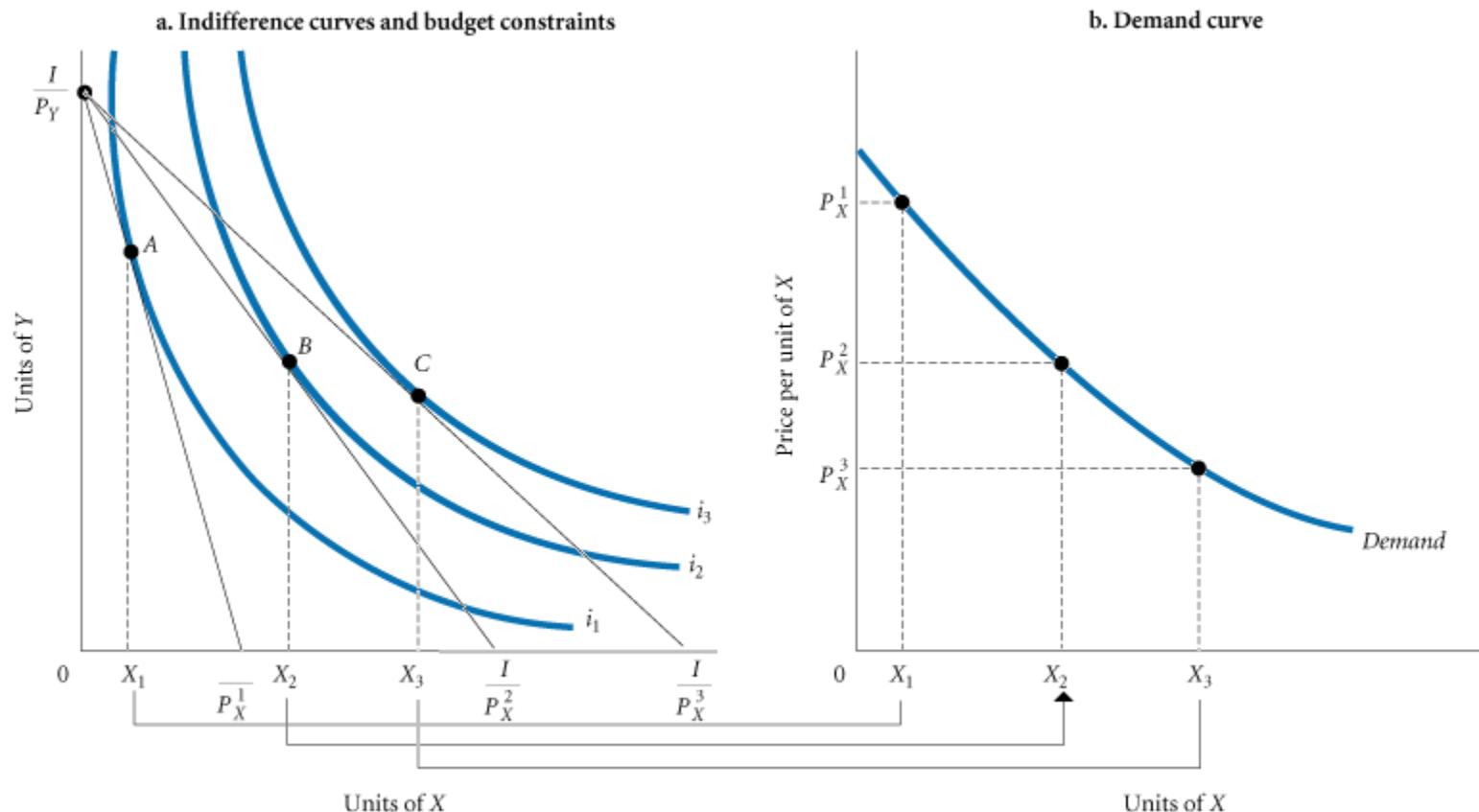


FIGURE 6A.4 Deriving a Demand Curve from Indifference Curves and Budget Constraint

Deriving a Demand Curve from Indifference Curves and Budget Constraints

- Now we lower the price of X to P_x^2
 - Lowering the price expands the opportunity set, and the budget constraint swivels to the right.
 - Because the price of X has fallen, when our consumer spends all of the income on X , he or she can buy more of it.
 - Our consumer is also better off because of being able to move to a higher indifference curve.
 - The new utility-maximizing point is B , where the consumer demands X_2 units of X .
 - Because the consumer demands X_2 units of X at a price of P_x^2 , we plot against X_2 in the right-hand diagram.
- Thus, we see how the demand curve can be derived from a consumer's preference map and budget constraint.

CONSUMER SURPLUS & Diamond/Water Paradox

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

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.

Diamond/Water Paradox

Adam Smith

- The things which have the greatest value in use have frequently little or no value in exchange; and on the contrary, those which have the greatest value in exchange have frequently little or no value in use.
 - Nothing is more useful than water: but it will purchase scarce anything; scarce anything can be had in exchange for it.
 - A diamond, on the contrary, has scarce any value in use; but a very great quantity of other goods may frequently be had in exchange for it

Diamond/Water Paradox

- Although diamonds have arguably more than “scarce any value in use” today (for example, they are used to cut glass), Smith’s **diamond/water paradox** is still instructive, at least where water is concerned.
- **The low price of water owes much to the fact that it is in plentiful supply.**
 - Even at a price of zero, we do not consume an infinite amount of water.
 - We consume up to the point where *marginal utility* drops to zero.
- **Each of us enjoys an enormous consumer surplus when we consume nearly free water.**
 - At a price of zero, **consumer surplus** is the entire area under the demand curve.
 - We tend to take water for granted, but imagine what would happen to its price if there were not enough for everyone.
 - It would command a high price indeed.

CONSUMER SURPLUS

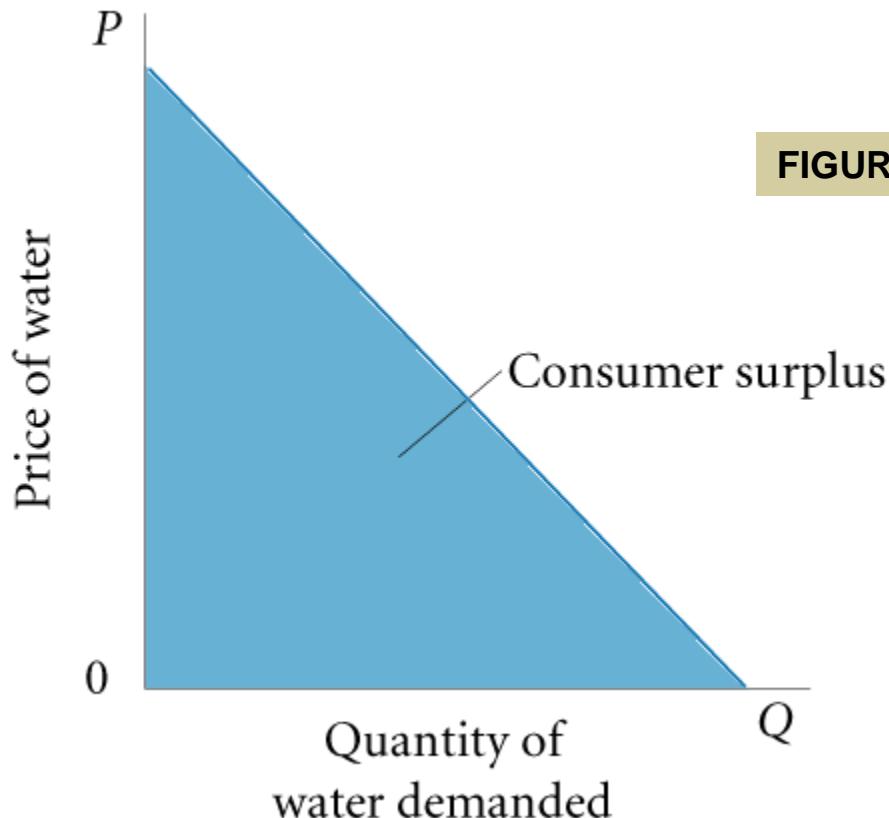


FIGURE 6.8 The Diamond/Water Paradox

cost-benefit analysis The formal technique by which the benefits of a public project are weighed against its costs.

ECONOMICS IN PRACTICE

Soda Beverage Choice

Many countries have started imposing a tax on soda beverages as a measure to raise revenue as well as to prevent obesity.

Research found that due to the tax sales shifted to other cheaper, high-caloric or generic versions of soda beverages.

THINKING PRACTICALLY

1. Using the utility-maximizing rule, illustrate how consumers who are affected by the soda tax policy make choices to achieve an optimal decision.



ECONOMICS IN PRACTICE

Substitution and Market Baskets

When Mr. Smith shops, he compares the marginal utility of each product he consumes relative to its price in deciding what bundle to buy.

When we artificially restrict Mr. Smith's ability to substitute goods, we almost inevitably give him a more expensive bundle.

THINKING PRACTICALLY

1. An employer decides to transfer one of her executives to Europe. "Don't worry," she says, "I will increase your salary so that you can afford exactly the same things in your new home city as you can buy here." Is this the right salary adjustment?



ECONOMICS IN PRACTICE

Uber Drivers

Uber is a company that matches people who are available to use their own cars to drive people around with those who want a ride.

Uber drivers have a great deal of job flexibility in terms of how much they work and when to accept a passenger.

THINKING PRACTICALLY

1. Why is Uber willing to let drivers be flexible in the number of hours they work?



Ch-6 (Additional Study Material)

Exceptions to the Law of Demand

[Giffen goods etc]

Income effect and substitution effect of price change

- A change in demand for a commodity, say X, due to change in the price of the same commodity (i.e. X) is called **price effect**. It can be decomposed in two effects:
- **Income Effect**: The income effect results from an increase or decrease in the consumer's **real income or purchasing power** as a result of the price change.
 - Eg: Suppose the Jones household typically buys 10 gallons of milk each month at a price of \$4 per gallon. Thus, the Jones household's monthly expenditure for milk is \$40. If the price of milk fell to \$3 per gallon, the household's monthly expenditure for 10 gallons of milk would fall to \$30. The Jones household is better off due to the drop in the price of milk because the extra \$10 can be spent on additional gallons of milk or on other products. If, on the other hand, the price of milk increased from \$4 per gallon to \$5 per gallon, the Jones household would be financially worse off because it would have to reduce its consumption of milk or some other good or service.

Income effect and substitution effect of price change

- **Substitution effect:** The substitution effect of a price change states that if the price of a product falls, consumers will buy more of that product and buy less of a higher-priced substitute good. Conversely, if the price of a product rises, consumers will buy less of it and buy more of a lower-priced substitute.
 - Consider the Jones household's monthly milk expenditures once again. According to the substitution effect of a price change, a decrease in the price of milk from \$4 per gallon to \$3 per gallon would likely result in the purchase of additional gallons of milk and the purchase of fewer units of substitute goods such as soft drinks or bottled water. If, on the other hand, the price of milk jumped from \$4 per gallon to \$5 per gallon, the Jones household would likely respond by purchasing fewer gallons of milk and more units of substitutes such as soft drinks or bottled water.

Impact of a fall in the price of good X

Nature of Good X	Substitution Effect (Direction of Change)	Income Effect (Direction of Change)	Substitution & Income Effects (Magnitude of Change)	Price Effect
Normal Good	Increase in quantity demanded of Good X	Increase in quantity demanded of Good X	-	Positive
Inferior Good	Increase in quantity demanded of Good X	Decrease in quantity demanded of Good X	$SE > IE$	Positive
Giffen Good	Increase in quantity demanded of Good X	Decrease in quantity demanded of Good X	$SE < IE$	Negative

Effects of a Price Reduction on the following goods

	Substitution Effect	Income Effect	Overall Effect
Good X Normal Good	Positive Demand rises as good is relatively cheaper (+10 units)	+	Positive Demand rises as real income rises (10 Units) = Demand Rises by 20 units
Good Y Inferior Good	Positive Demand rises as good is relatively cheaper (+10 units)	+	Negative Demand falls as real income rises (- 6 Units) = Demand rises by 4 units because the positive substitution effect is greater than the negative Income effect
Good Z Giffen Good	Positive Demand rises as good is relatively cheaper (+6 Units)	+	Negative Demand falls as real income rises (- 8 Units) = Demand falls by 2 units because the negative Income effect is greater than the positive substitution effect

Giffen Goods

- The standard example of a Giffen good is potatoes in nineteenth century Ireland.
- Potatoes were a staple of the people's diet and when their price rose people became much poorer in a real sense.
- These people substituted away from other, normal goods, and bought more of the relatively inferior potatoes, with the net effect that consumption of potatoes rose even as their price rose.

Exceptions to the Law of Demand

- 1) **Giffen Goods**

Essentials which constitute a large proportion of the expenditure of low-income families e.g. white bread, potatoes, rice. If the price of bread is increased then people would probably continue to buy the quantity they require after the price increase.

Example - White Bread

- 2) **Snob items or Goods of Ostentation**

When the price of these goods falls (Rolls Royce) they lose their exclusiveness as more people can now afford them and so demand amongst the more wealthy for these goods decreases.

Example - Rolex

- 3) **Speculative Goods**

Goods, the demand for which is influenced by expectations – when the price of such goods increase, (stocks, houses) the quantity demanded may also increase because of the expectation of future price increases.

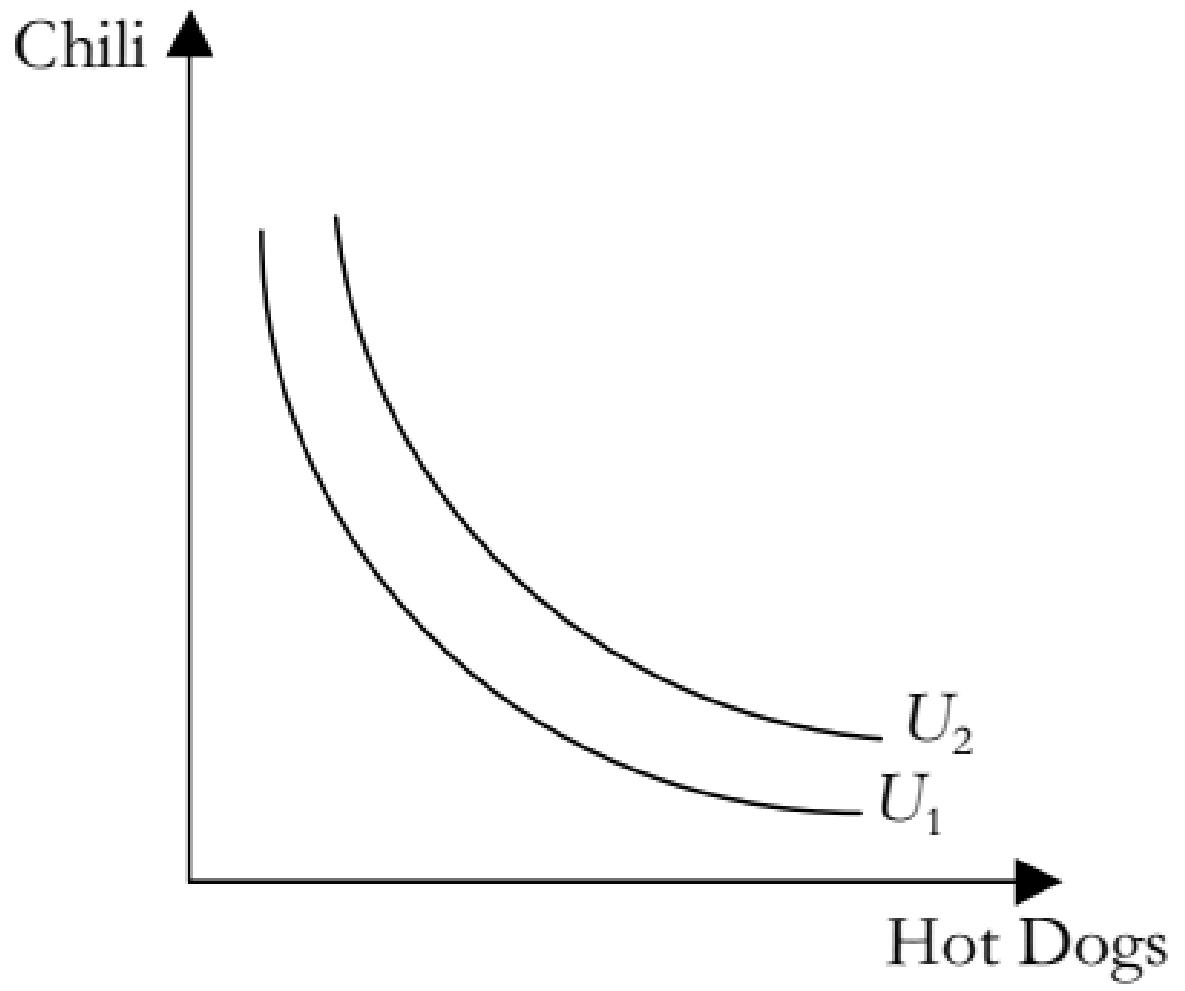
Example - Houses , Shares

Types of IC

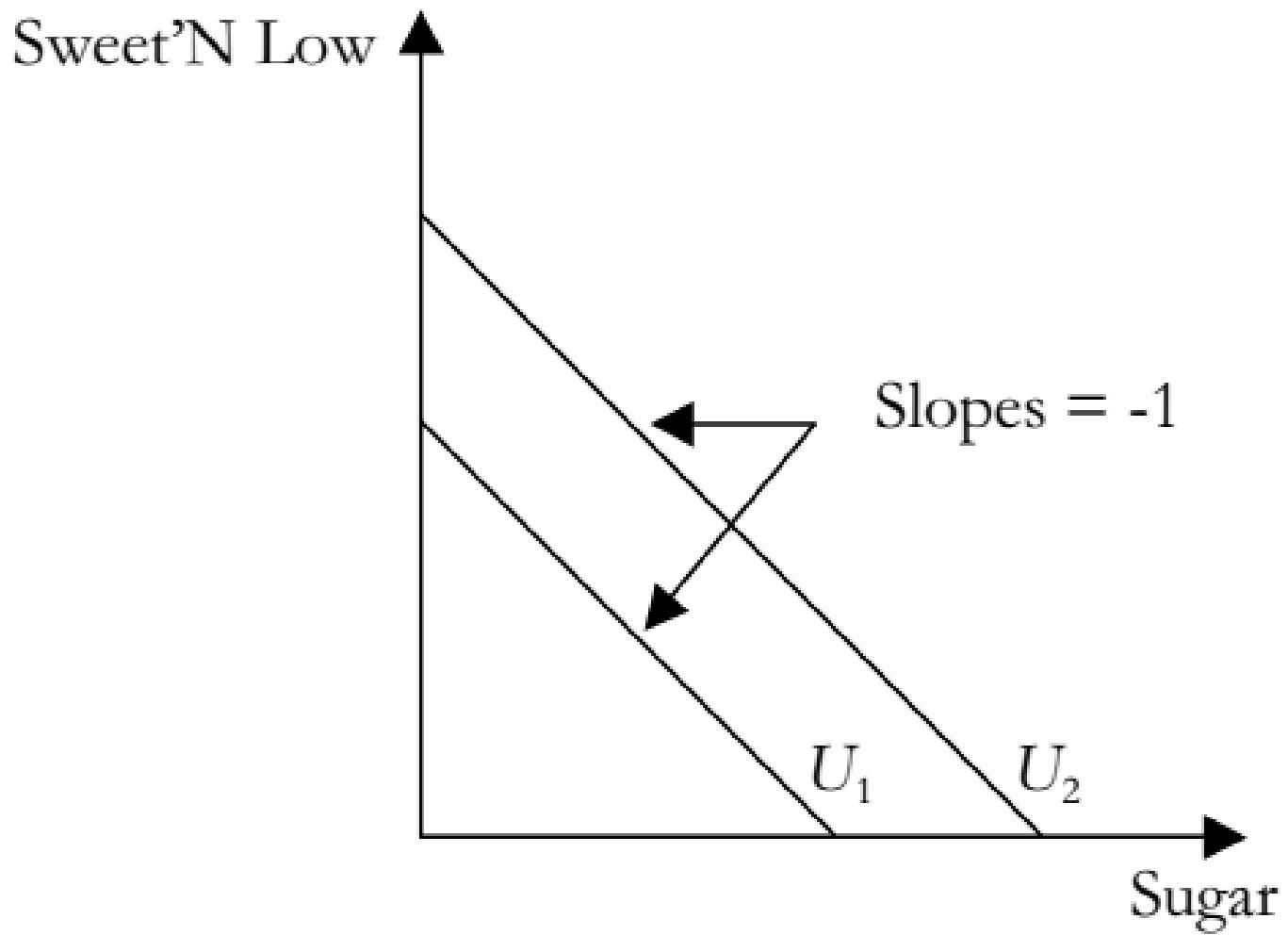
[Substitutes, Compliments etc]

30.

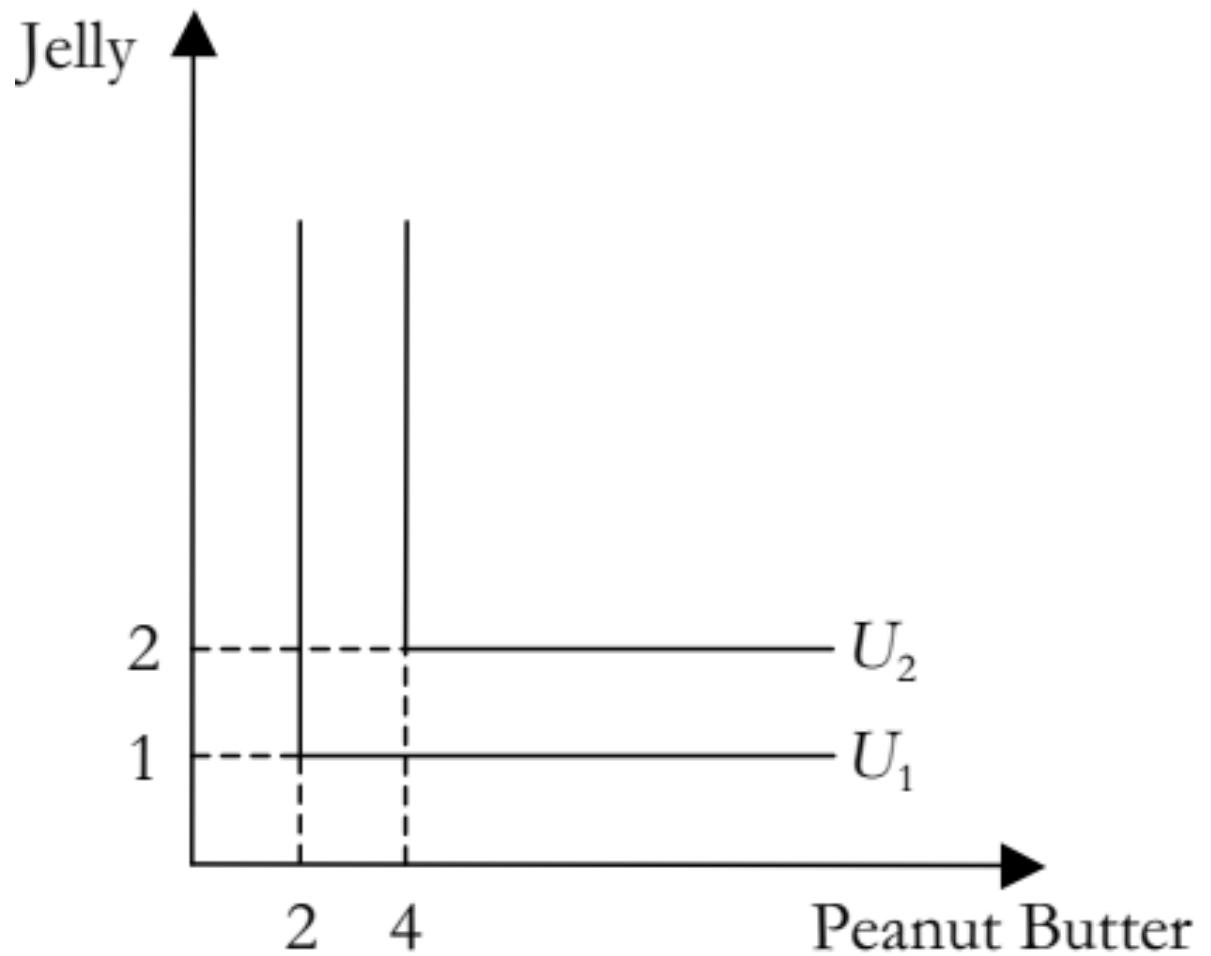
- For the following sets of goods draw two indifference curves, U^1 and U^2 , with $U^2 > U^1$. Draw each graph placing the amount of the first good on the horizontal axis.
 - a. Hot dogs and chili (the consumer likes both and has a diminishing marginal rate of substitution of hot dogs for chili)



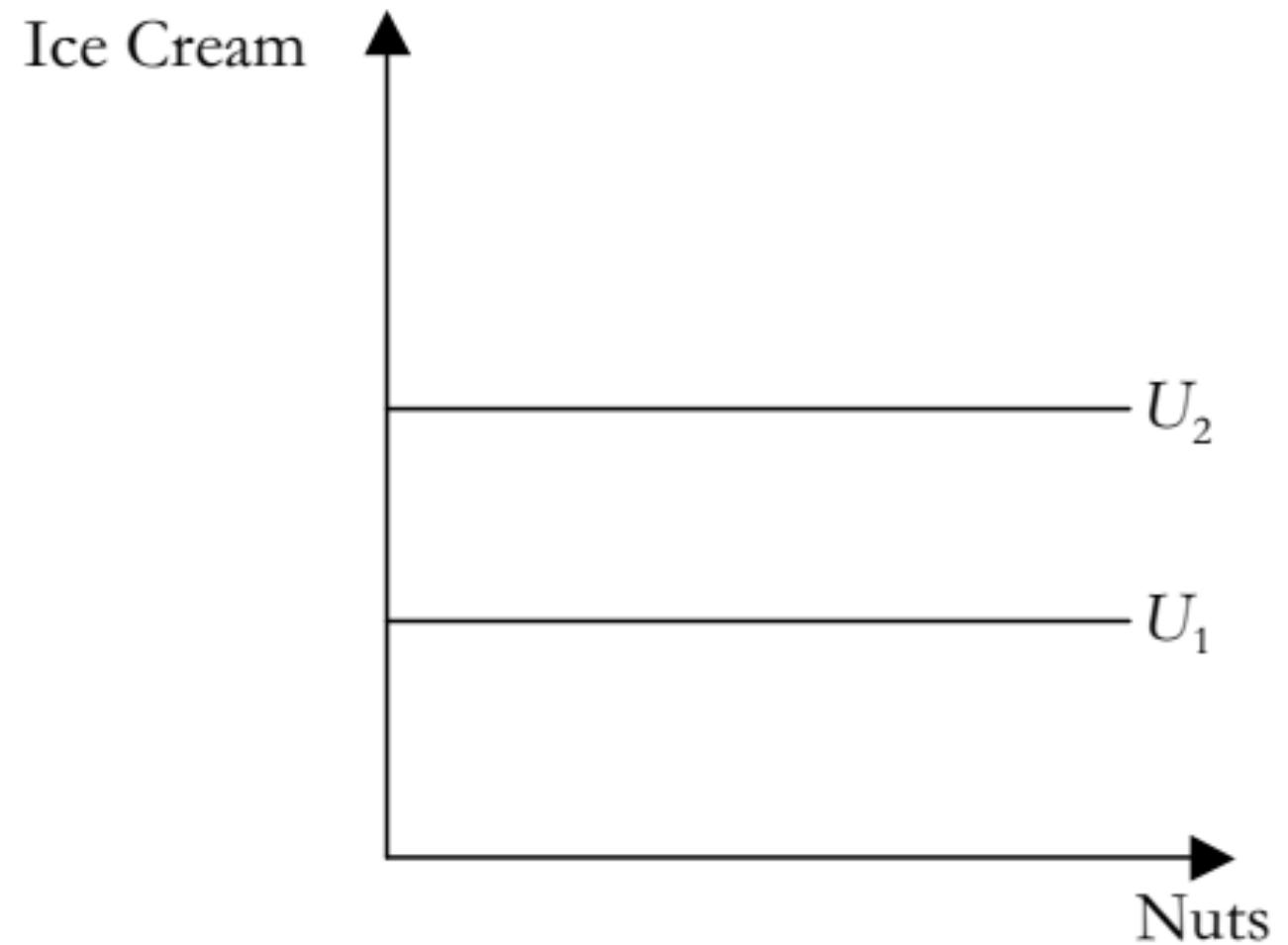
- b. Sugar and Sweet'N Low (the consumer likes both and will accept an ounce of Sweet'N Low or an ounce of sugar with equal satisfaction)
 - **Substitutes**



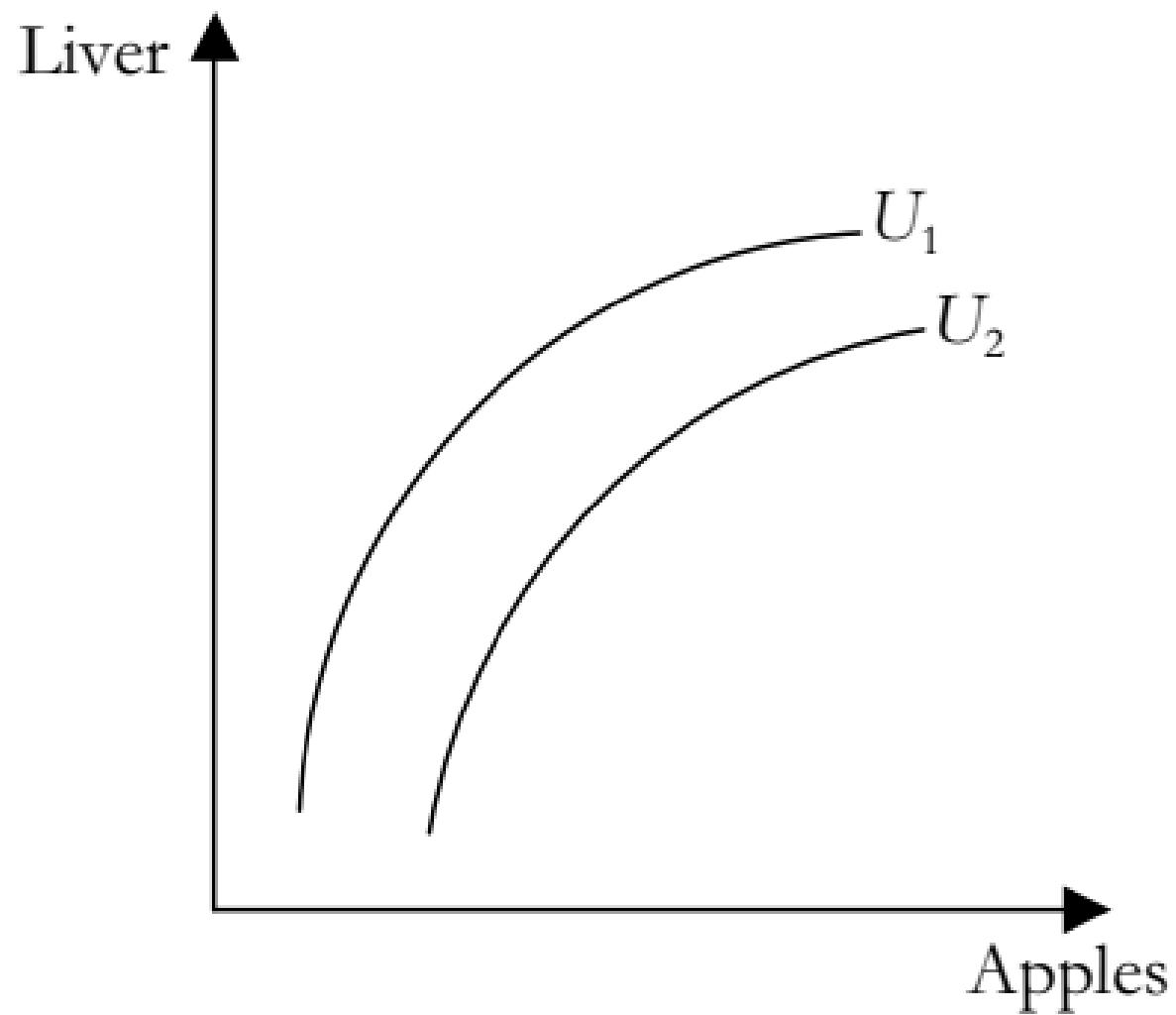
- c. Peanut butter and jelly (the consumer likes exactly 2 ounces of peanut butter for every ounce of jelly)
 - **Complements**



- d. Nuts (which the consumer neither likes nor dislikes) and ice cream (which the consumer likes)



- e. Apples (which the consumer likes) and liver (which the consumer dislikes)



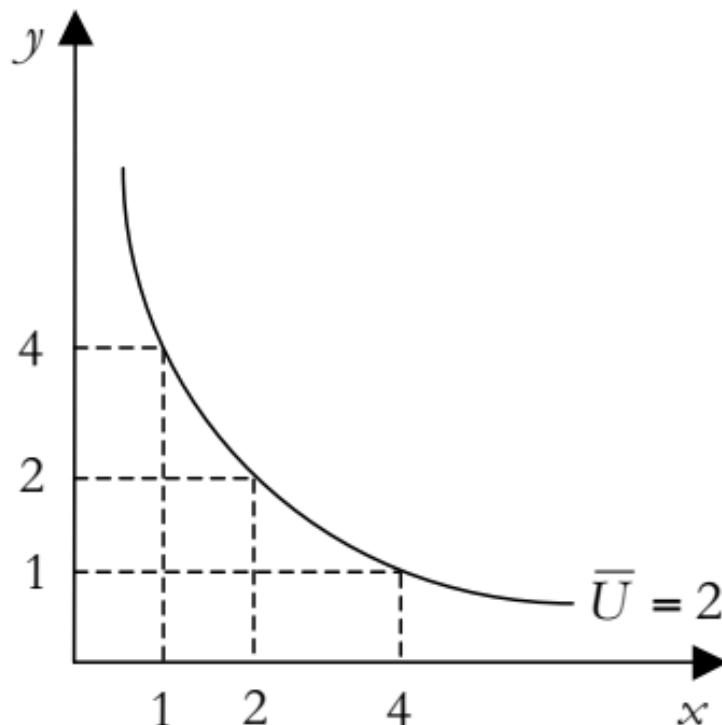
MRS

25.

- Graph a typical indifference curve for the following utility functions and determine whether they obey the assumption of diminishing MRS:

$$U(x, y) = \sqrt{xy}$$

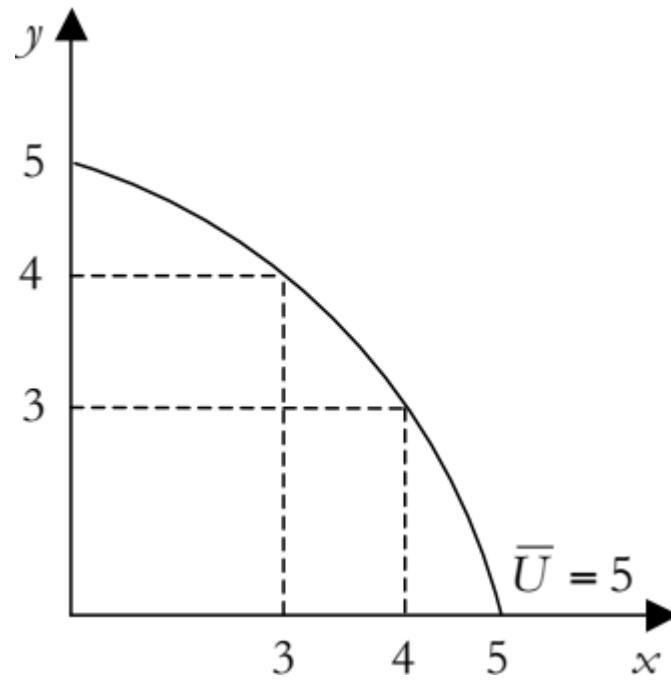
- Since the indifference curves are bowed towards the origin, they do obey the assumption of diminishing *MRS*.
- Alternatively, we know MU_x and MU_y are both positive. So when quantity of X increases, quantity of Y must decrease. The $MRS_{xy} = Y/X$. So as X increase, the denominator gets bigger and MRS decreases. As X increase, Y decreases and the numerator gets smaller so MRS decreases. Both these effects work so that as X increase MRS decreasing.



26.

$$U(x, y) = \sqrt{x^2 + y^2}$$

- Since the indifference curves are not bowed towards the origin, they do not obey the assumption of diminishing MRS . Alternatively, we know MU_x is positive and MU_y is positive, so as quantity of X increases, the quantity of Y must decrease.
- The $MRS_{xy} = X/Y$. So as X increases the numerator increases so MRS increases. As X increases Y decreases so denominator is getting smaller and MRS increases. Both these effects work in the same direction so MRS is increasing not diminishing



27.

Suppose a consumer's preferences for two goods can be represented by the Cobb-Douglas utility function $U(x, y) = A x^\alpha y^\beta$, where A , α , and β are positive constants.

- a. What is $MRS_{x,y}$?

We begin by calculating the marginal utilities with respect to x and y :

$$MU_x = \frac{\partial U(x, y)}{\partial x}$$

$$= \alpha A x^{\alpha-1} y^\beta$$

$$MU_y = \frac{\partial U(x, y)}{\partial y}$$

$$= \beta A x^\alpha y^{\beta-1}$$

We can then use these marginal utilities to obtain $MRS_{x,y}$:

$$MRS_{x,y} = \frac{MU_x}{MU_y}$$

$$= \frac{\alpha A x^{\alpha-1} y^\beta}{\beta A x^\alpha y^{\beta-1}}.$$

$$= \frac{\alpha}{\beta} \frac{y}{x}$$

- b. Is $MRS_{x,y}$ diminishing, constant, or increasing as the consumer substitutes x for y along an indifference curve?

To determine this, we need to substitute for y using the equation of the indifference curve so as to have $MRS_{x,y}$ expressed solely in terms of x .

The equation of the indifference curve is

$$\bar{U} = Ax^\alpha y^\beta,$$

where \bar{U} represents a constant level of utility. Solving this equation for y gives us

$$y^\beta = \frac{\bar{U}}{Ax^\alpha}$$

$$y = \left(\frac{\bar{U}}{Ax^\alpha} \right)^{\frac{1}{\beta}}$$

$$y = \frac{\bar{U}^{\frac{1}{\beta}}}{A^{\frac{1}{\beta}} x^{\frac{\alpha}{\beta}}}$$

Substituting for y in our expression for $MRS_{x,y}$ yields

$$MRS_{x,y} = \frac{\alpha}{\beta} \frac{y}{x}$$

$$= \frac{\alpha}{\beta} \frac{1}{x} \left(\frac{\bar{U}^{\frac{1}{\beta}}}{A^{\frac{1}{\beta}} x^{\frac{\alpha}{\beta}}} \right)$$

$$= \frac{\alpha}{\beta} \left(\frac{\bar{U}}{A} \right)^{\frac{1}{\beta}} \left(\frac{1}{x^{1+\frac{\alpha}{\beta}}} \right)$$

Since A , α , and β are positive constants, the first two terms in the equation above are also positive and constant. Moreover, the exponent on x , $1 + \frac{\alpha}{\beta}$, is also positive and constant. Therefore, as x increases, $MRS_{x,y}$ decreases.

That is, $MRS_{x,y}$ is diminishing.

28.

- Diminishing?

Repeat Problem 2 for the quasi-linear utility function $U(x, y) = 2\sqrt{x} + y$.

We begin by calculating the marginal utilities with respect to x and y :

$$MU_x = \frac{\partial U(x, y)}{\partial x} = \frac{1}{\sqrt{x}}$$
$$MU_y = \frac{\partial U(x, y)}{\partial y} = 1$$

We can then use these marginal utilities to obtain $MRS_{x,y}$:

$$MRS_{x,y} = \frac{MU_x}{MU_y}$$

$$= \frac{1}{\sqrt{x}}$$

Unlike Problem 2, this problem does not require us to substitute for y in order to determine whether or not $MRS_{x,y}$ is diminishing. (The reason is that y does not appear in our expression for $MRS_{x,y}$.) We can just look at our expression for $MRS_{x,y}$ and see that as x increases, $MRS_{x,y}$ decreases. Therefore, $MRS_{x,y}$ is diminishing.

To summarize, we know “more is better” because MU_x and MU_y are both positive; therefore, the indifference curves must be downward sloping. Moreover, we determined that $MRS_{x,y}$ is diminishing; therefore, the indifference curves must be bowed in towards the origin.



THANK YOU

Notes on IC

Notes on IC

When a consumer's preferences are such that he likes to consume some amount of both the goods, he reaches an equilibrium position at the point of tangency between the budget line and his indifference curve.

This equilibrium position at the point of tangency which lies within commodity space between the two axes is often called **interior solution.**

The economic implication of the interior solution is that consumer's pattern of consumption is diversified that is, he purchases some amount of both the commodities.

Convex Indifference Curves and Corner Equilibrium:

The **reason for not purchasing a commodity** by a consumer may be that the **price or opportunity cost of that particular commodity may be too high for him.**

Fig 8.22 (Interior solution not possible: Only consume Y):

The price of commodity X is so high that budget line is steeper than the indifference curves between the two commodities.

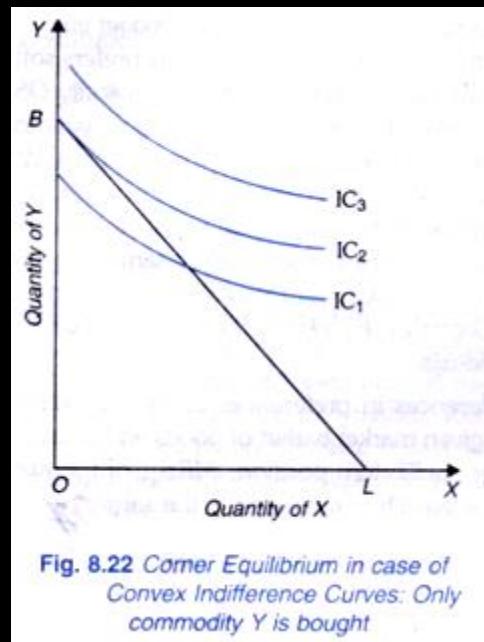


Fig 8.23 (Interior solution not possible: Only consume X):

The price of commodity Y is so high that budget line BL is less steep than the indifference curves between the two goods.

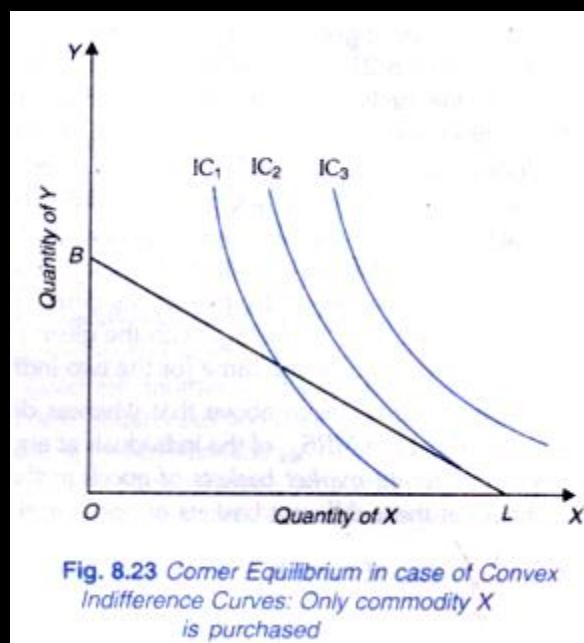
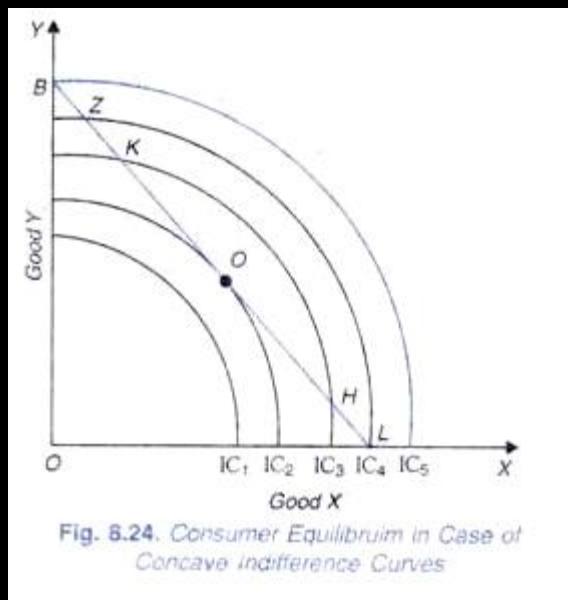


Fig. 8.23 Corner Equilibrium in case of Convex Indifference Curves: Only commodity X is purchased

Corner Equilibrium and Concave Indifference Curves:

Concavity of the indifference curves:

- => MRS will increases as X is substituted for Y.
- => Consumer has a distaste for variety, that is, does not like diversification in consumption
- => interior solution will not exist (Corner Solution) => He will buy either X or Y depending upon whether L or B lies on the higher indifference curve



Corner Solution in Case of Perfect Substitutes and Perfect Complements:

- **Indifference curves** for perfect substitutes are linear.
- **For PS- Interior solution not possible**

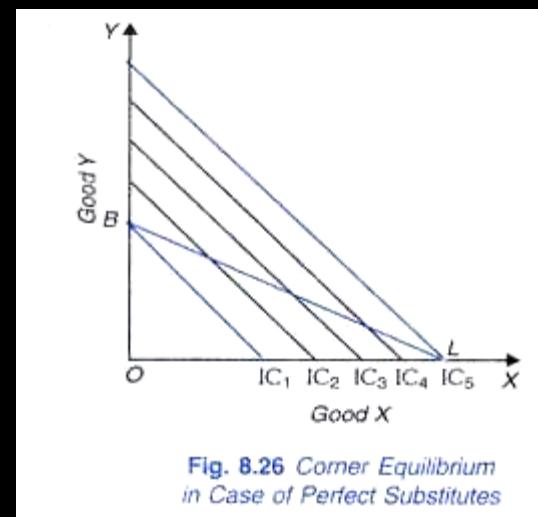
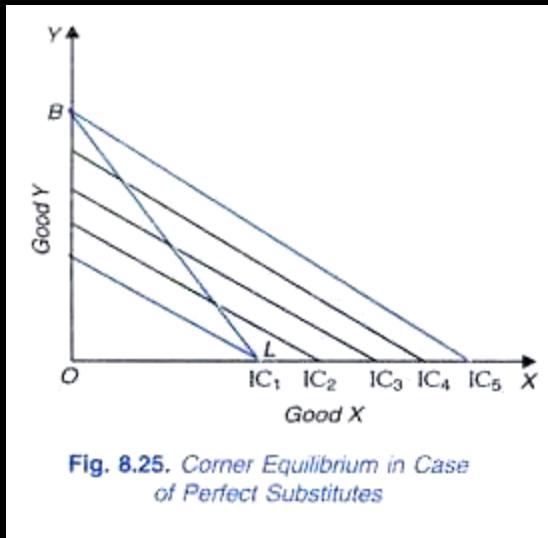
Since the budget line cannot be tangent to a point of the straight-line indifference curve of substitutes.

In this case budget line would cut the straight-line indifference curves.

Two possibilities can be visualized:

Case-I (the slope of the budget line BL can be greater than the slope of indifference curves, as in Fig. 8.25 => B would lie on a higher indifference curve than L and the consumer will buy only Y)

Case-II (the slope of the budget line can be less than the slope of indifference curve, as in Fig. 8.26 => L would lie on a higher indifference curve than B and the consumer will buy only X)



- **Indifference curves** for perfect complementary goods have a **right-angled shape**.
- **For PC- Corner solution**

In case of perfect complements equilibrium point of the indifference curve IC_2 which is indifference curve just touching the budget line BL at point C

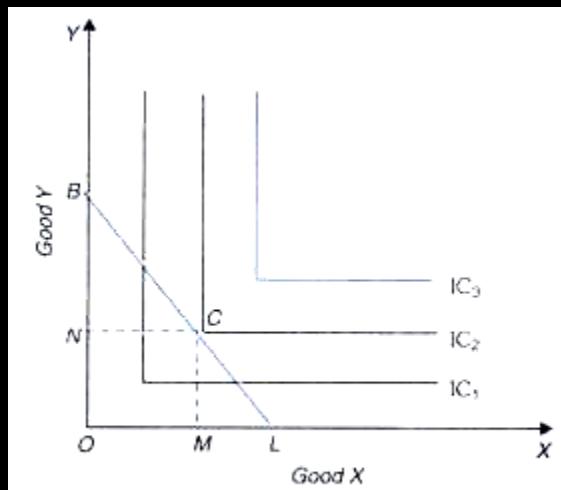


Fig. 8.27. In case of perfect complements equilibrium exists at the corner of an indifference curve

Budget Constraints & Choice Sets

Uniform *Ad Valorem* Sales Taxes

- An *ad valorem* sales tax levied at a rate of 5% increases all prices by 5%, from p to $(1+0.05)p = 1.05p$.
- An *ad valorem* sales tax levied at a rate of t increases all prices by tp from p to $(1+t)p$.
- A uniform sales tax is applied uniformly to all commodities.

Uniform *Ad Valorem* Sales Taxes

- A uniform sales tax levied at rate t changes the constraint from

$$p_1x_1 + p_2x_2 = m$$

to

$$(1+t)p_1x_1 + (1+t)p_2x_2 = m$$

Uniform *Ad Valorem* Sales Taxes

- A uniform sales tax levied at rate t changes the constraint from

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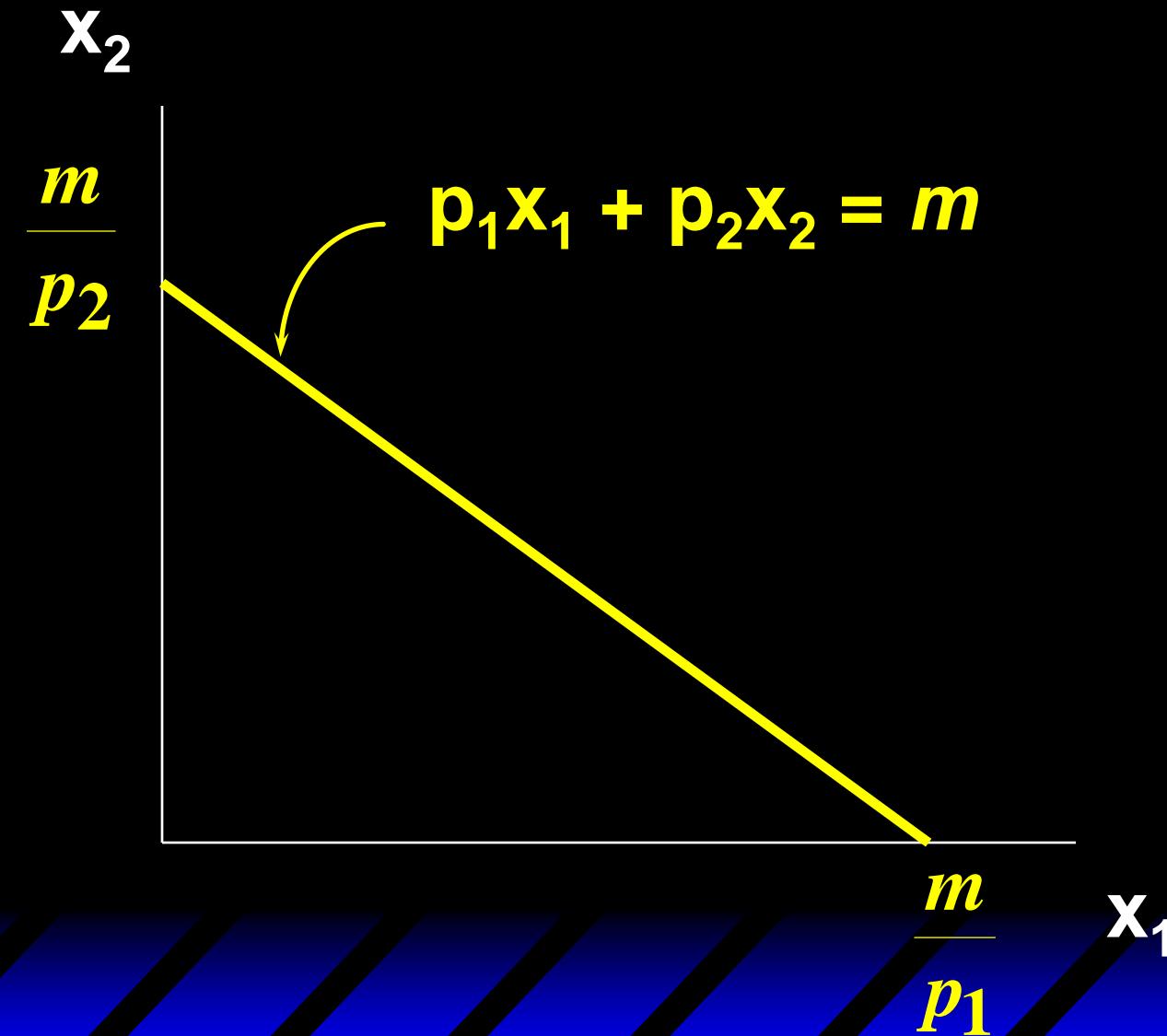
to

$$(1+t)p_1x_1 + (1+t)p_2x_2 = m$$

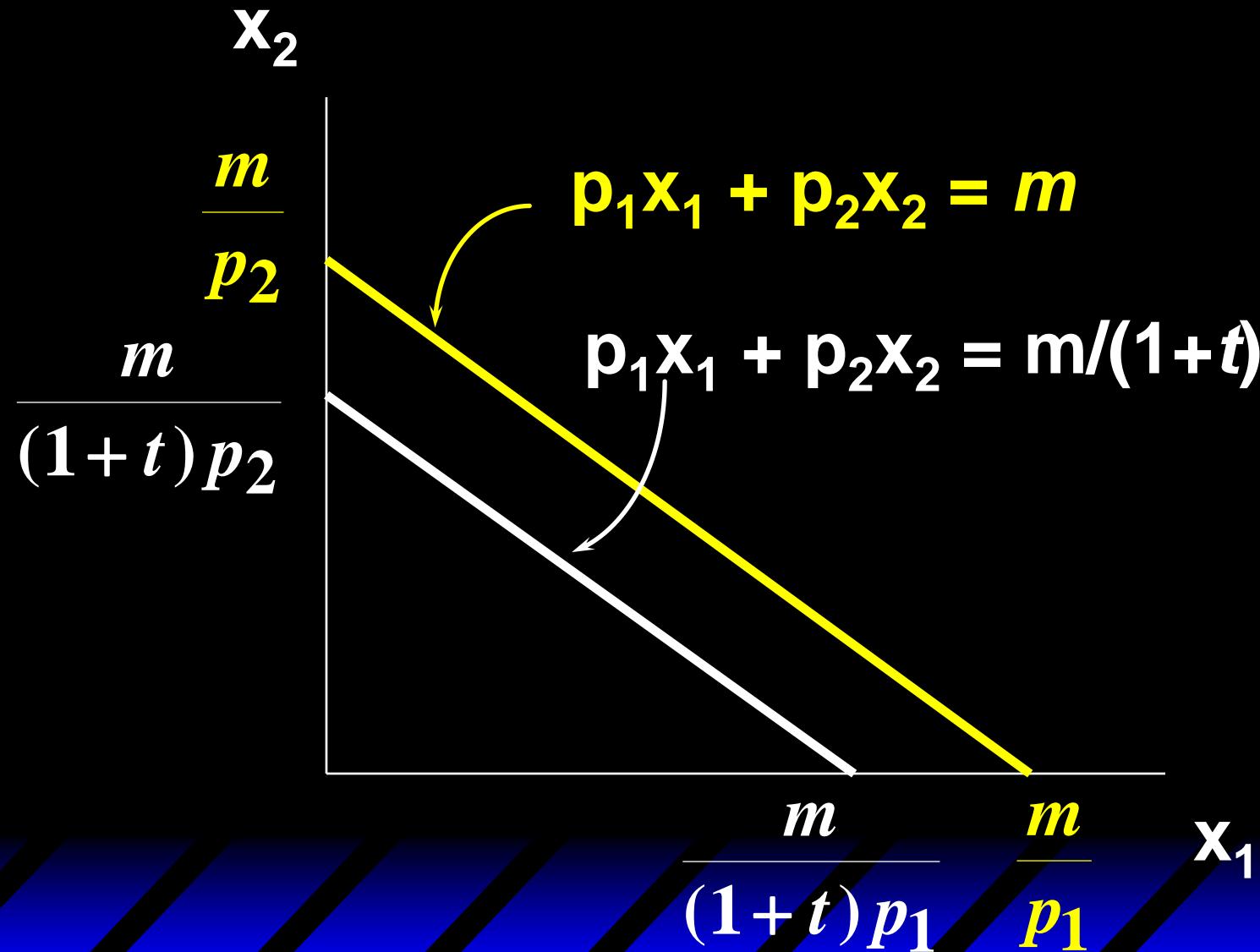
i.e.

$$p_1x_1 + p_2x_2 = m/(1+t).$$

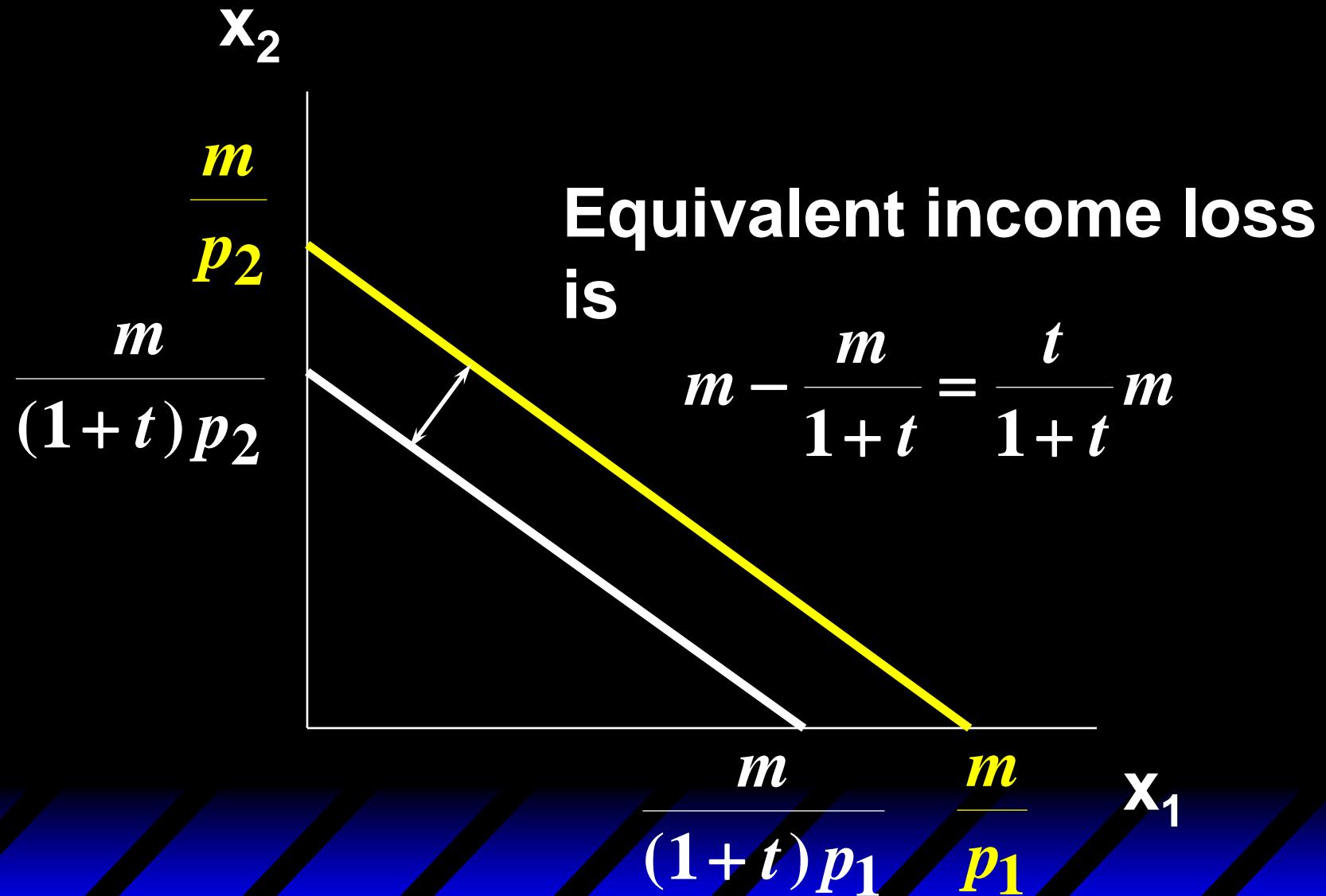
Uniform *Ad Valorem* Sales Taxes



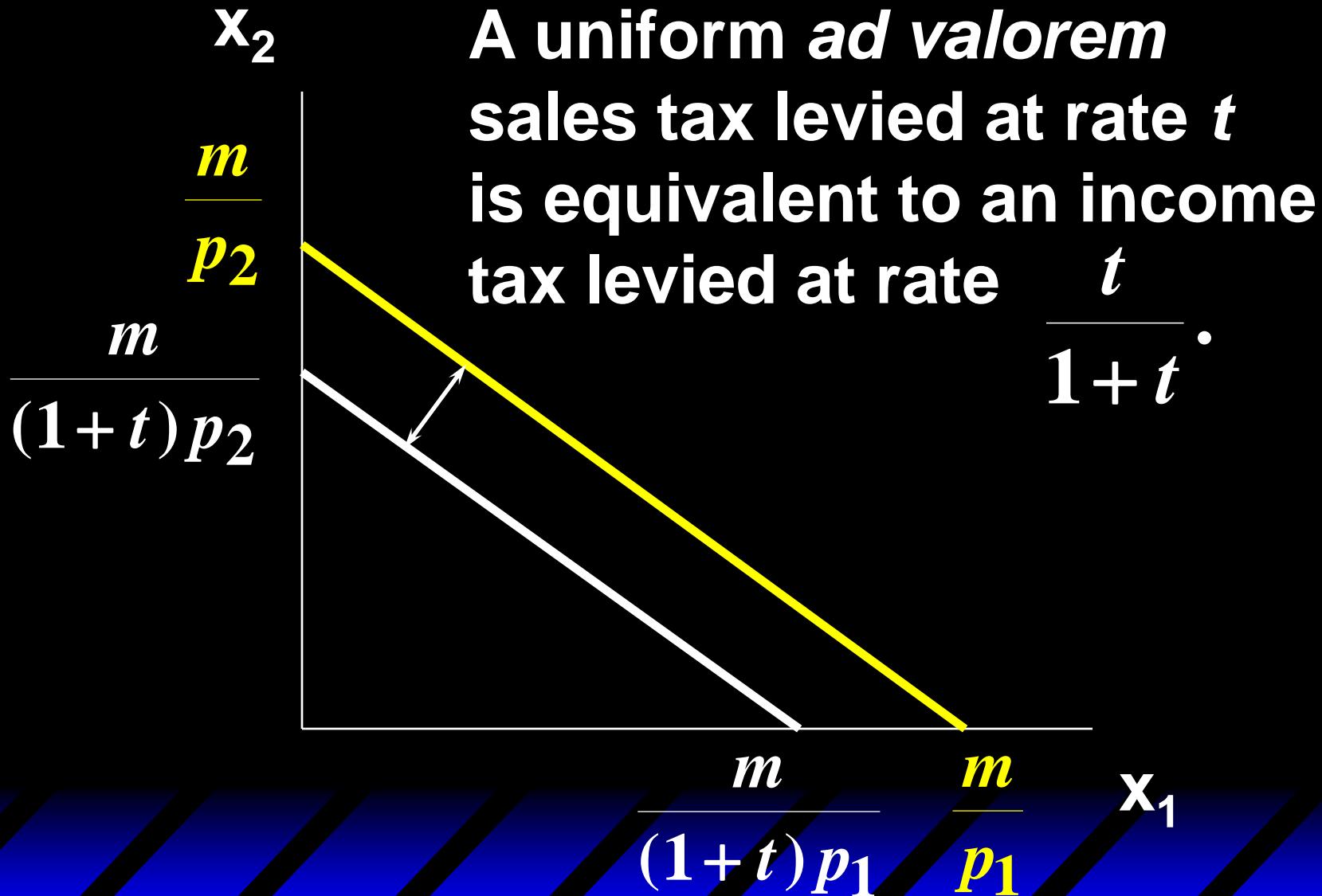
Uniform *Ad Valorem* Sales Taxes



Uniform *Ad Valorem* Sales Taxes



Uniform *Ad Valorem* Sales Taxes



Shapes of Budget Constraints

- Q: What makes a budget constraint a straight line?
- A: A straight line has a constant slope and the constraint is

$$p_1x_1 + \dots + p_nx_n = m$$

so if prices are constants then a constraint is a straight line.

Shapes of Budget Constraints

- But what if prices are not constants?
- E.g. bulk buying discounts, or price penalties for buying “too much”.
- Then constraints will be curved.

Shapes of Budget Constraints - Quantity Discounts

- Suppose p_2 is constant at \$1 but that $p_1=\$2$ for $0 \leq x_1 \leq 20$ and $p_1=\$1$ for $x_1 > 20$.

Shapes of Budget Constraints - Quantity Discounts

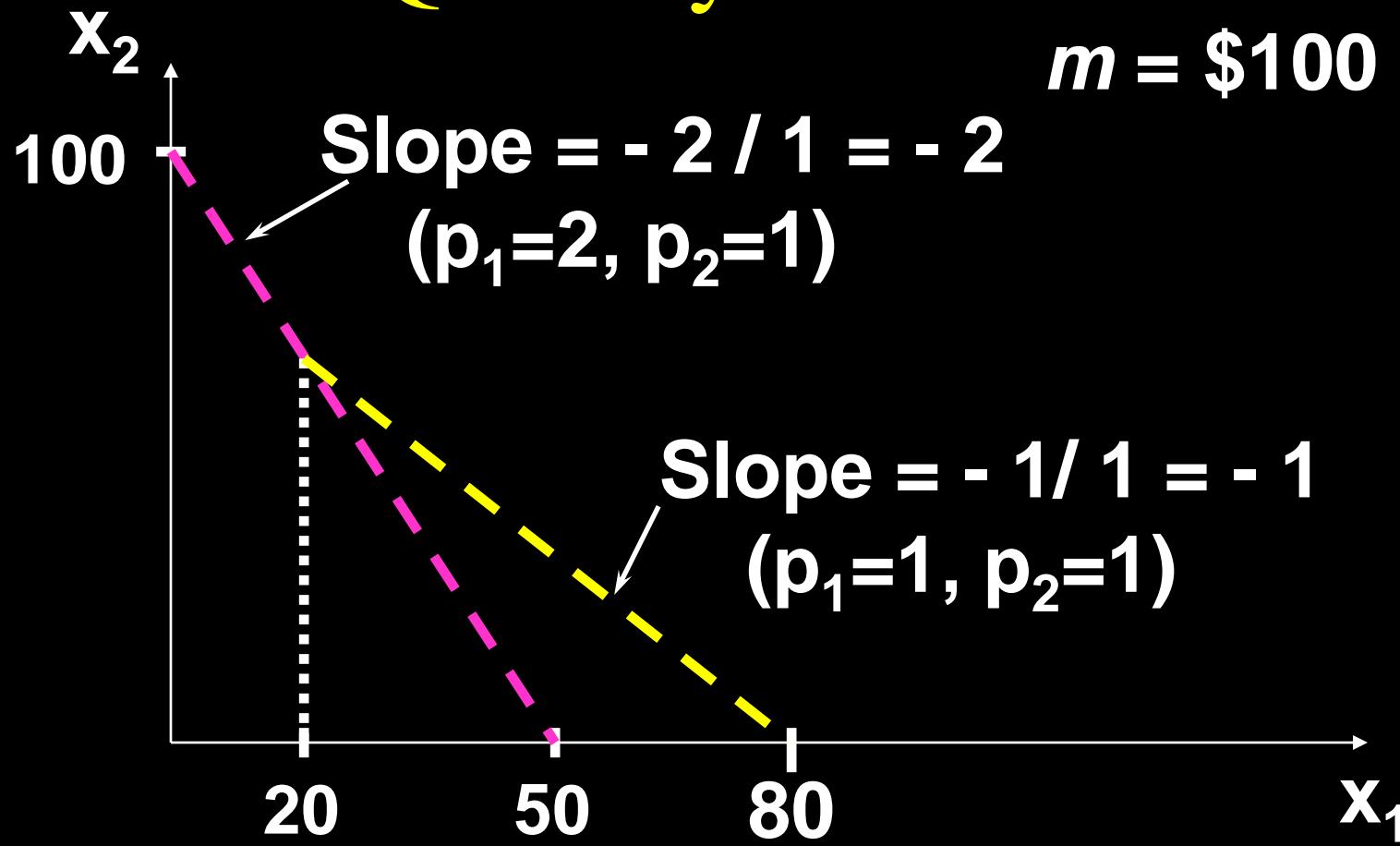
- Suppose p_2 is constant at \$1 but that $p_1=\$2$ for $0 \leq x_1 \leq 20$ and $p_1=\$1$ for $x_1 > 20$. Then the constraint's slope is

- 2, for $0 \leq x_1 \leq 20$

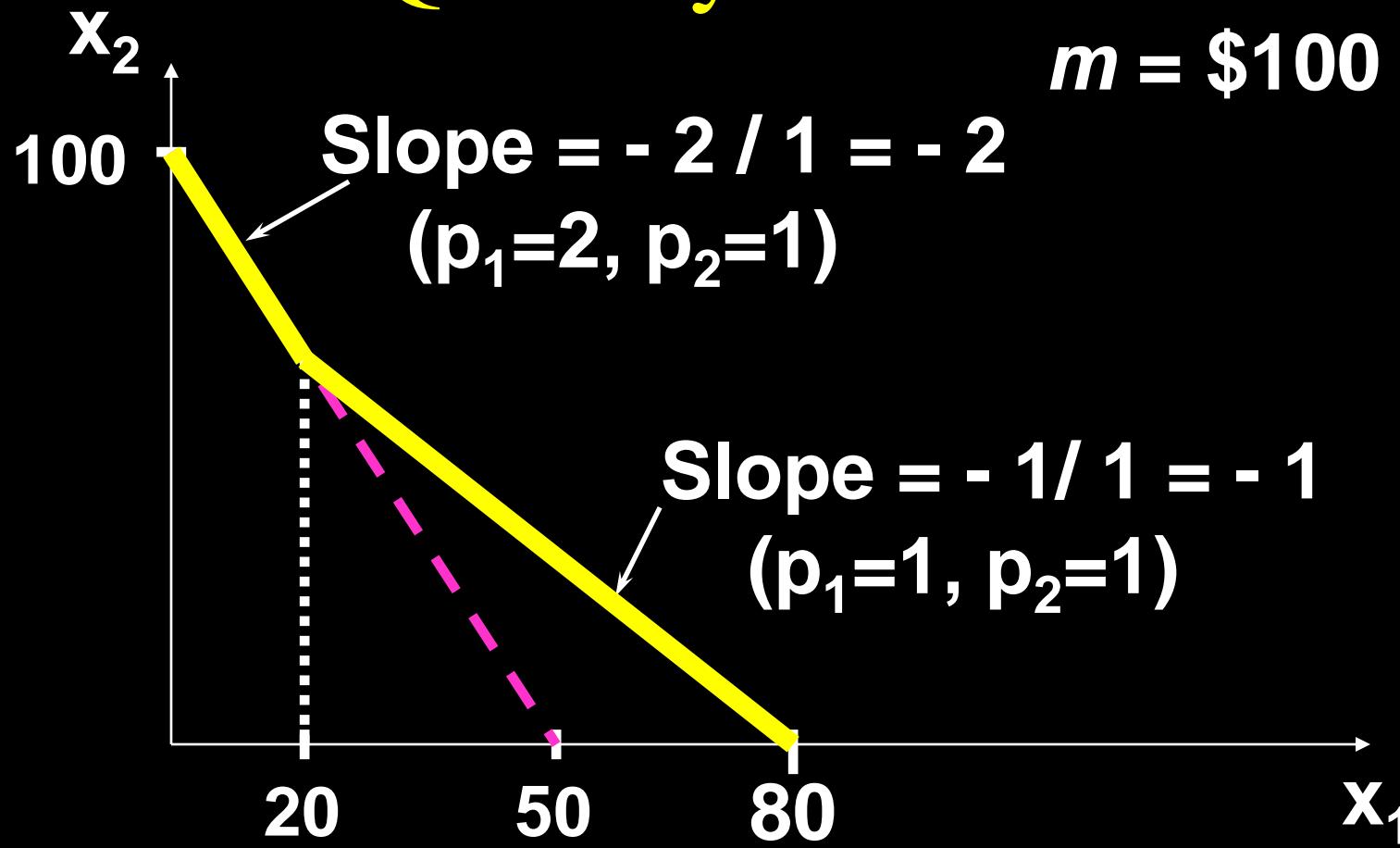
$$-\frac{p_1}{p_2} = \begin{cases} -2, & \text{for } 0 \leq x_1 \leq 20 \\ -1, & \text{for } x_1 > 20 \end{cases}$$

and the constraint is

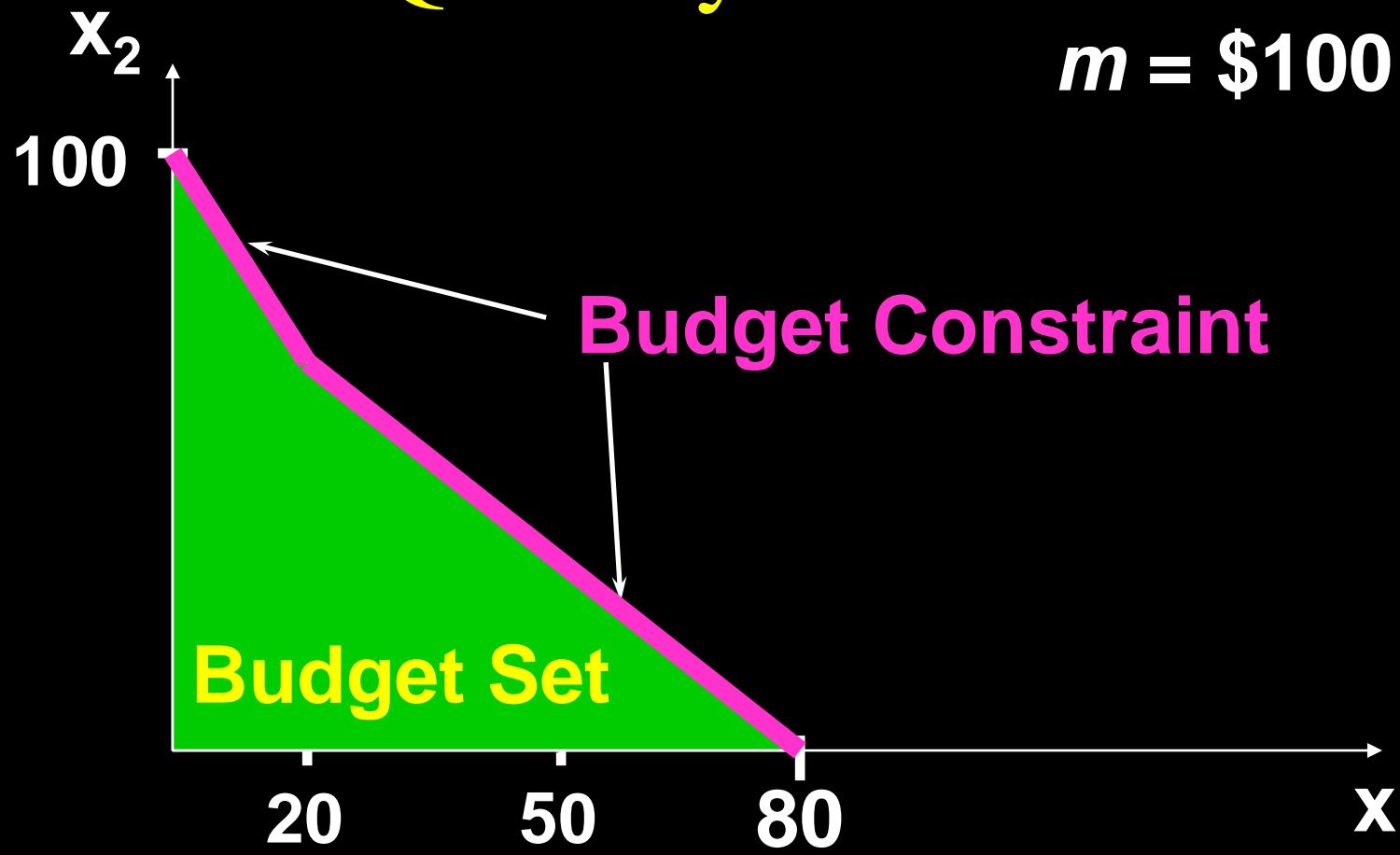
Shapes of Budget Constraints with a Quantity Discount



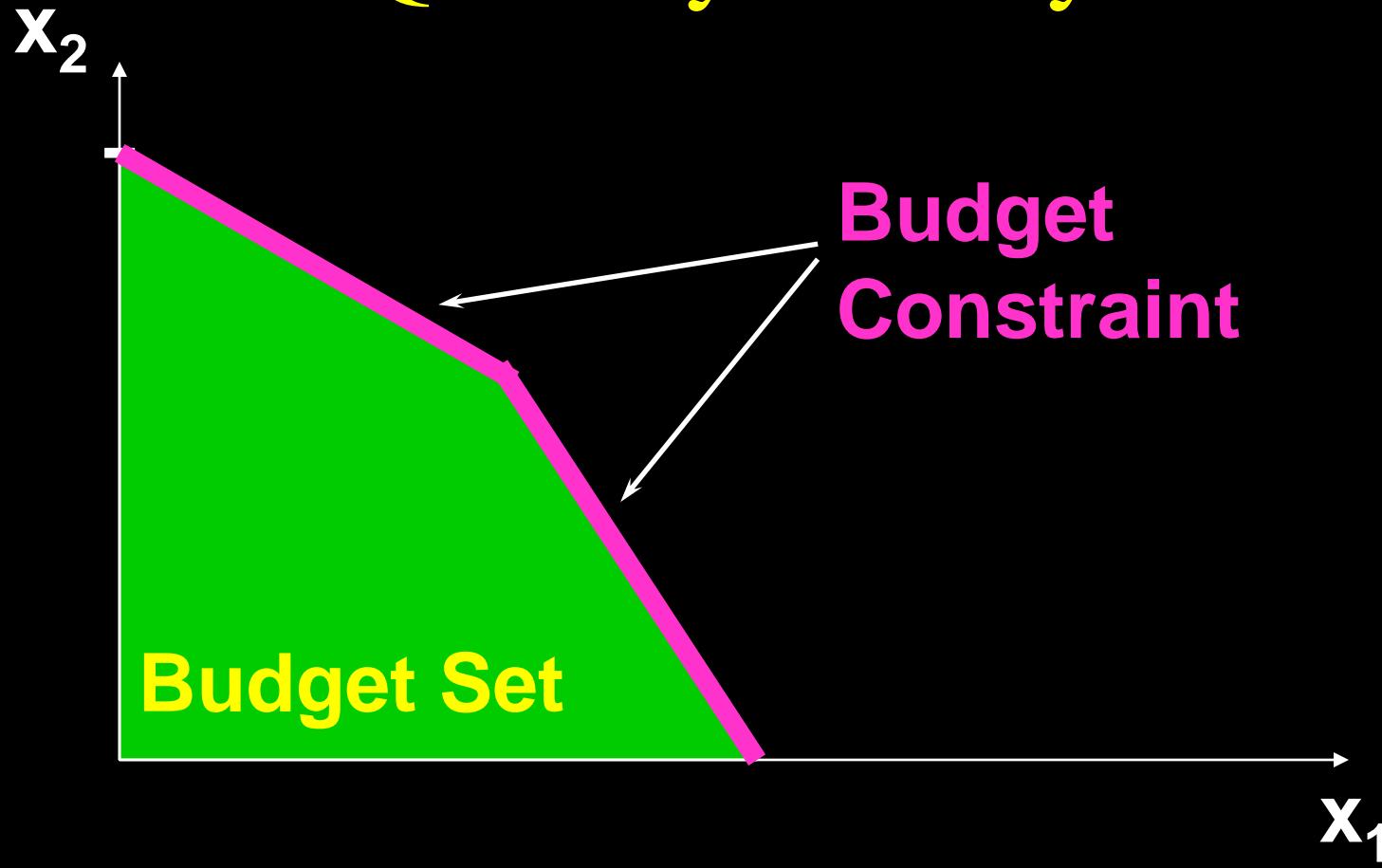
Shapes of Budget Constraints with a Quantity Discount



Shapes of Budget Constraints with a Quantity Discount



Shapes of Budget Constraints with a Quantity Penalty

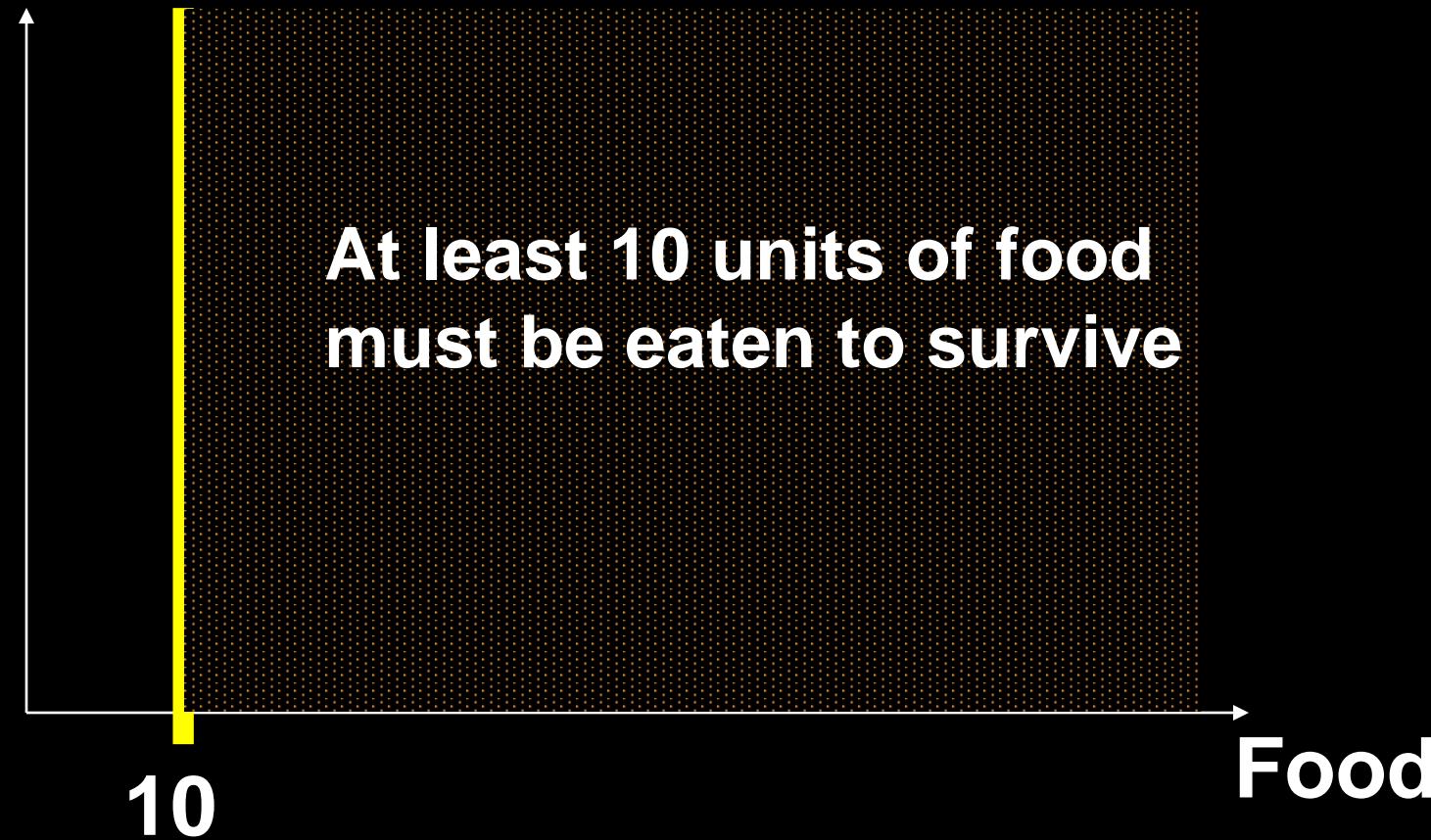


More General Choice Sets

- Choices are usually constrained by more than a budget; e.g. time constraints and other resources constraints.
- A bundle is available only if it meets every constraint.

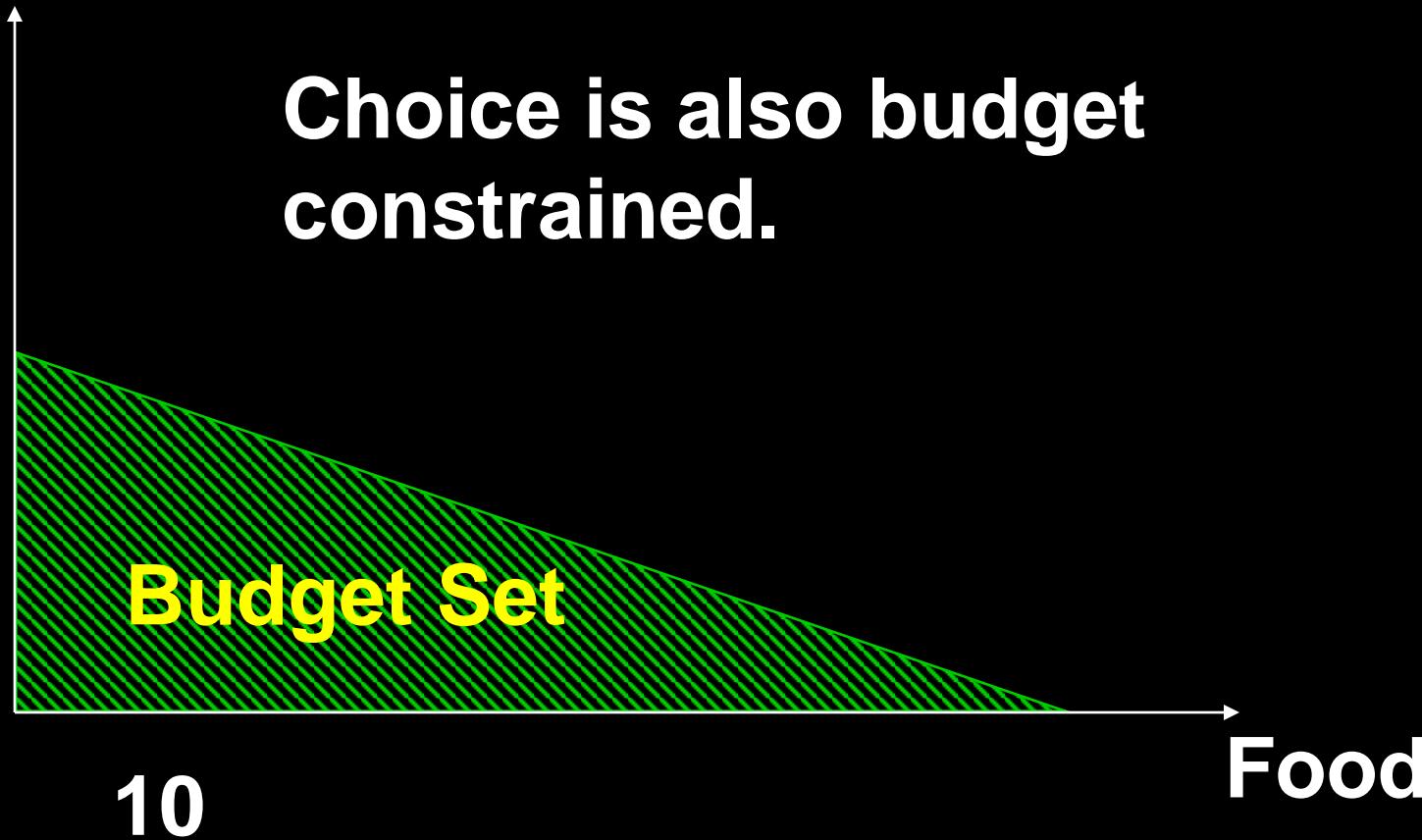
More General Choice Sets

Other Stuff



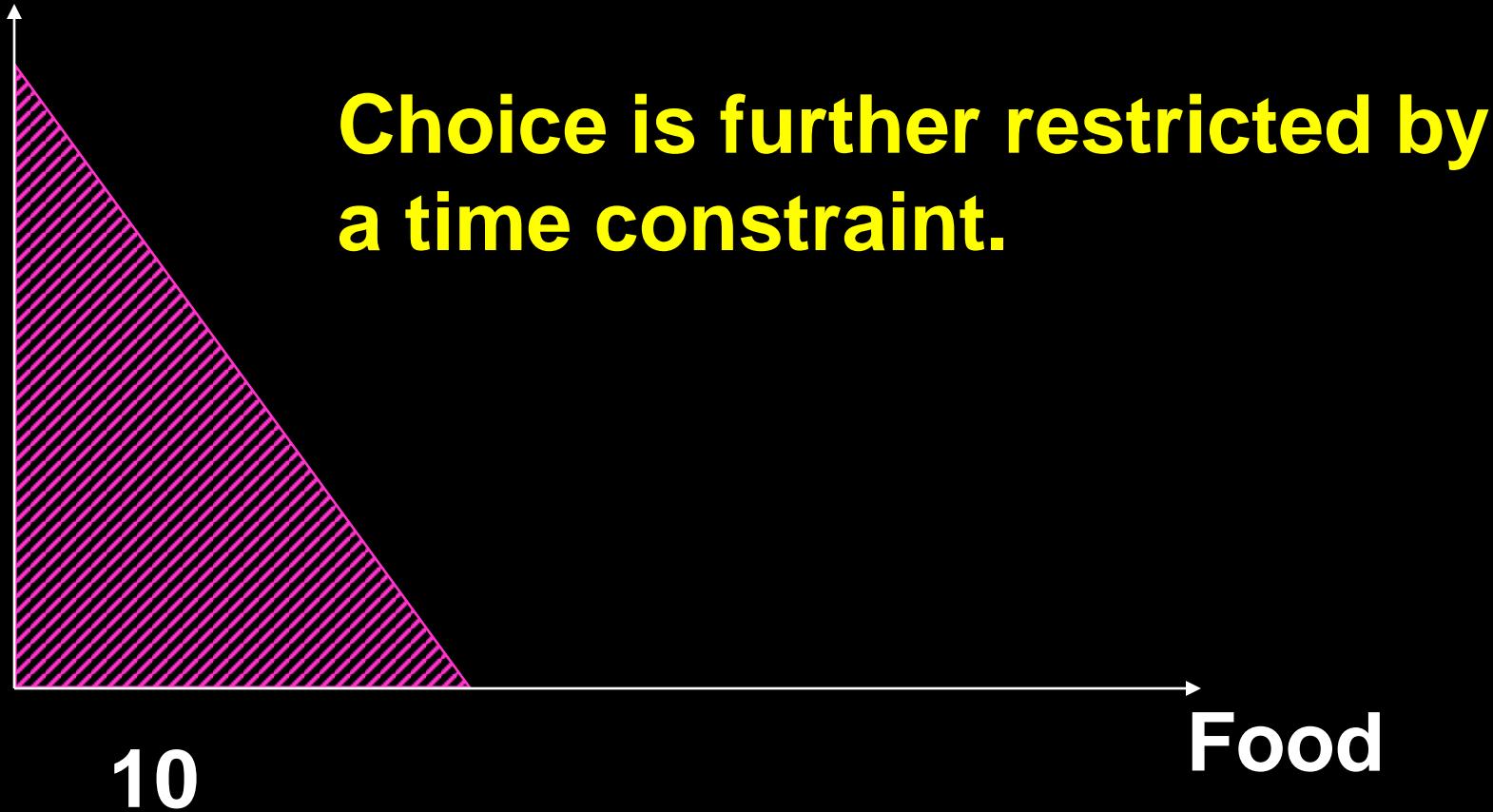
More General Choice Sets

Other Stuff



More General Choice Sets

Other Stuff

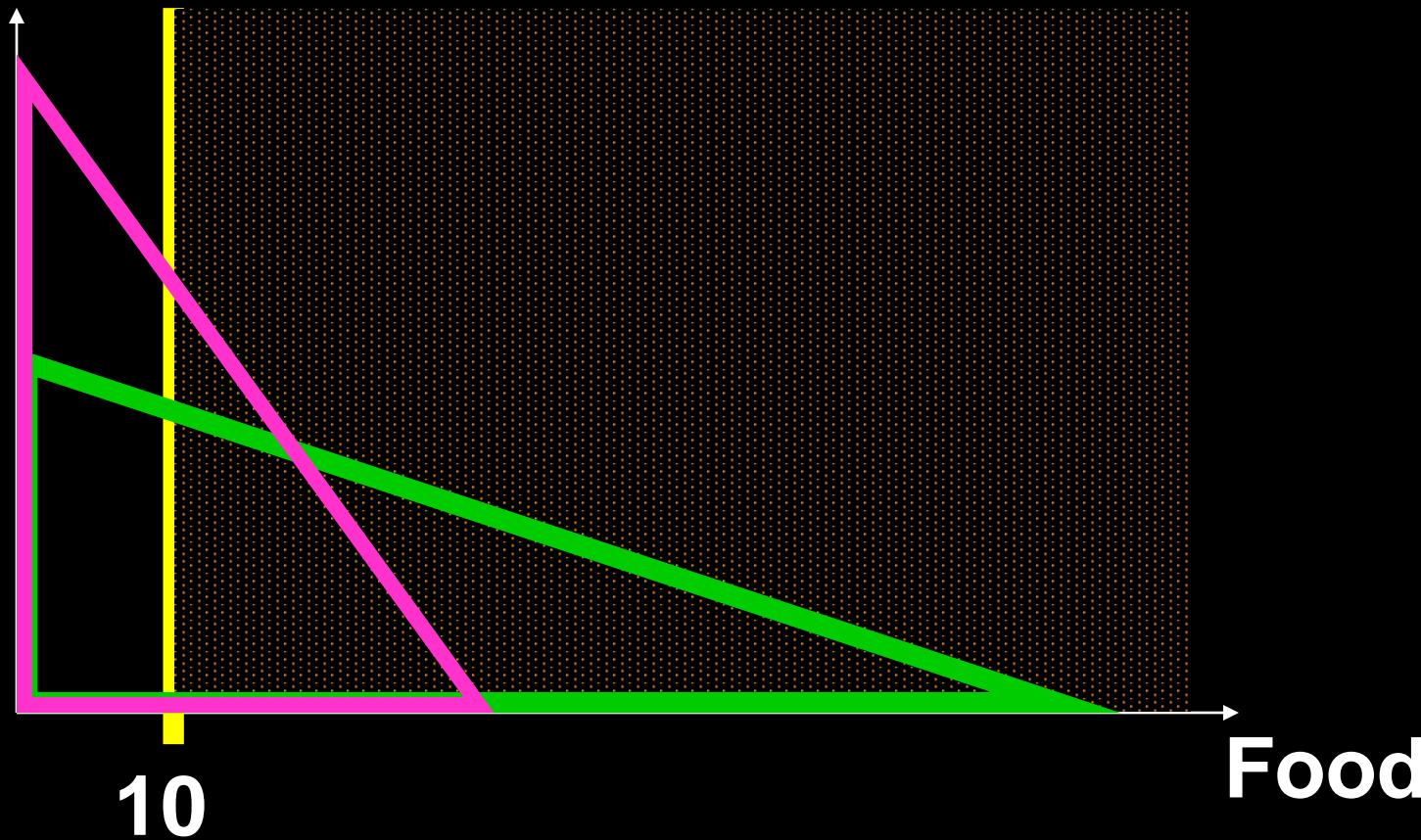


More General Choice Sets

So what is the choice set?

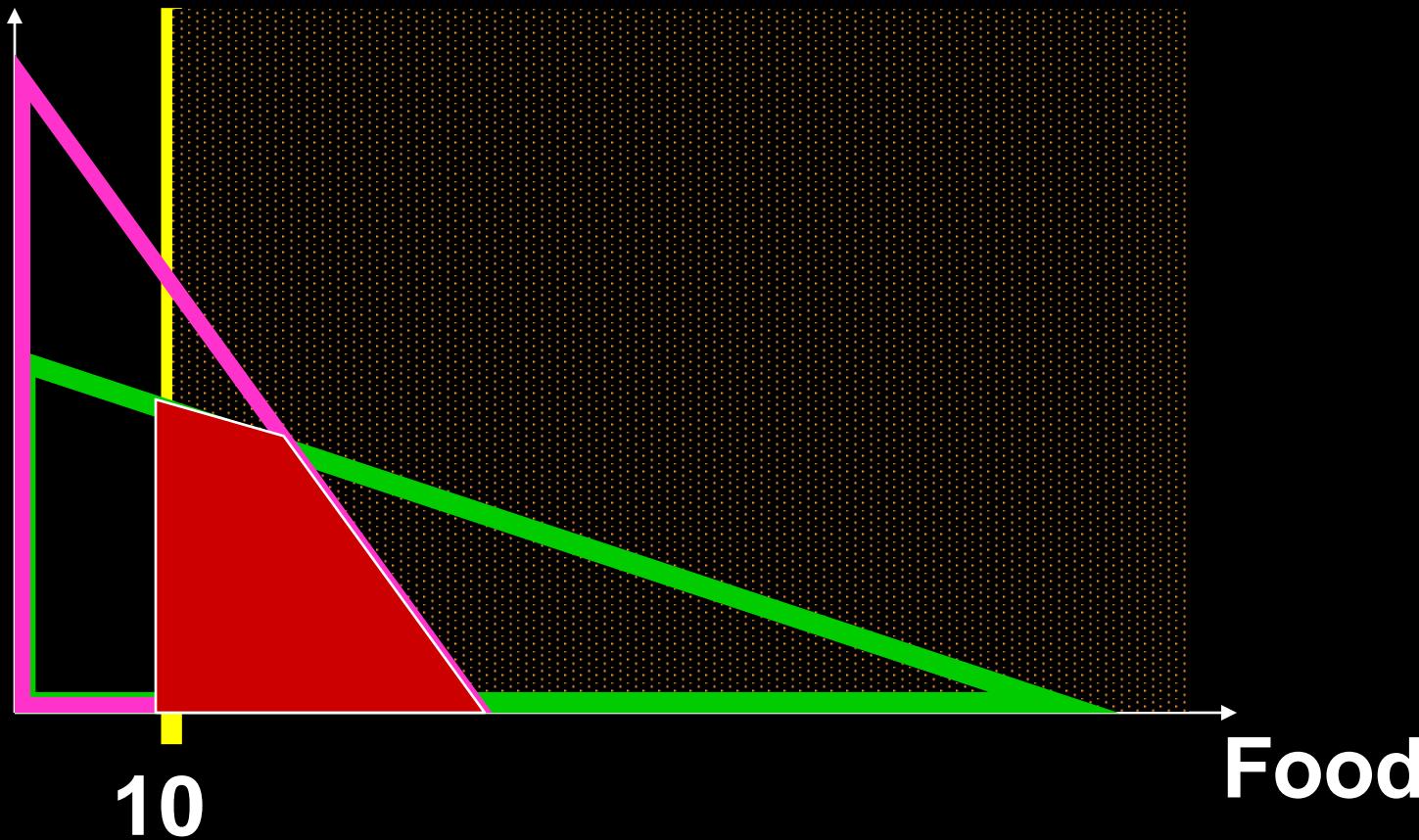
More General Choice Sets

Other Stuff



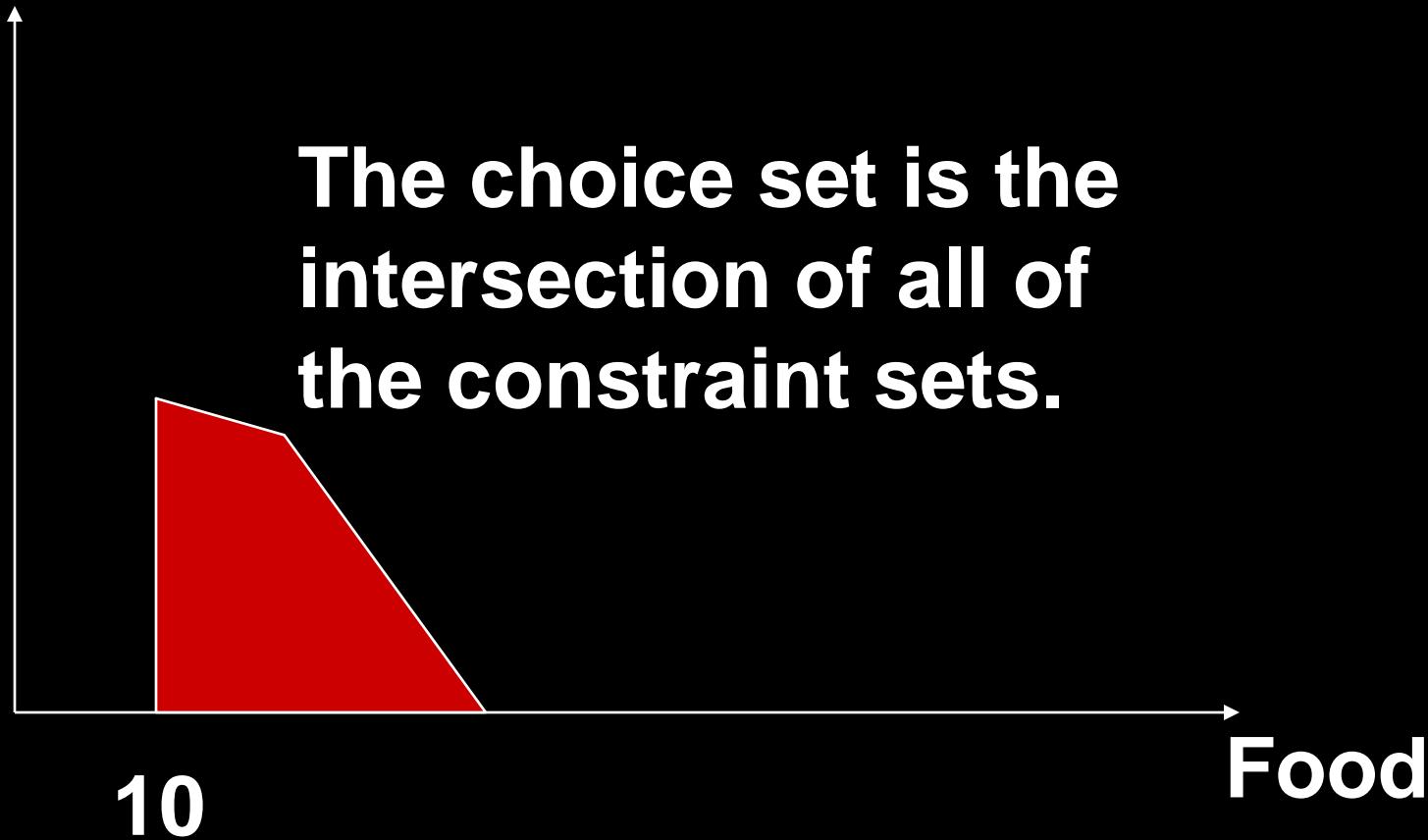
More General Choice Sets

Other Stuff



More General Choice Sets

Other Stuff



Chapter Two

Budgetary and Other Constraints on Choice

Consumption Choice Sets

- A **consumption choice set** is the collection of all consumption choices available to the consumer.
- What constrains consumption choice?
 - Budgetary, time and other resource limitations.

Budget Constraints

- A **consumption bundle** containing x_1 units of commodity 1, x_2 units of commodity 2 and so on up to x_n units of commodity n is denoted by the vector (x_1, x_2, \dots, x_n) .
- Commodity prices are p_1, p_2, \dots, p_n .

Budget Constraints

- Q: When is a consumption bundle (x_1, \dots, x_n) affordable at given prices p_1, \dots, p_n ?

Budget Constraints

- Q: When is a bundle (x_1, \dots, x_n) affordable at prices p_1, \dots, p_n ?
- A: When
$$p_1x_1 + \dots + p_nx_n \leq m$$
where m is the consumer's (disposable) income.

Budget Constraints

- The bundles that are only just affordable form the consumer's **budget constraint**. This is the set

$$\{ (x_1, \dots, x_n) \mid x_1 \geq 0, \dots, x_n \geq 0 \text{ and } p_1 x_1 + \dots + p_n x_n = m \}.$$

Budget Constraints

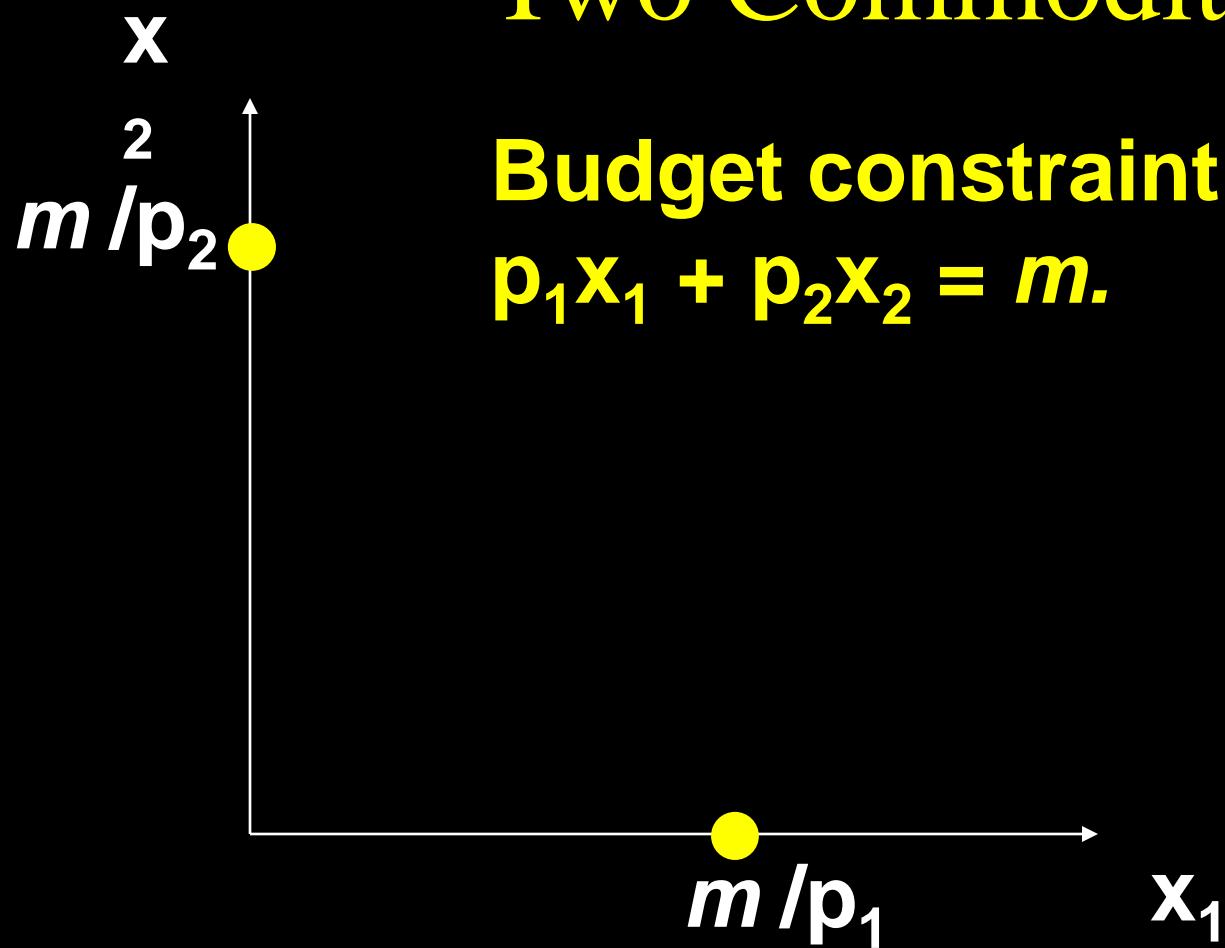
- The consumer's **budget set** is the set of all affordable bundles;

$$B(p_1, \dots, p_n, m) =$$

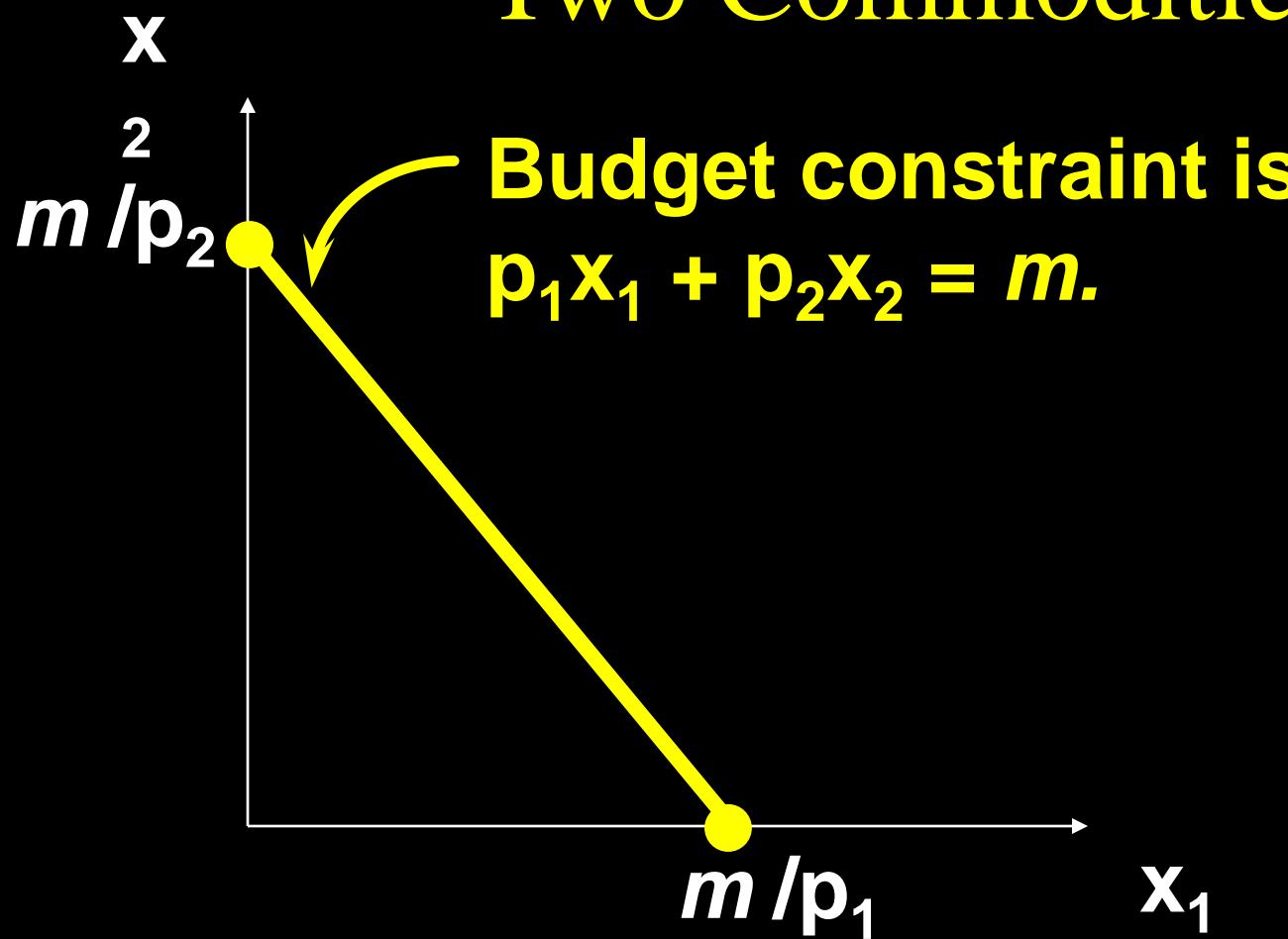
$$\{ (x_1, \dots, x_n) \mid x_1 \geq 0, \dots, x_n \geq 0 \text{ and } p_1 x_1 + \dots + p_n x_n \leq m \}$$

- The budget constraint is the upper boundary of the budget set.

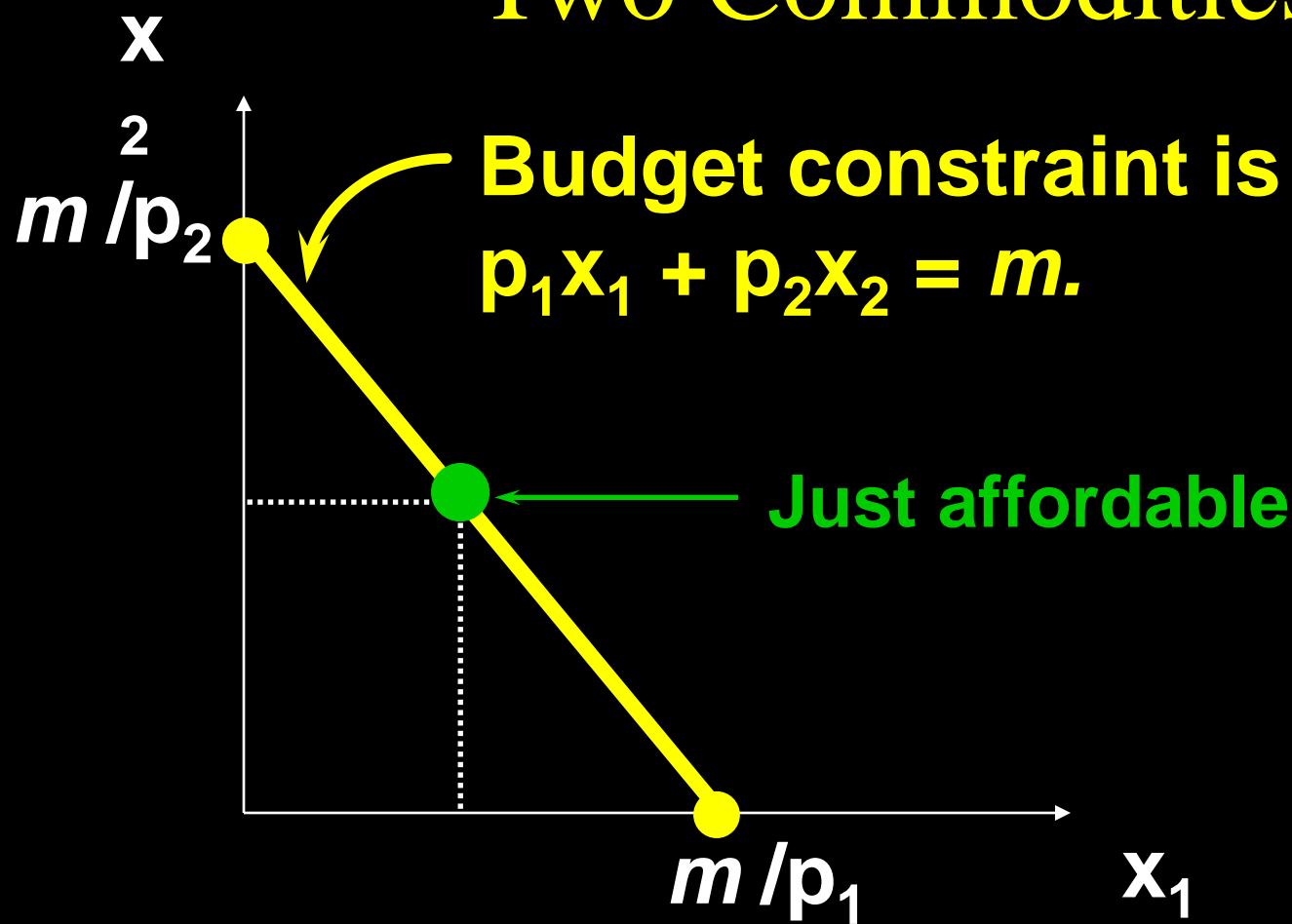
Budget Set and Constraint for Two Commodities



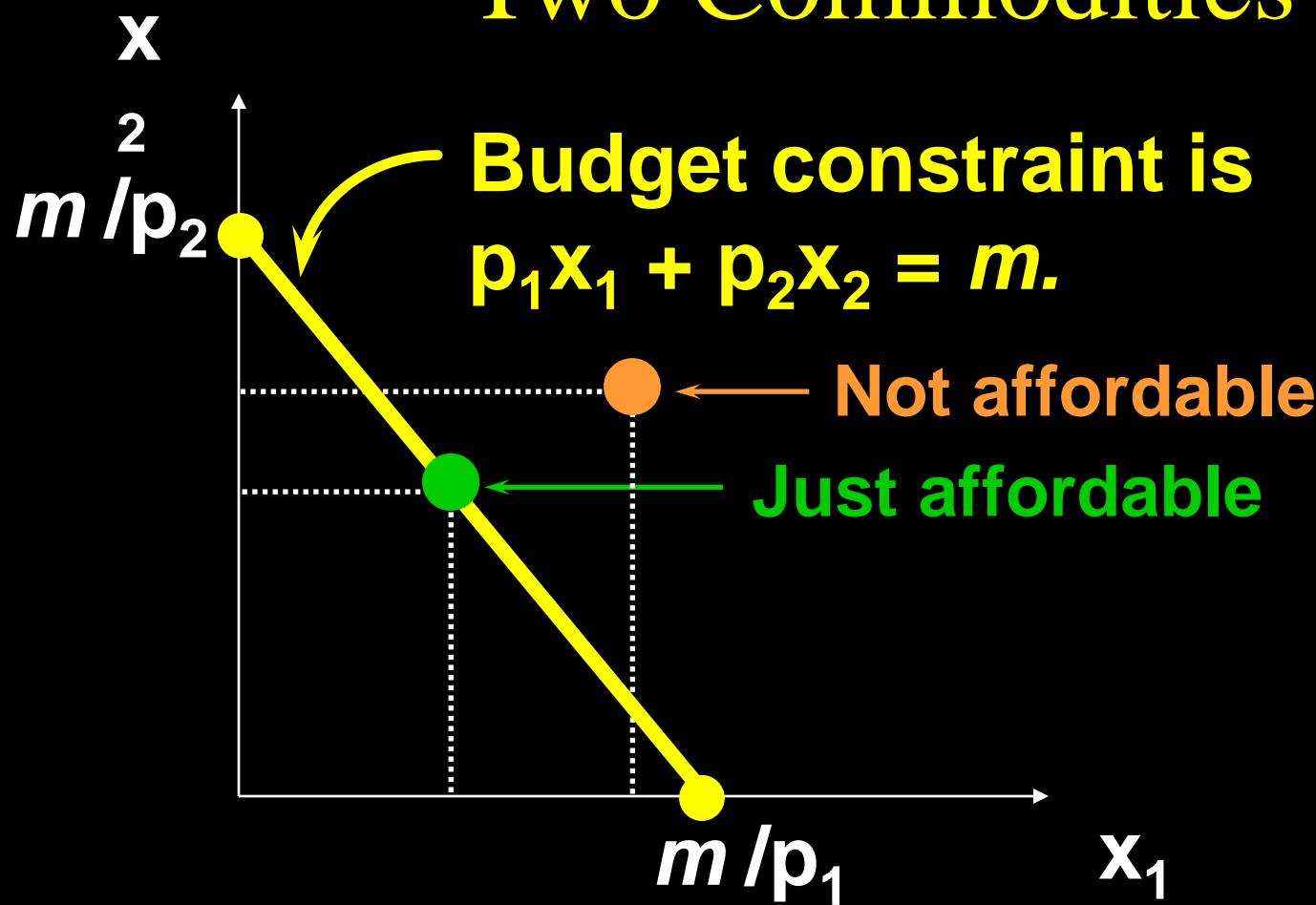
Budget Set and Constraint for Two Commodities



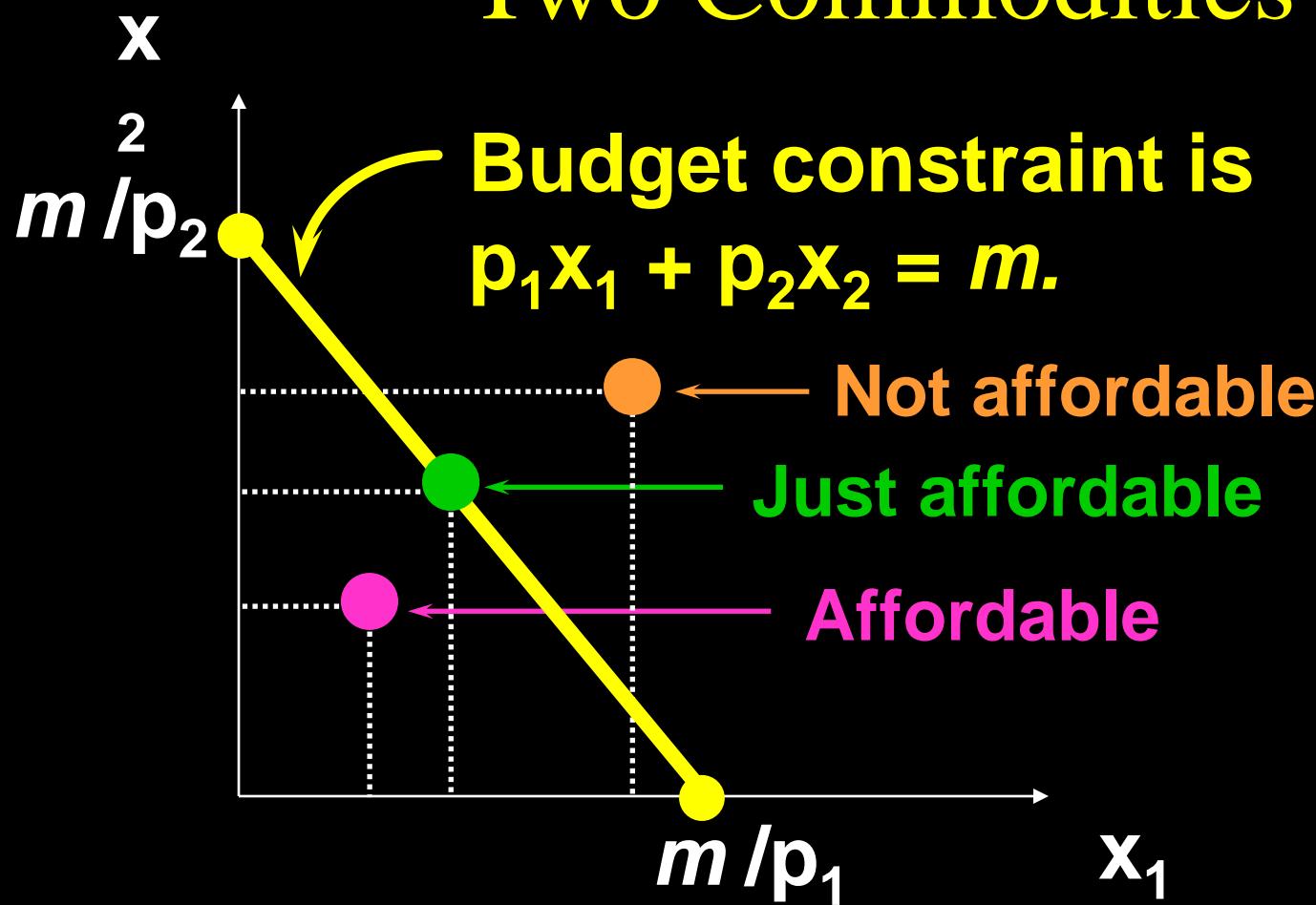
Budget Set and Constraint for Two Commodities



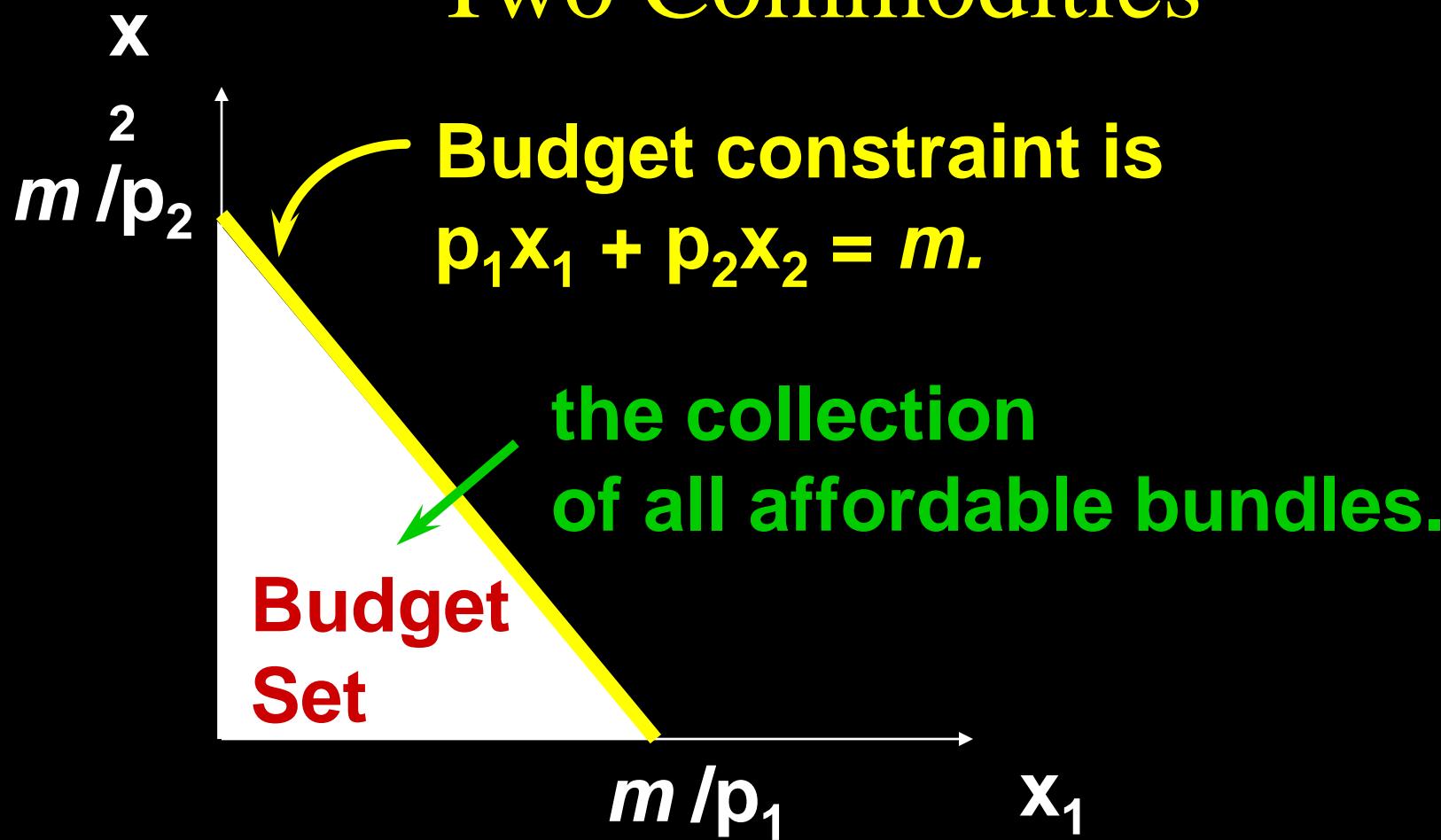
Budget Set and Constraint for Two Commodities



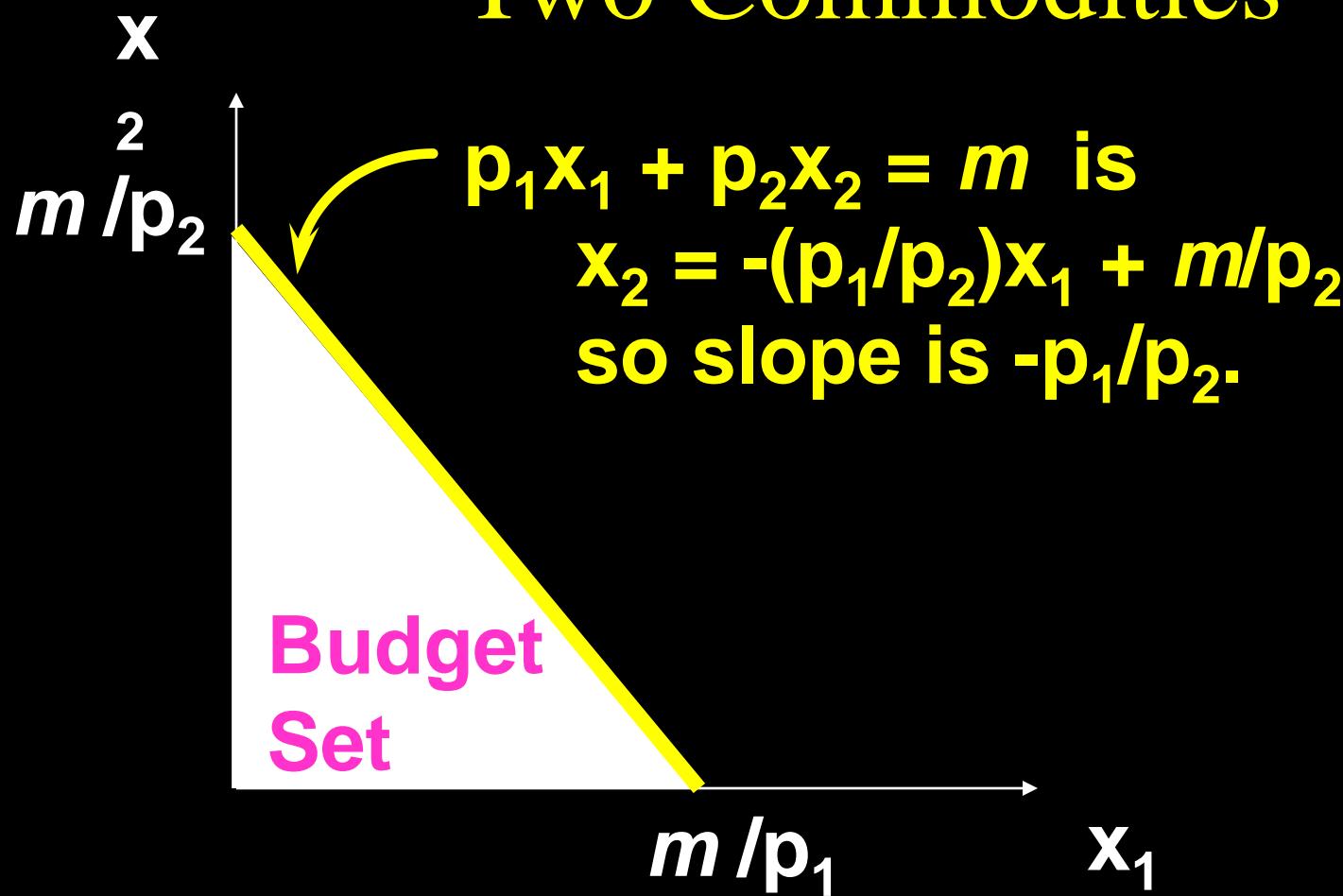
Budget Set and Constraint for Two Commodities



Budget Set and Constraint for Two Commodities



Budget Set and Constraint for Two Commodities



Budget Constraints

- For $n = 2$ and x_1 on the horizontal axis, the constraint's slope is $-p_1/p_2$. What does it mean?

$$x_2 = -\frac{p_1}{p_2}x_1 + \frac{m}{p_2}$$

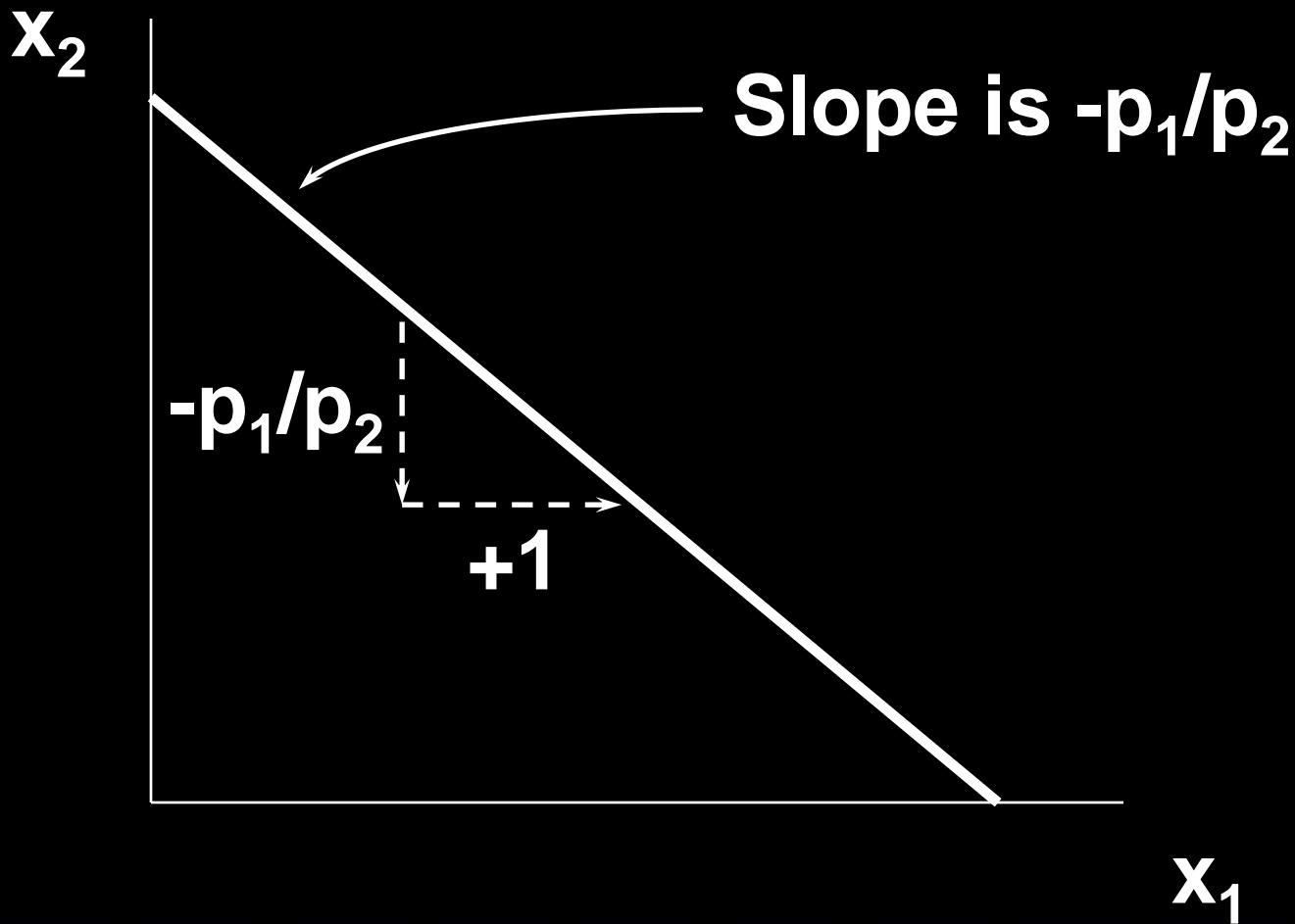
Budget Constraints

- For $n = 2$ and x_1 on the horizontal axis, the constraint's slope is $-p_1/p_2$. What does it mean?

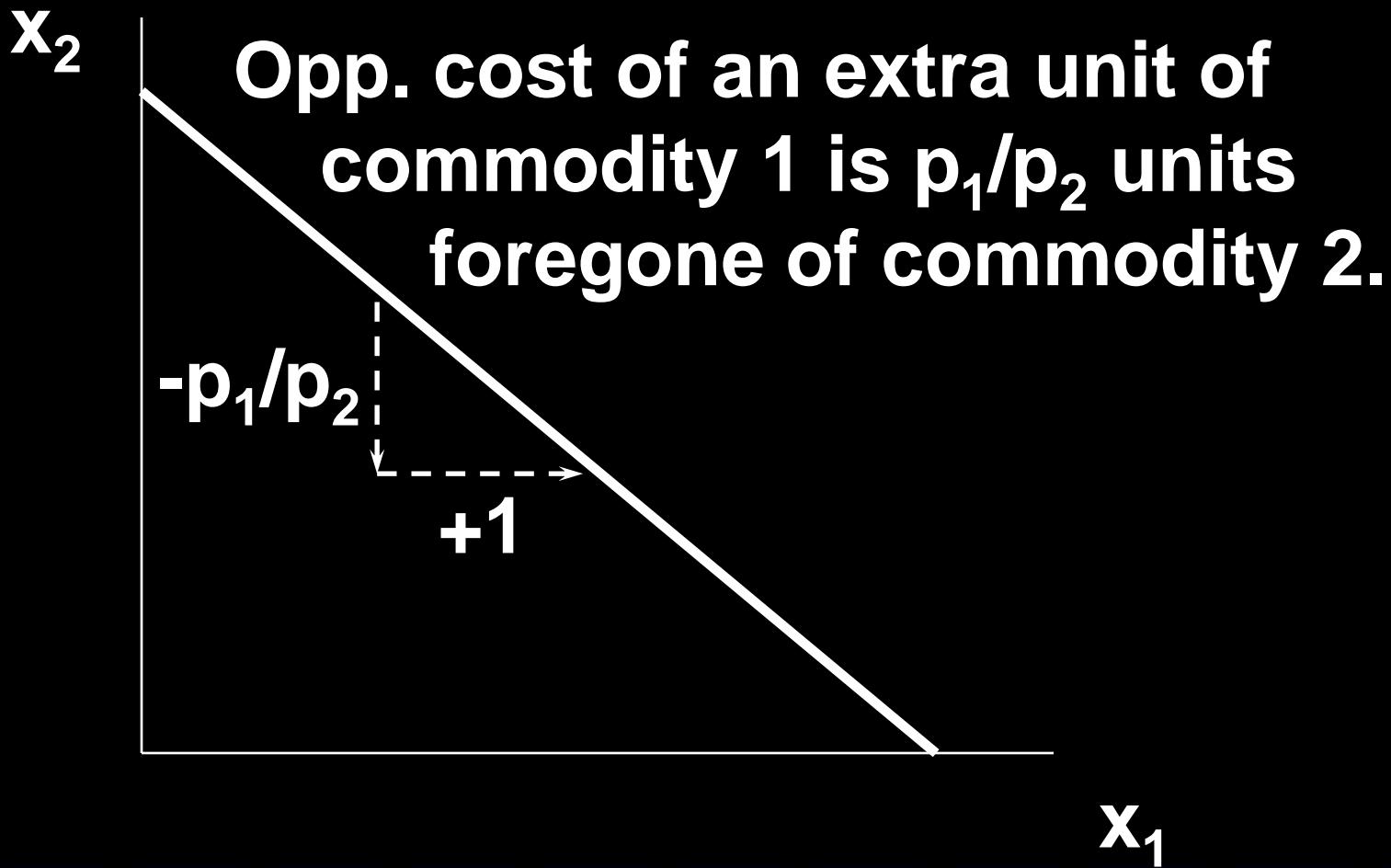
$$x_2 = -\frac{p_1}{p_2}x_1 + \frac{m}{p_2}$$

- Increasing x_1 by 1 must reduce x_2 by p_1/p_2 .

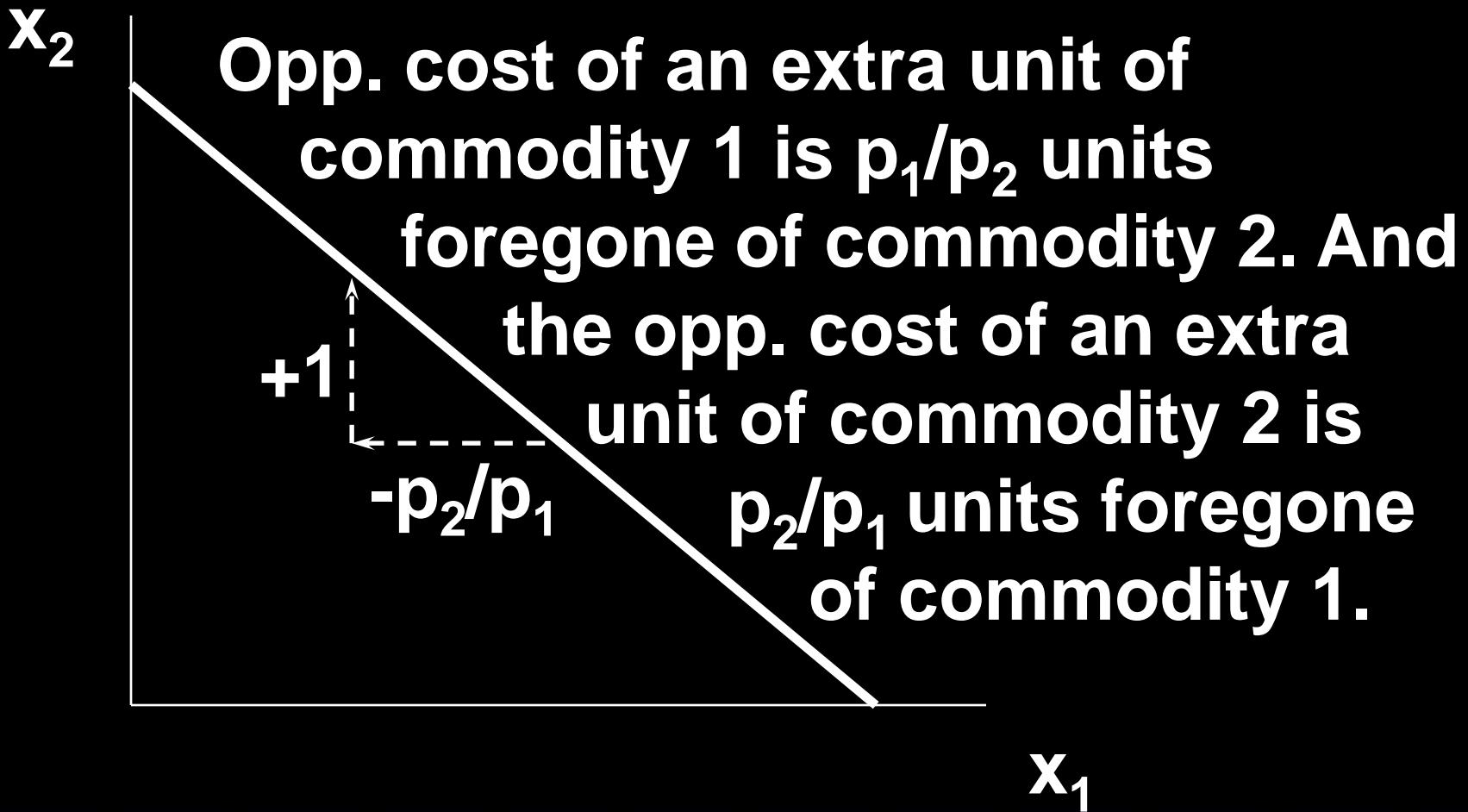
Budget Constraints



Budget Constraints



Budget Constraints



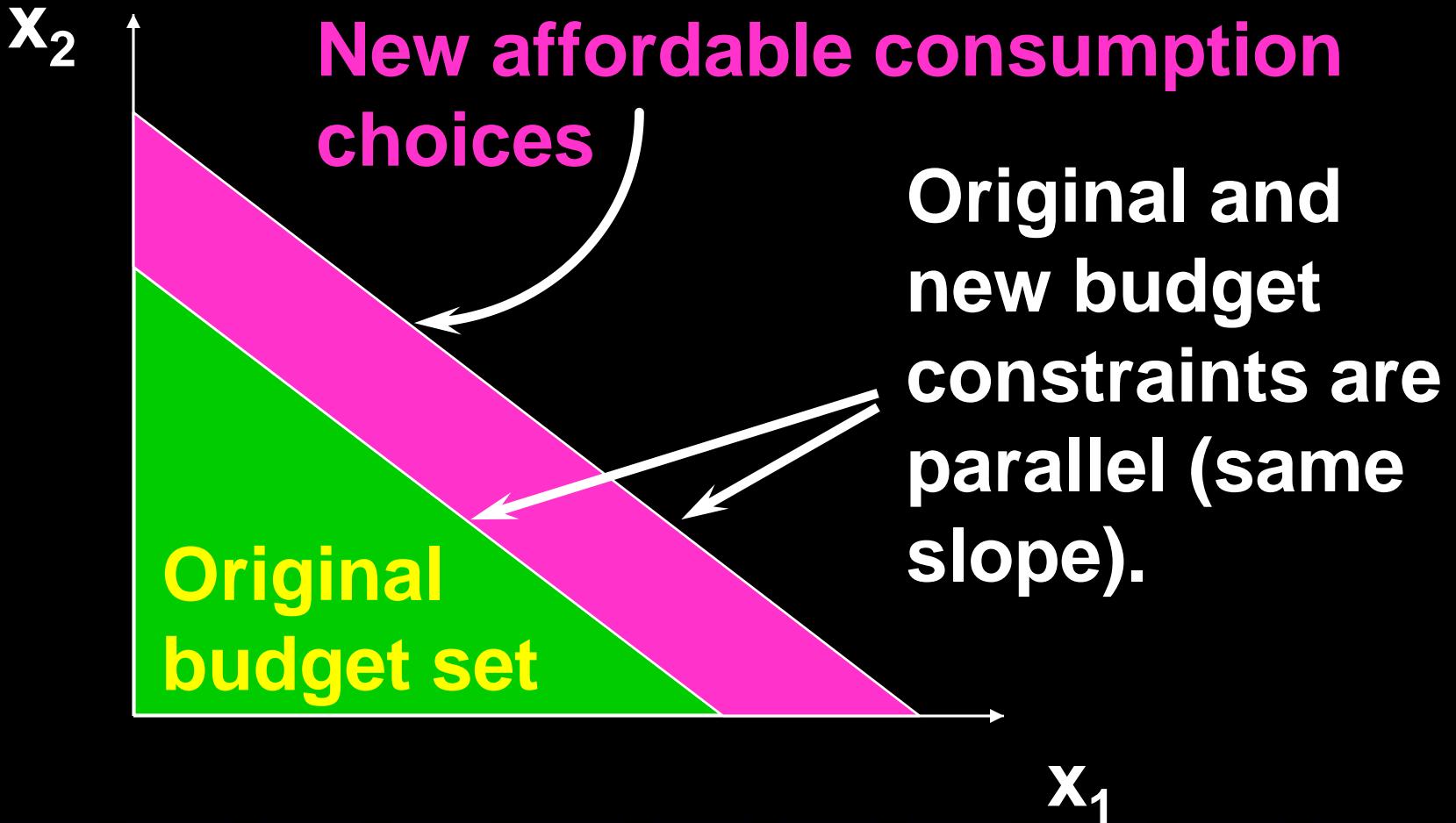
Budget Sets & Constraints; Income and Price Changes

- The budget constraint and budget set depend upon prices and income. What happens as prices or income change?

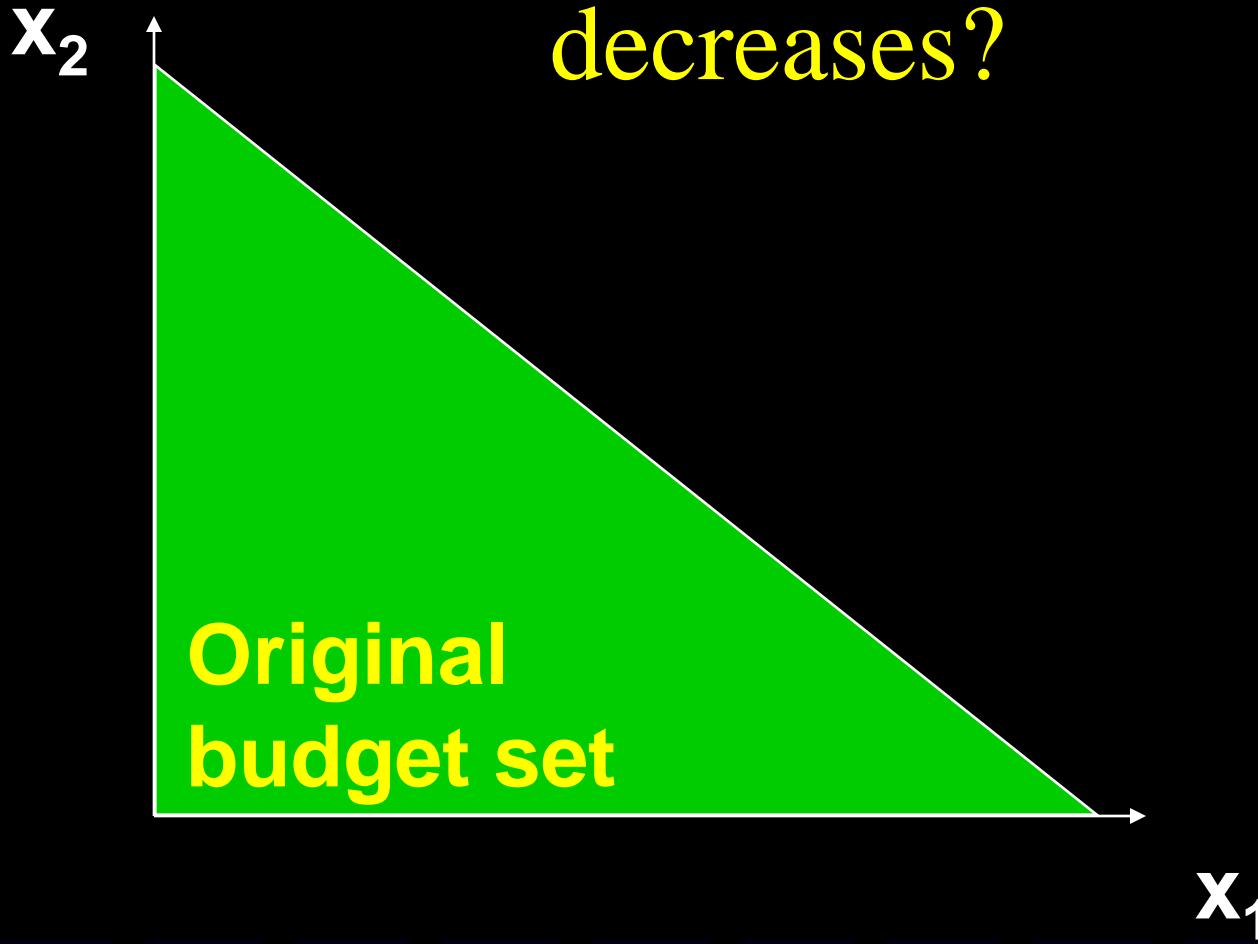
How do the budget set and budget constraint change as income m increases?



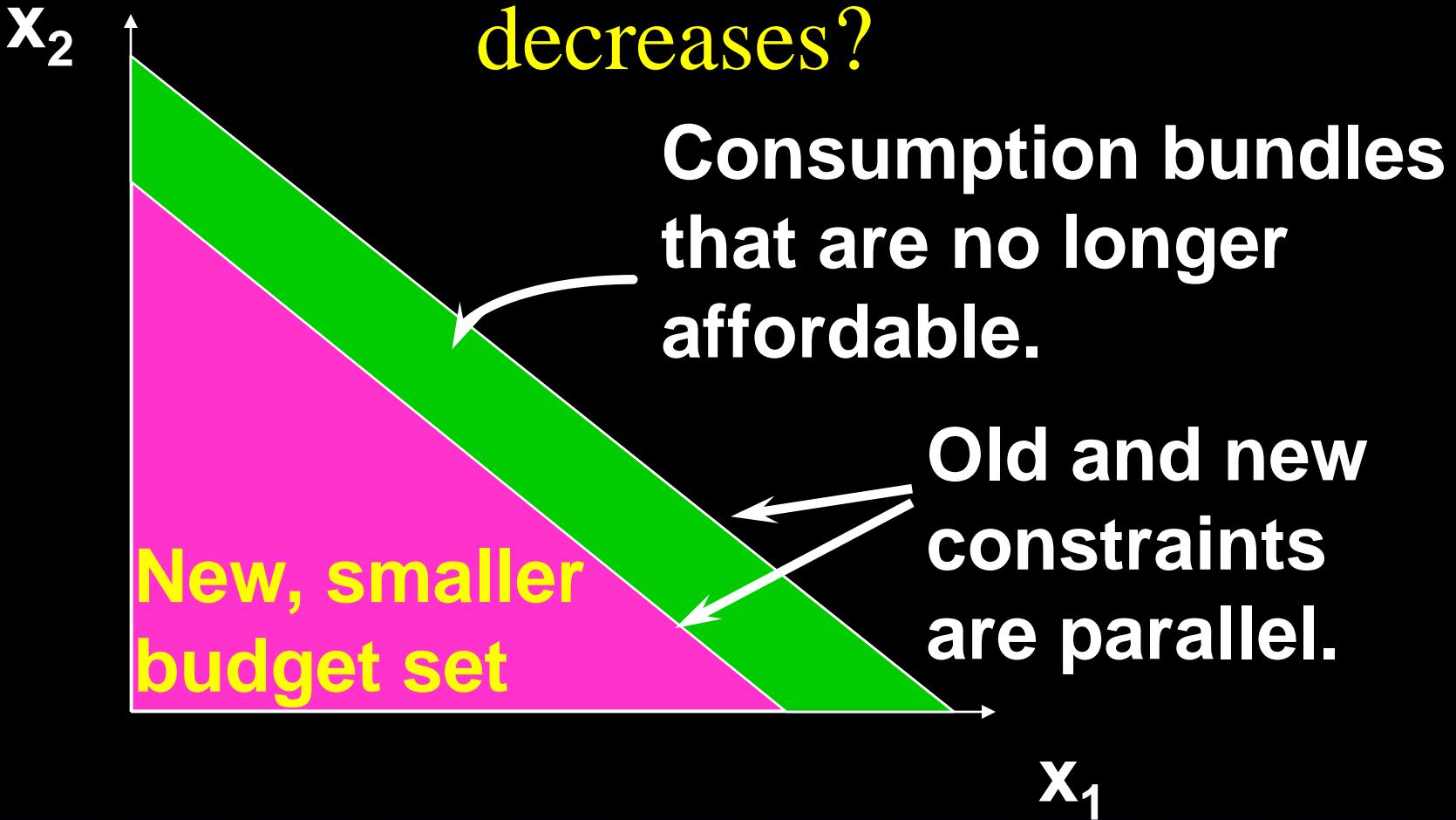
Higher income gives more choice



How do the budget set and budget constraint change as income m decreases?



How do the budget set and budget constraint change as income m decreases?



Budget Constraints - Income Changes

- Increases in income m shift the constraint outward in a parallel manner, thereby enlarging the budget set and improving choice.

Budget Constraints - Income Changes

- Increases in income m shift the constraint outward in a parallel manner, thereby enlarging the budget set and improving choice.
- Decreases in income m shift the constraint inward in a parallel manner, thereby shrinking the budget set and reducing choice.

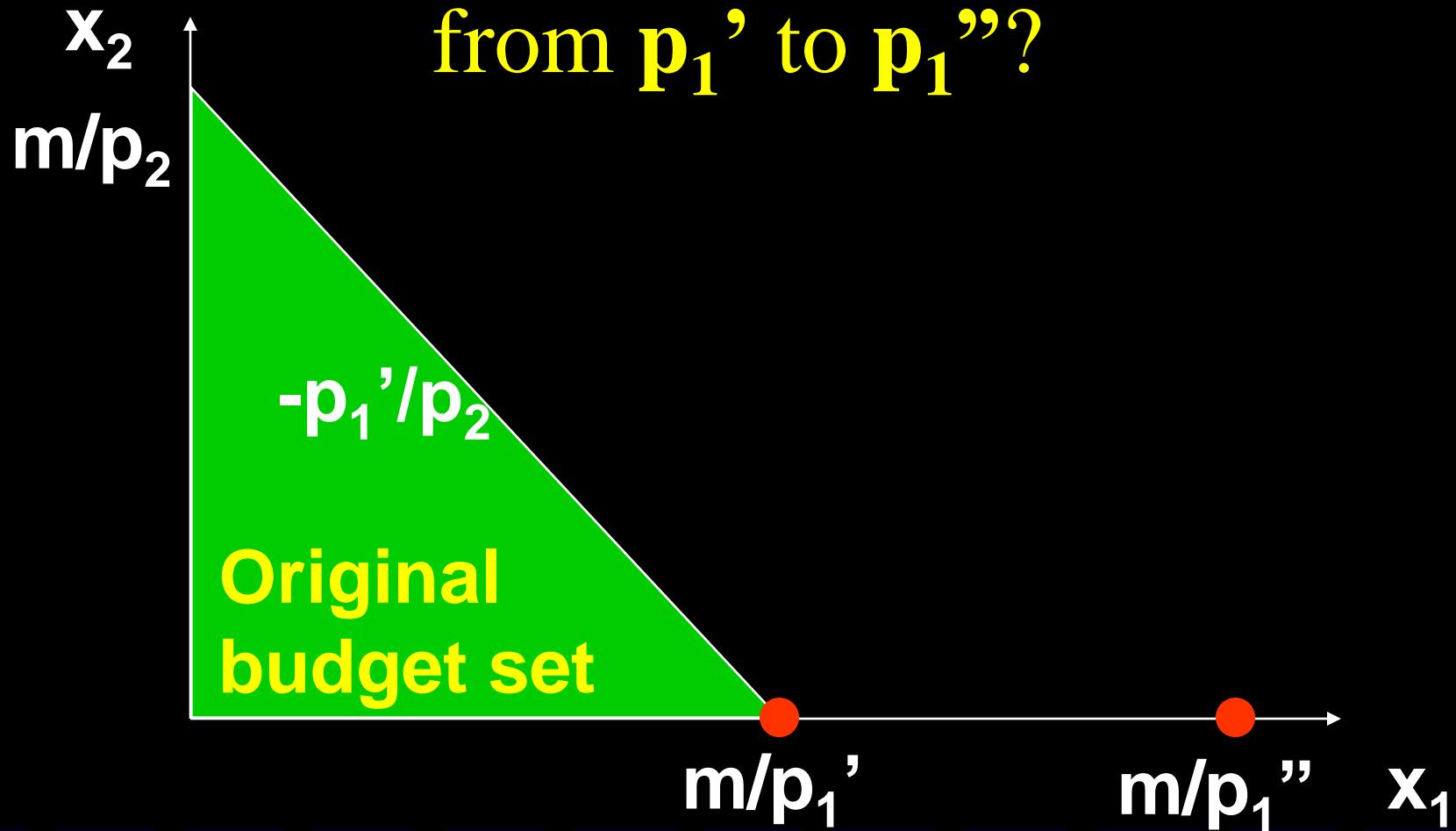
Budget Constraints - Income Changes

- No original choice is lost and new choices are added when income increases, so higher income cannot make a consumer worse off.
- An income decrease may (typically will) make the consumer worse off.

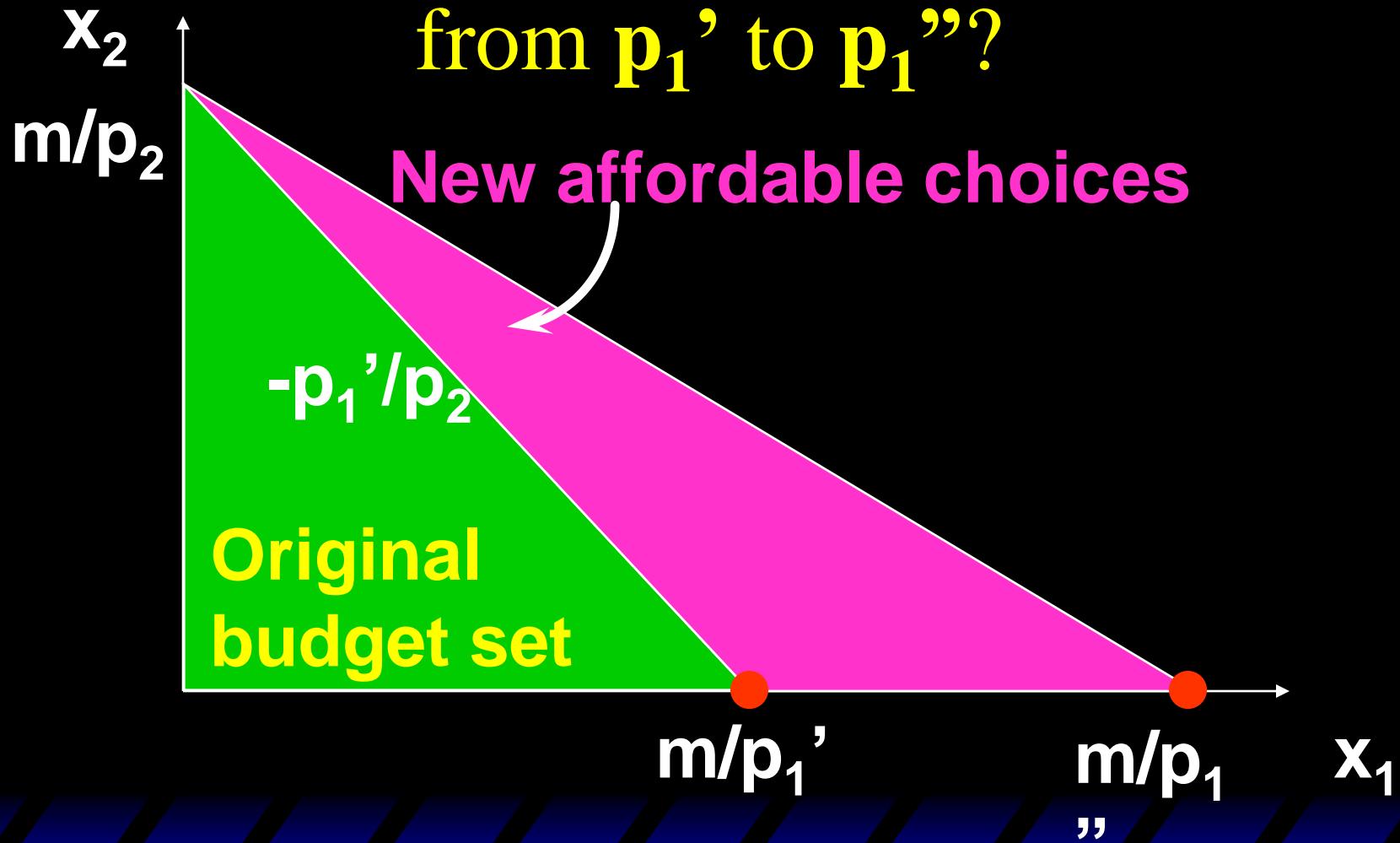
Budget Constraints - Price Changes

- What happens if just one price decreases?
- Suppose p_1 decreases.

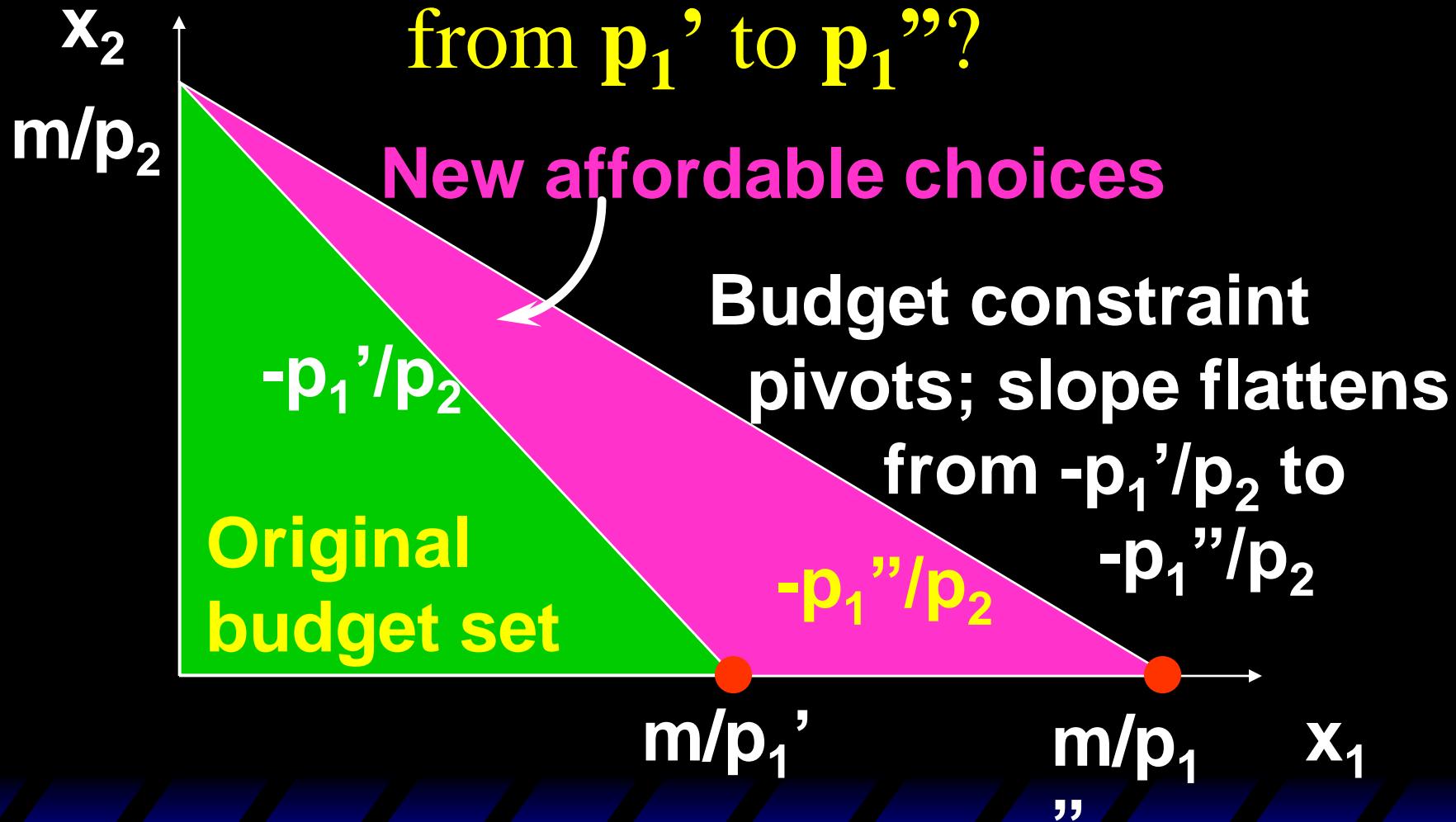
How do the budget set and budget constraint change as p_1 decreases from p_1' to p_1'' ?



How do the budget set and budget constraint change as p_1 decreases from p_1' to p_1'' ?



How do the budget set and budget constraint change as p_1 decreases from p_1' to p_1'' ?



Budget Constraints - Price Changes

- Reducing the price of one commodity pivots the constraint outward. No old choice is lost and new choices are added, so reducing one price cannot make the consumer worse off.

Budget Constraints - Price Changes

- Similarly, increasing one price pivots the constraint inwards, reduces choice and may (typically will) make the consumer worse off.

Uniform *Ad Valorem* Sales Taxes

- An *ad valorem* sales tax levied at a rate of 5% increases all prices by 5%, from p to $(1+0.05)p = 1.05p$.
- An *ad valorem* sales tax levied at a rate of t increases all prices by tp from p to $(1+t)p$.
- A uniform sales tax is applied uniformly to all commodities.

Uniform Ad Valorem Sales Taxes

- A uniform sales tax levied at rate t changes the constraint from

$$p_1x_1 + p_2x_2 = m$$

to

$$(1+t)p_1x_1 + (1+t)p_2x_2 = m$$

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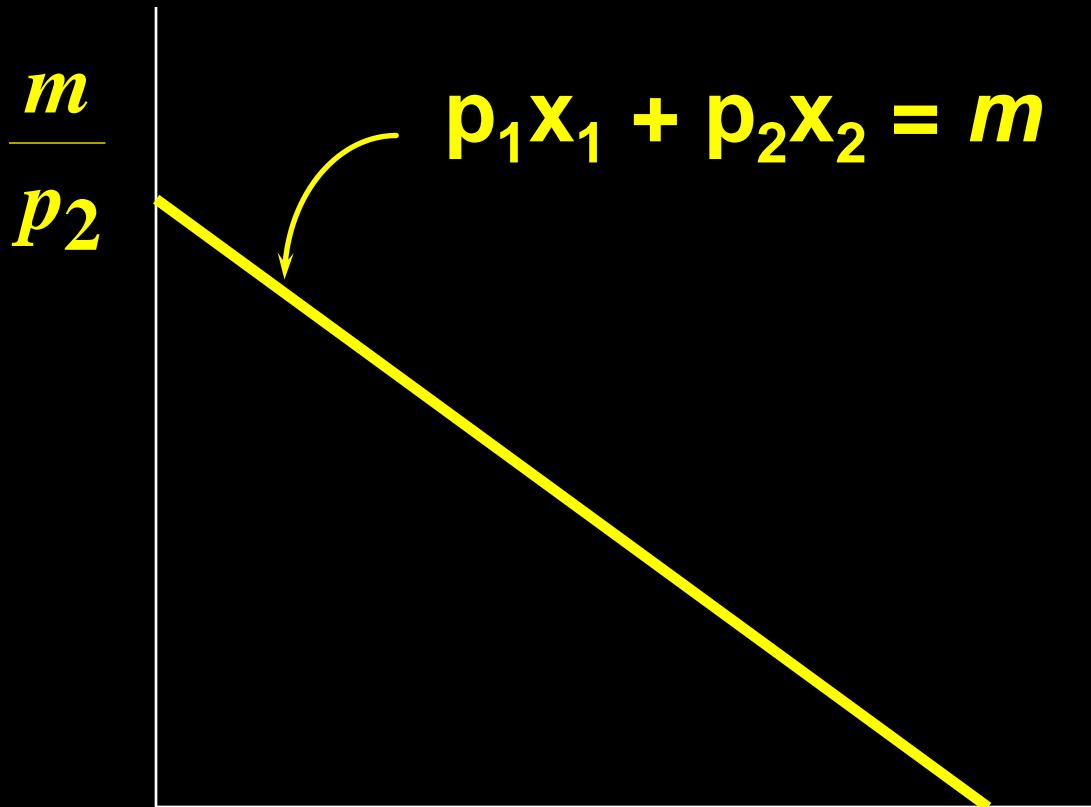
$$(1+t)p_1x_1 + (1+t)p_2x_2 = m$$

i.e.

$$p_1x_1 + p_2x_2 = m/(1+t).$$

Uniform *Ad Valorem* Sales Taxes

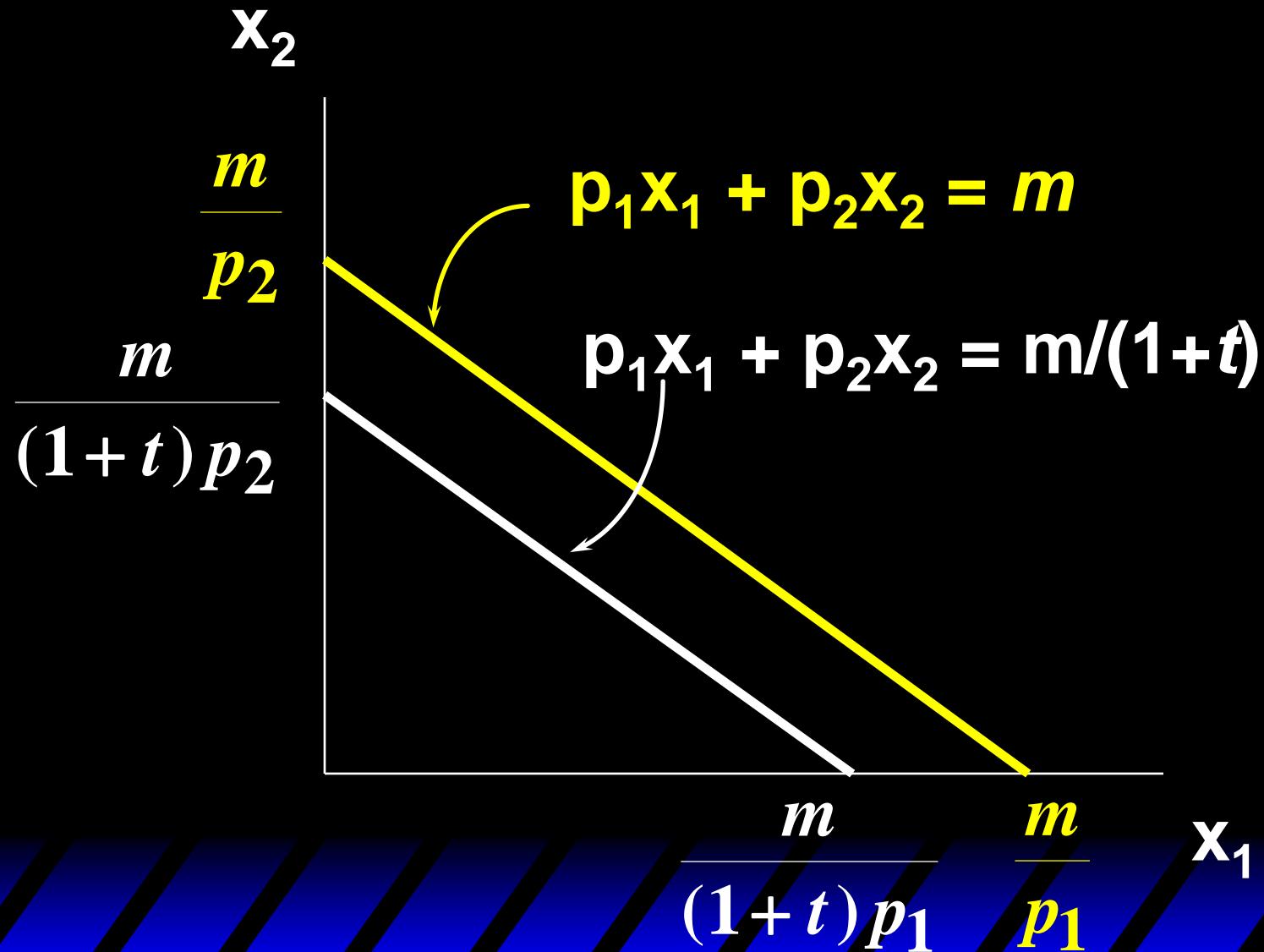
x_2



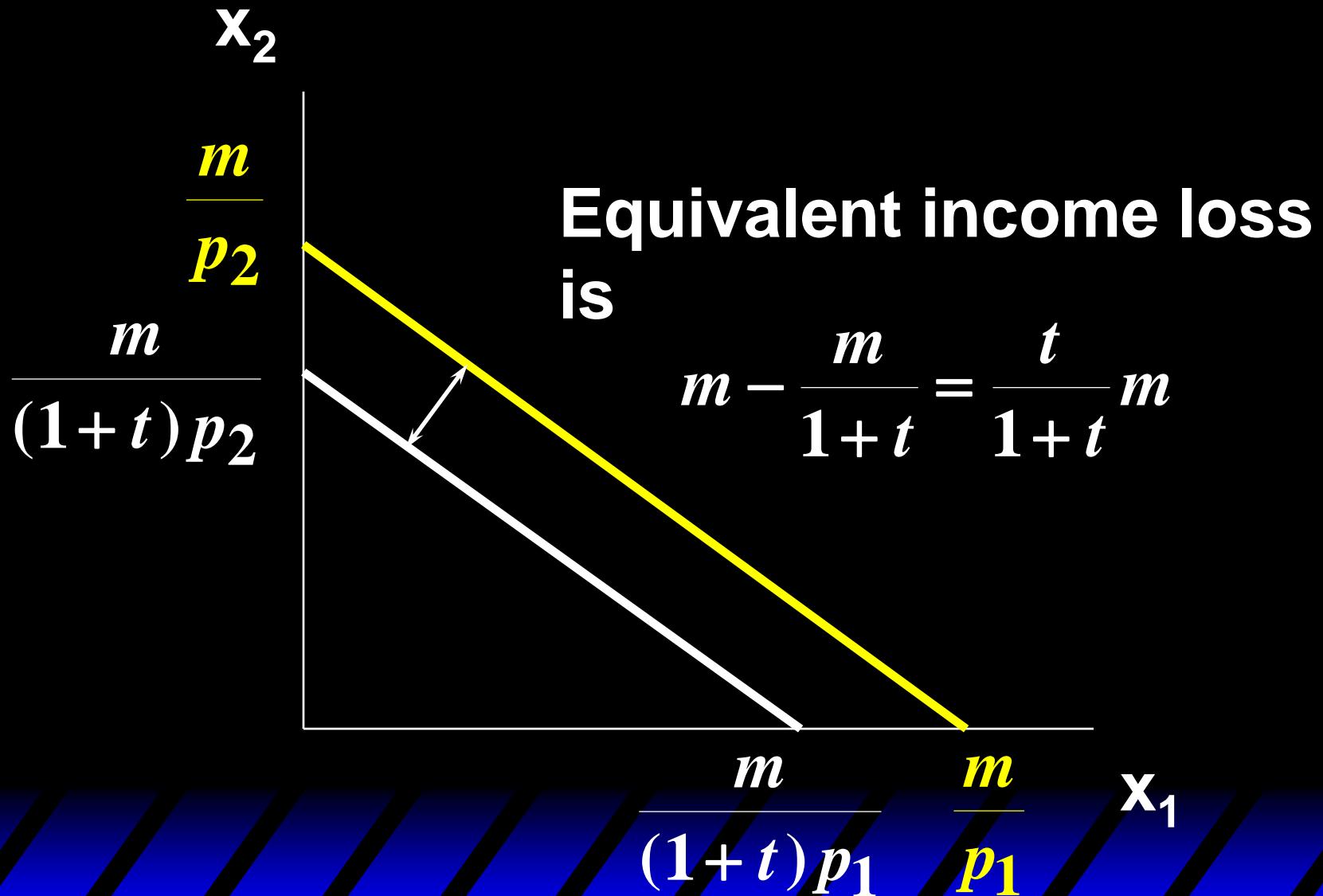
$\frac{m}{p_1}$

x_1

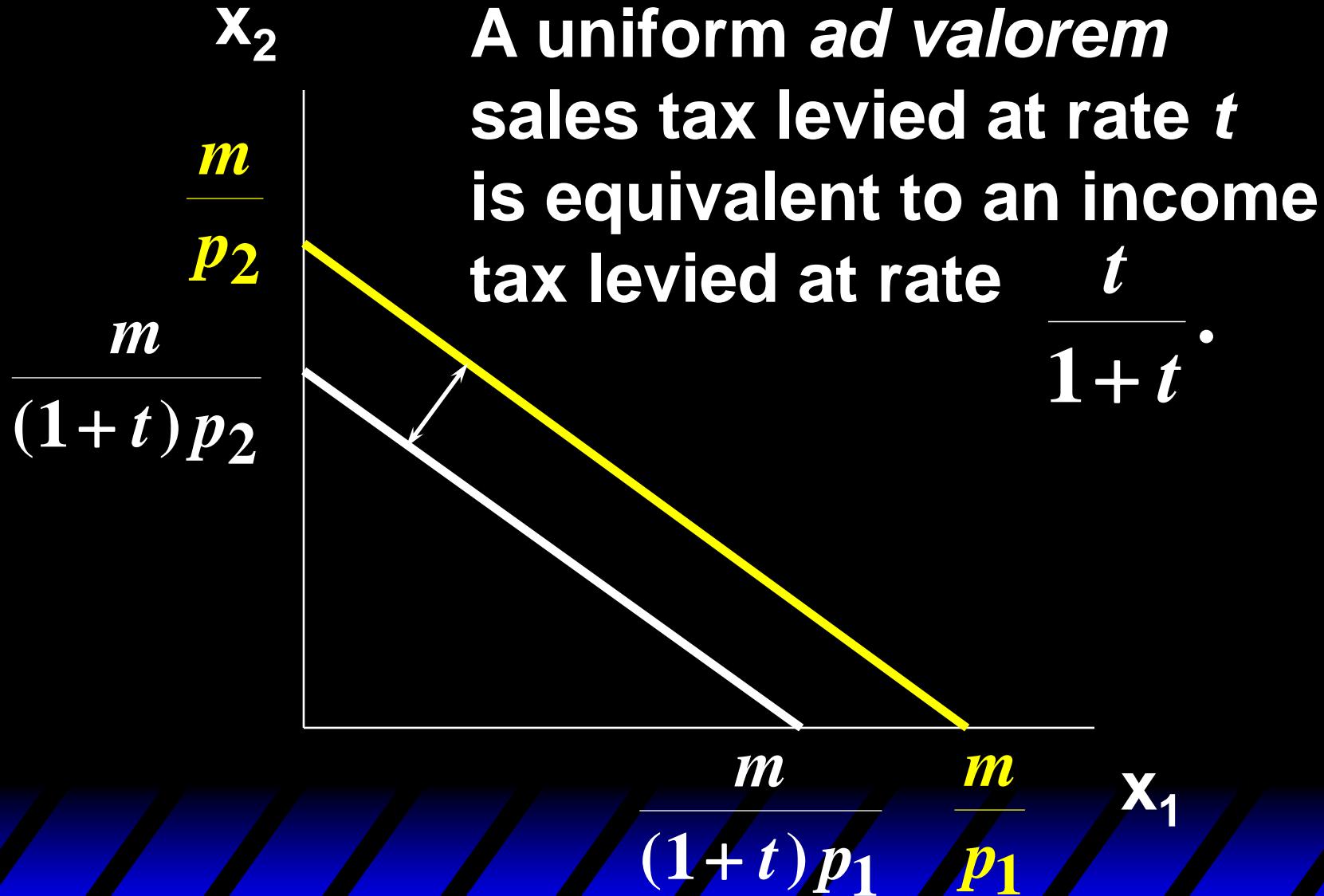
Uniform *Ad Valorem* Sales Taxes



Uniform *Ad Valorem* Sales Taxes



Uniform *Ad Valorem* Sales Taxes



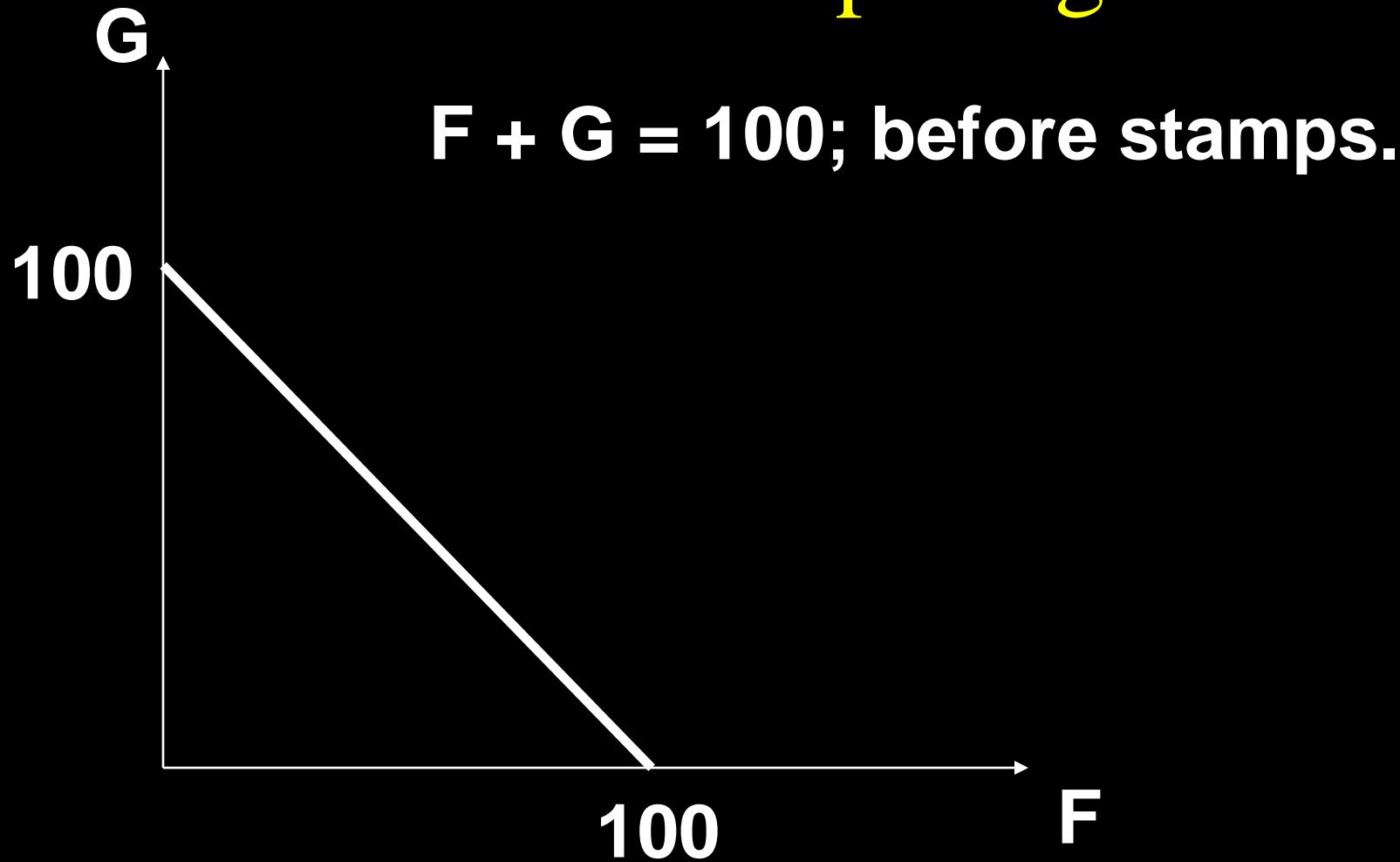
The Food Stamp Program

- Food stamps are coupons that can be legally exchanged only for food.
- How does a commodity-specific gift such as a food stamp alter a family's budget constraint?

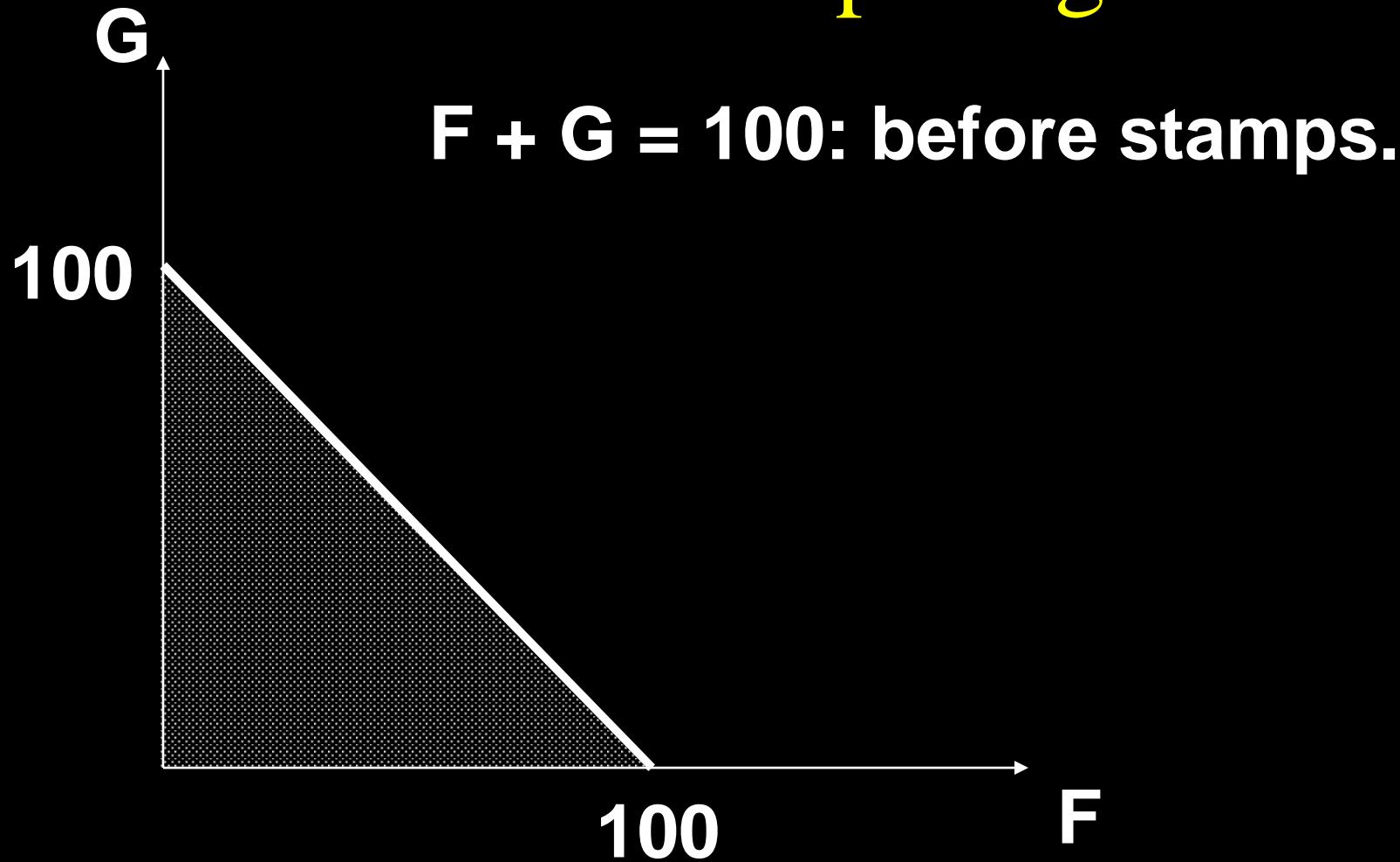
The Food Stamp Program

- Suppose $m = \$100$, $p_F = \$1$ and the price of “other goods” is $p_G = \$1$.
- The budget constraint is then
 $F + G = 100$.

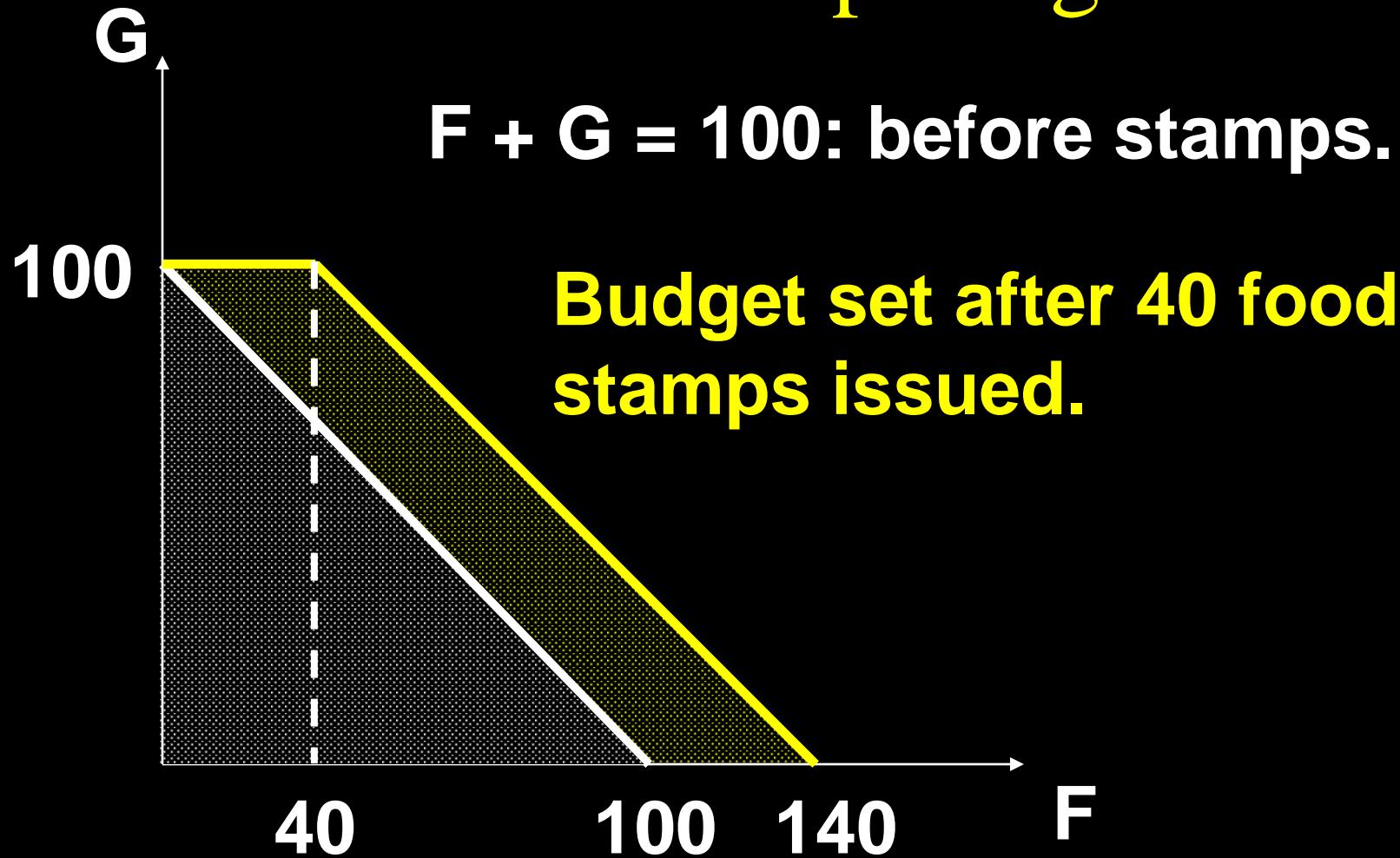
The Food Stamp Program



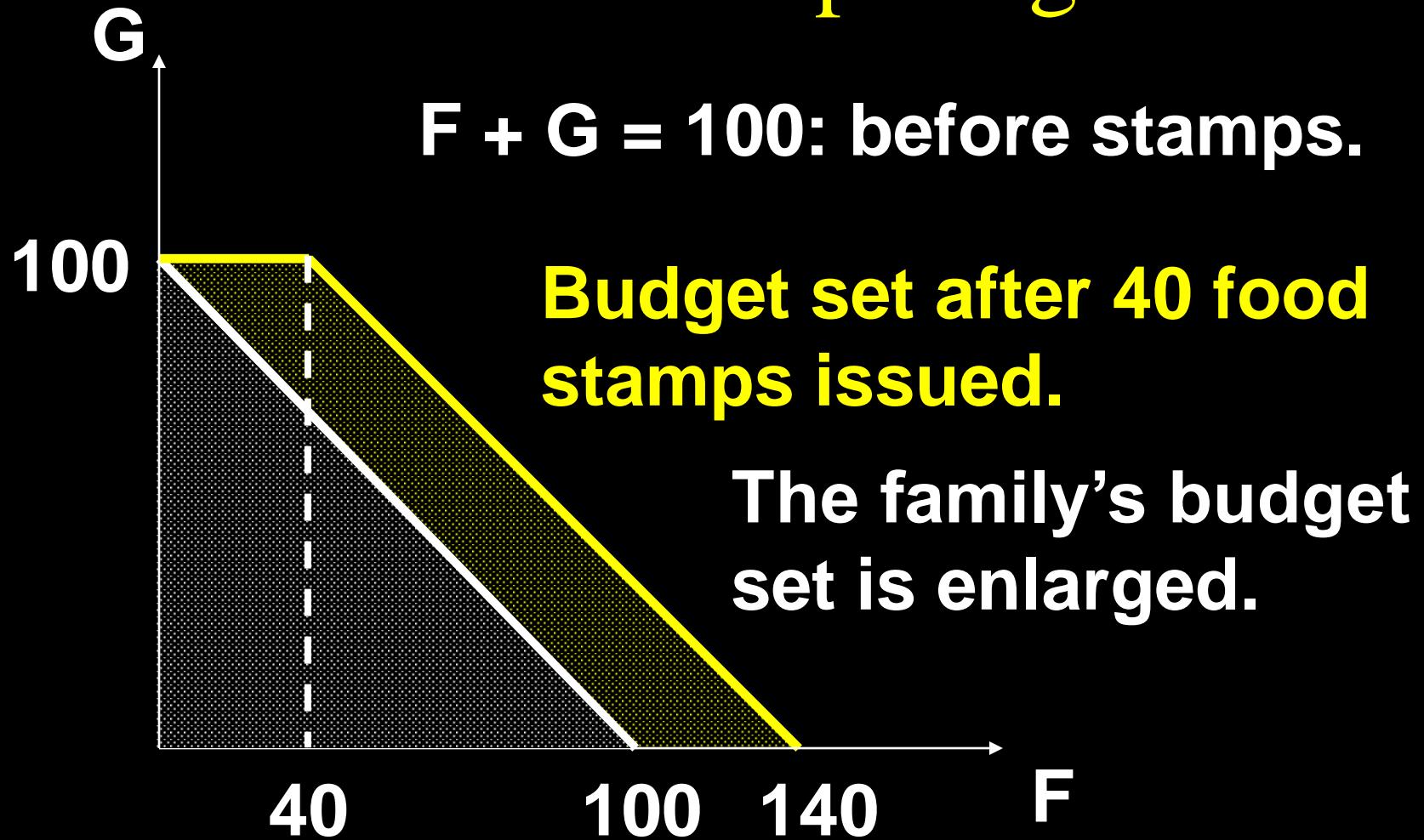
The Food Stamp Program



The Food Stamp Program



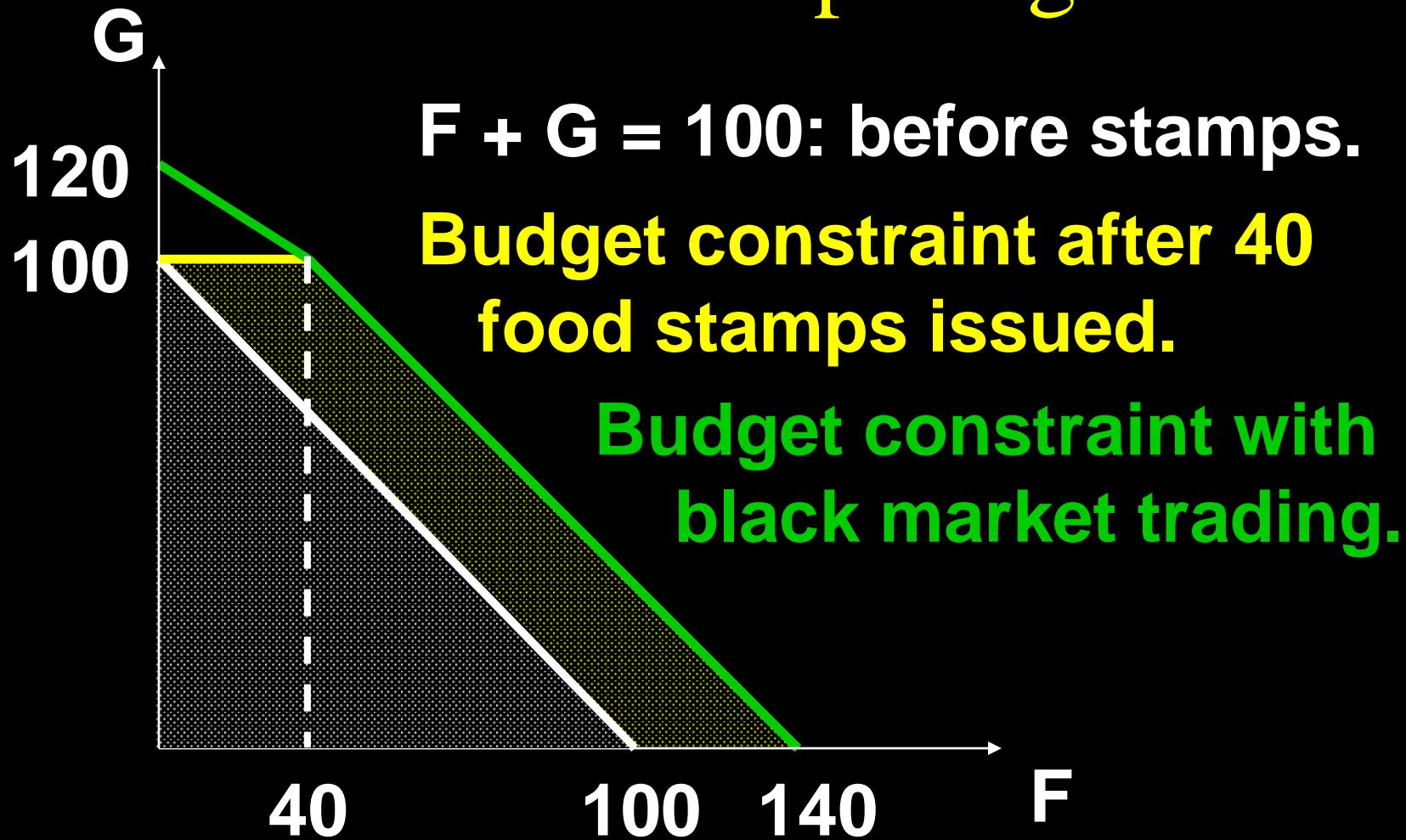
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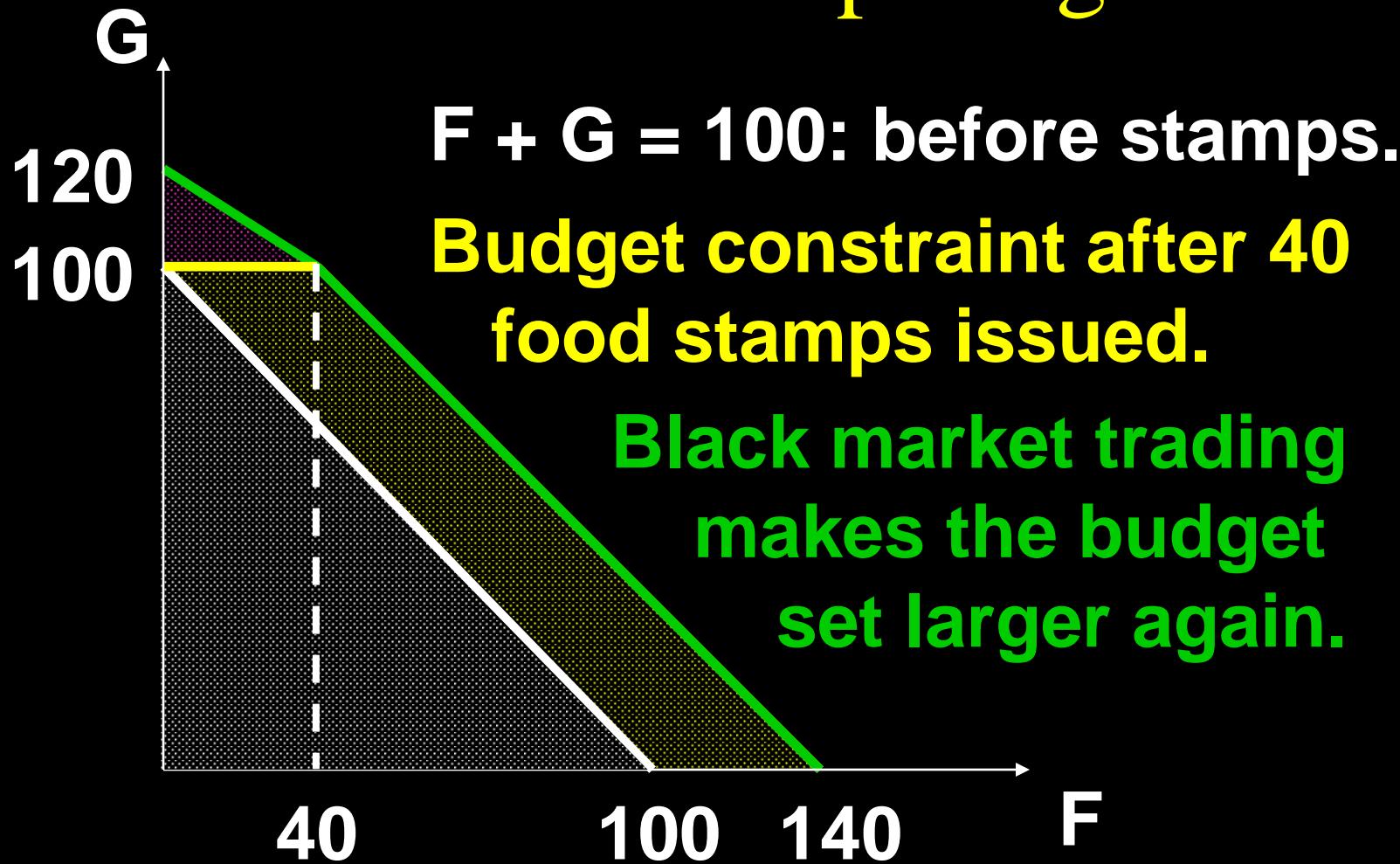
The Food Stamp Program

- What if food stamps can be traded on a black market for \$0.50 each?

The Food Stamp Program



The Food Stamp Program



Shapes of Budget Constraints

- Q: What makes a budget constraint a straight line?
- A: A straight line has a constant slope and the constraint is
$$p_1x_1 + \dots + p_nx_n = m$$
so if prices are constants then a constraint is a straight line.

Shapes of Budget Constraints

- But what if prices are not constants?
- E.g. bulk buying discounts, or price penalties for buying “too much”.
- Then constraints will be curved.

Shapes of Budget Constraints - Quantity Discounts

- Suppose p_2 is constant at \$1 but that $p_1 = \$2$ for $0 \leq x_1 \leq 20$ and $p_1 = \$1$ for $x_1 > 20$.

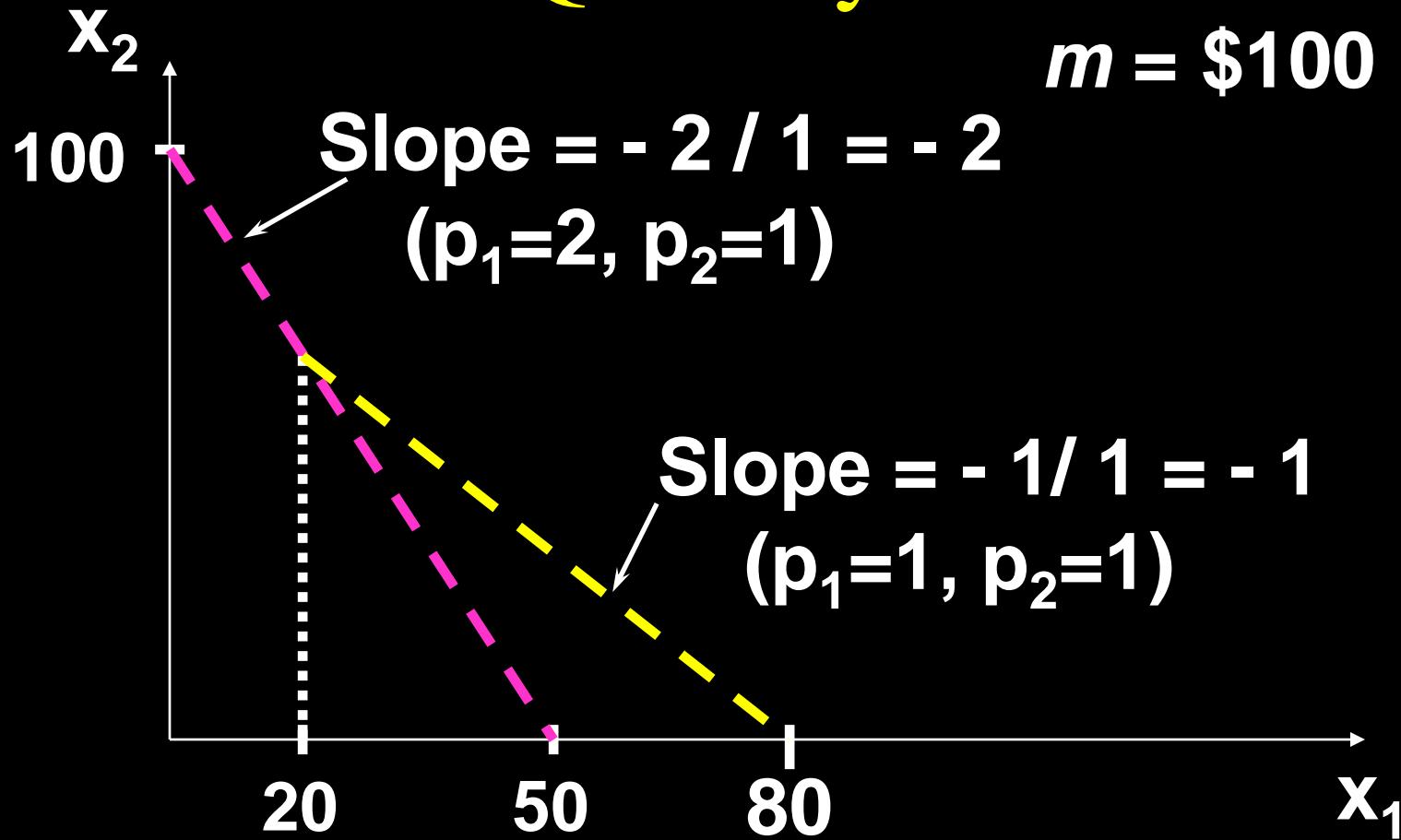
Shapes of Budget Constraints - Quantity Discounts

- Suppose p_2 is constant at \$1 but that $p_1=\$2$ for $0 \leq x_1 \leq 20$ and $p_1=\$1$ for $x_1 > 20$. Then the constraint's slope is

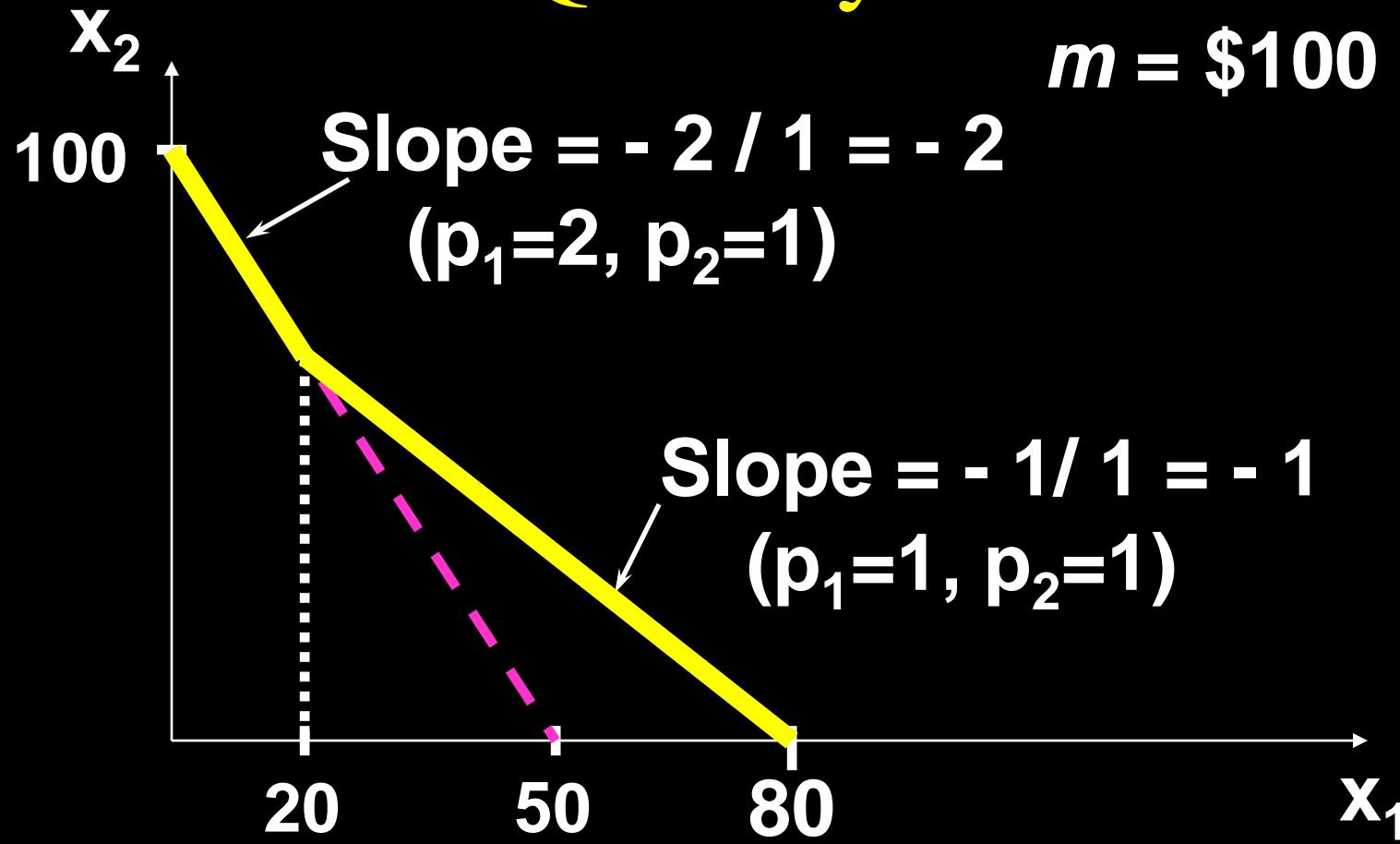
$$-\frac{p_1}{p_2} = \begin{cases} -2, & \text{for } 0 \leq x_1 \leq 20 \\ -1, & \text{for } x_1 > 20 \end{cases}$$

and the constraint is

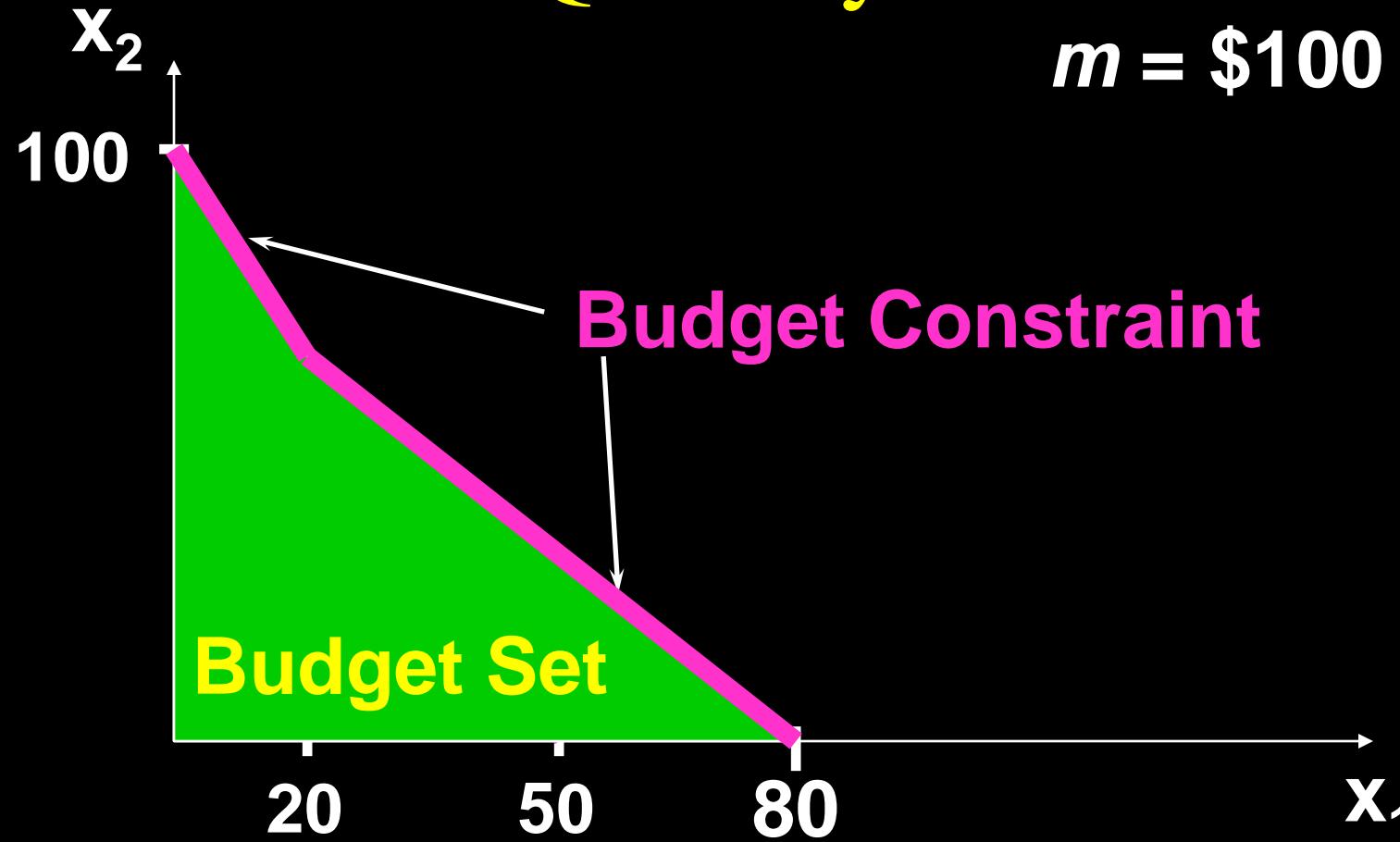
Shapes of Budget Constraints with a Quantity Discount



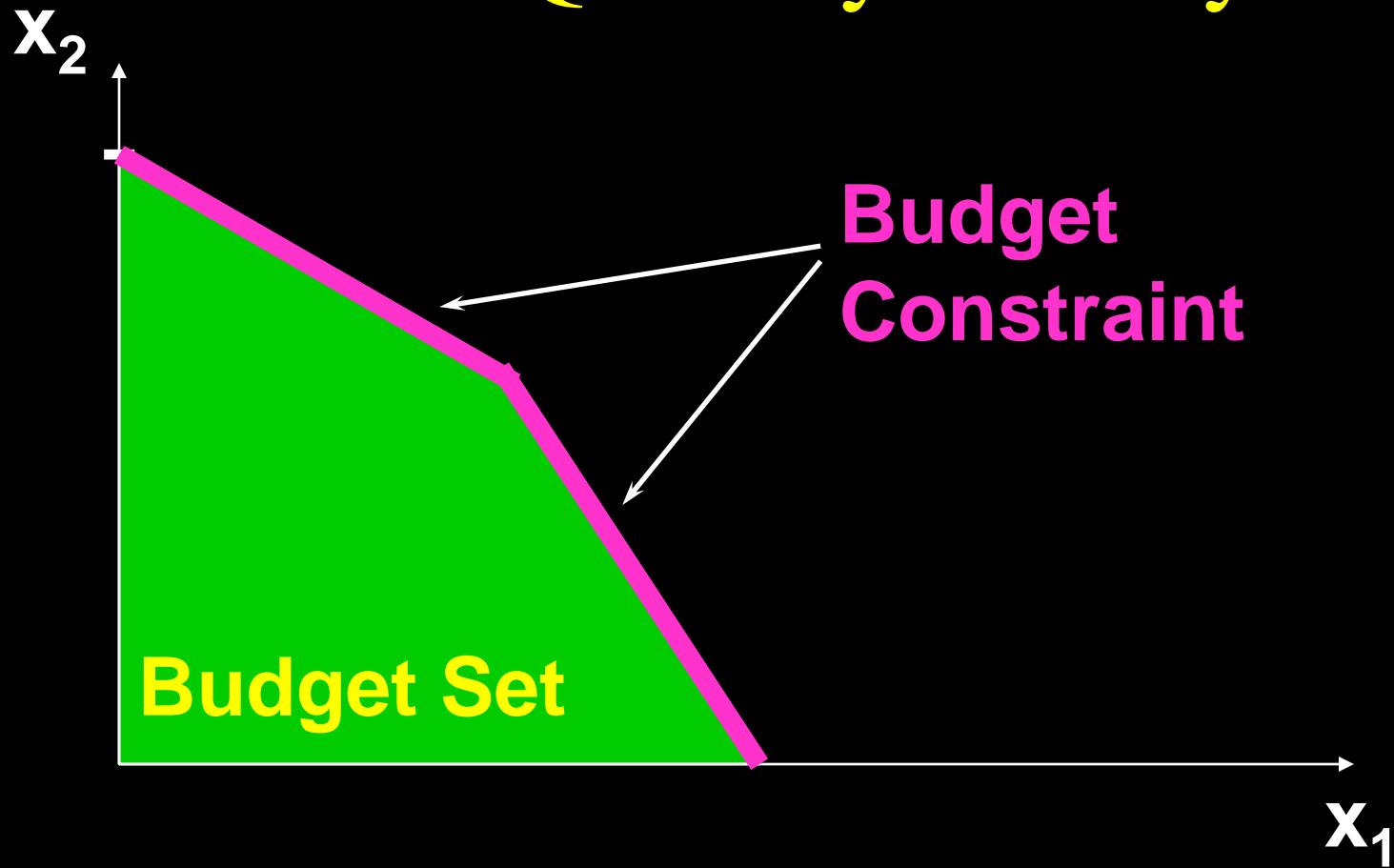
Shapes of Budget Constraints with a Quantity Discount



Shapes of Budget Constraints with a Quantity Discount



Shapes of Budget Constraints with a Quantity Penalty

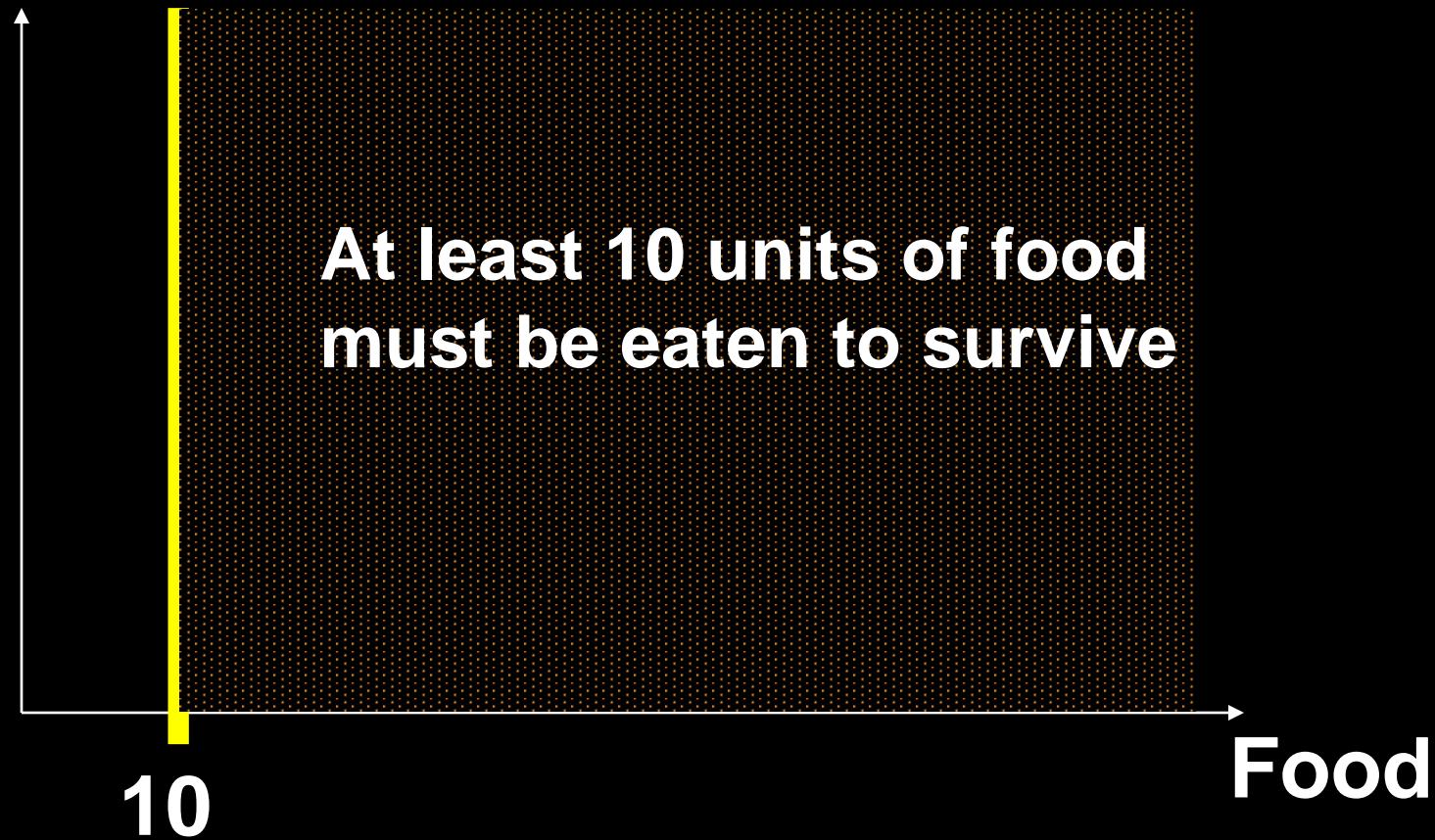


More General Choice Sets

- Choices are usually constrained by more than a budget; e.g. time constraints and other resources constraints.
- A bundle is available only if it meets every constraint.

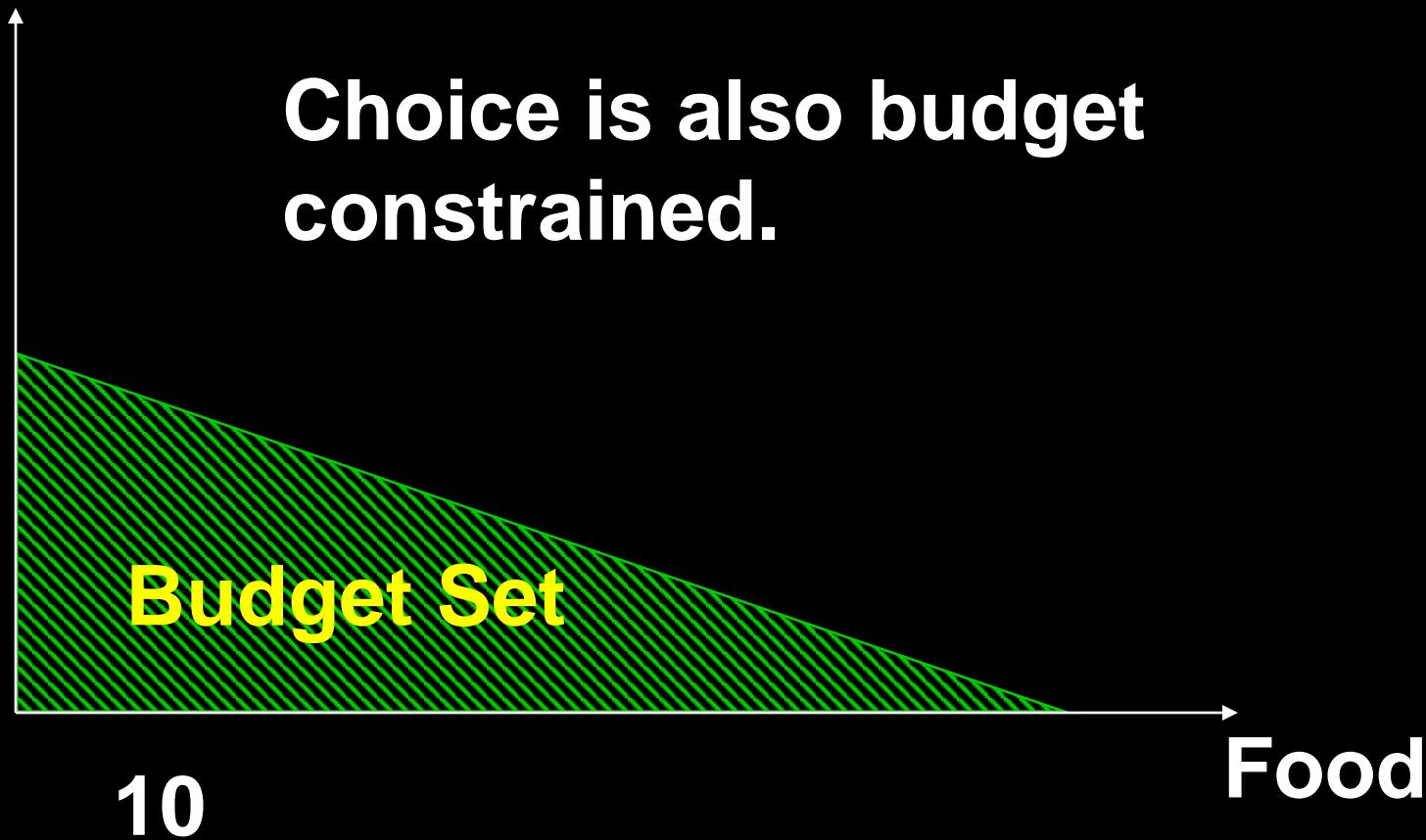
More General Choice Sets

Other Stuff



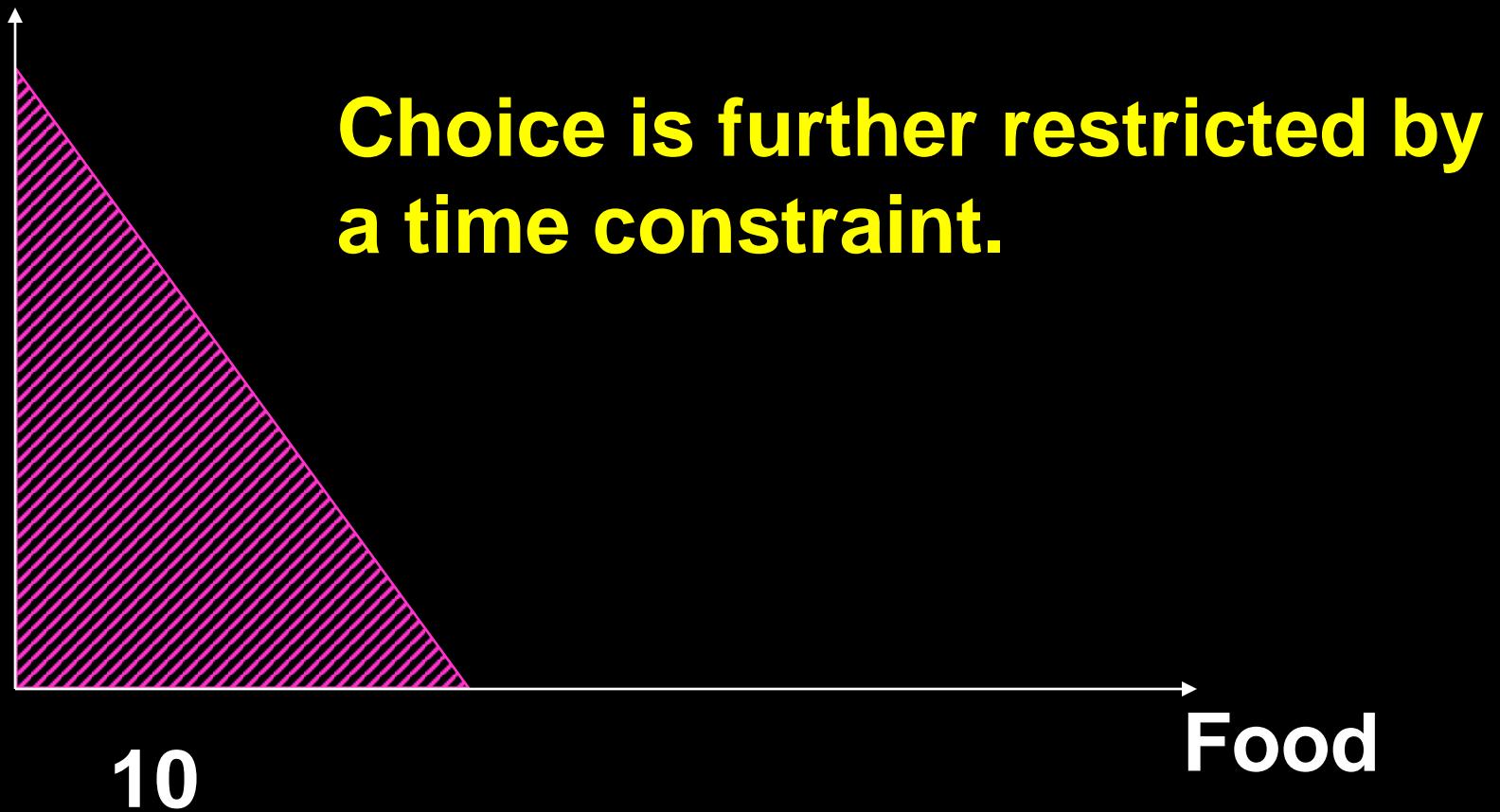
More General Choice Sets

Other Stuff



More General Choice Sets

Other Stuff

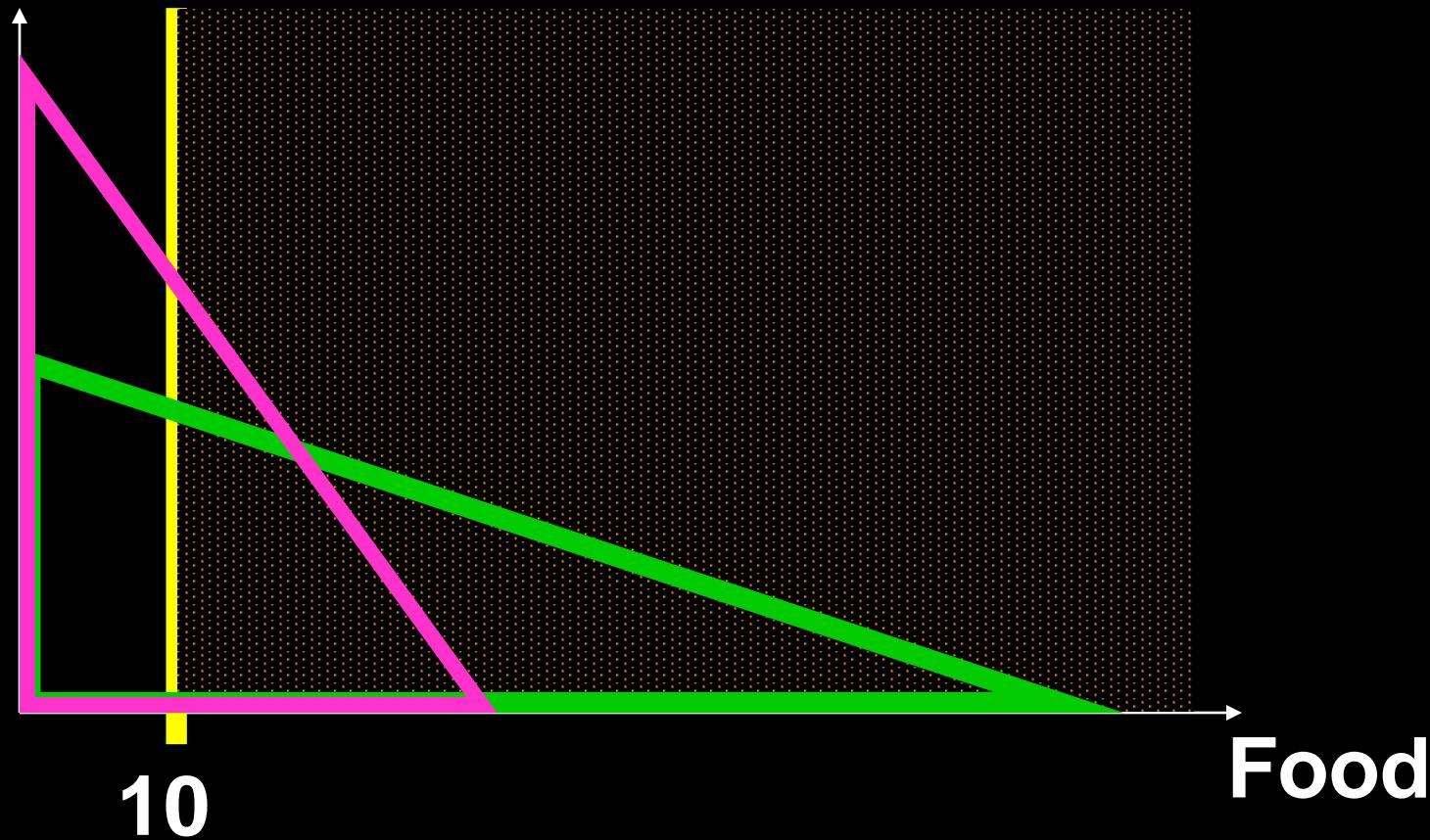


More General Choice Sets

So what is the choice set?

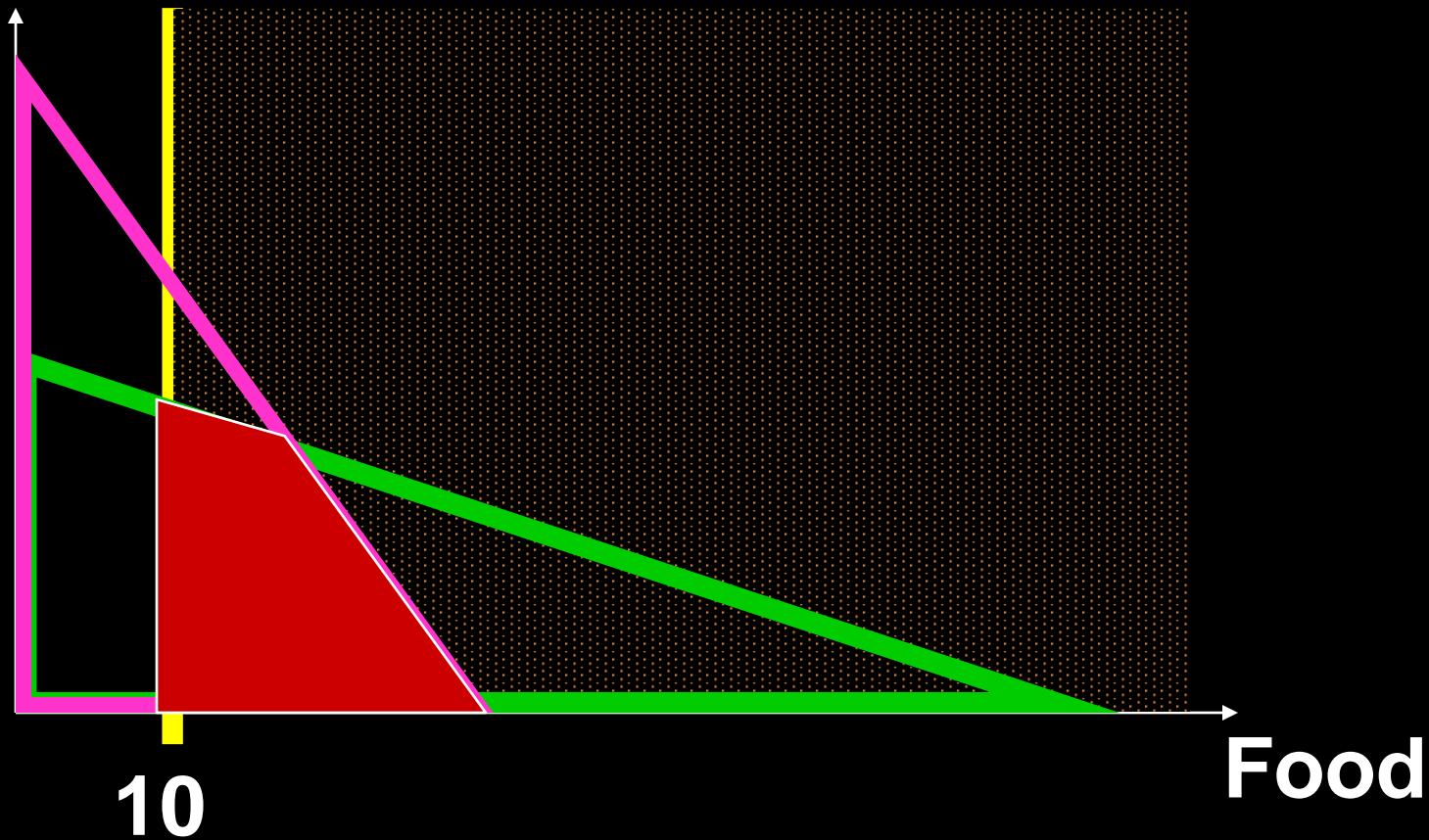
More General Choice Sets

Other Stuff



More General Choice Sets

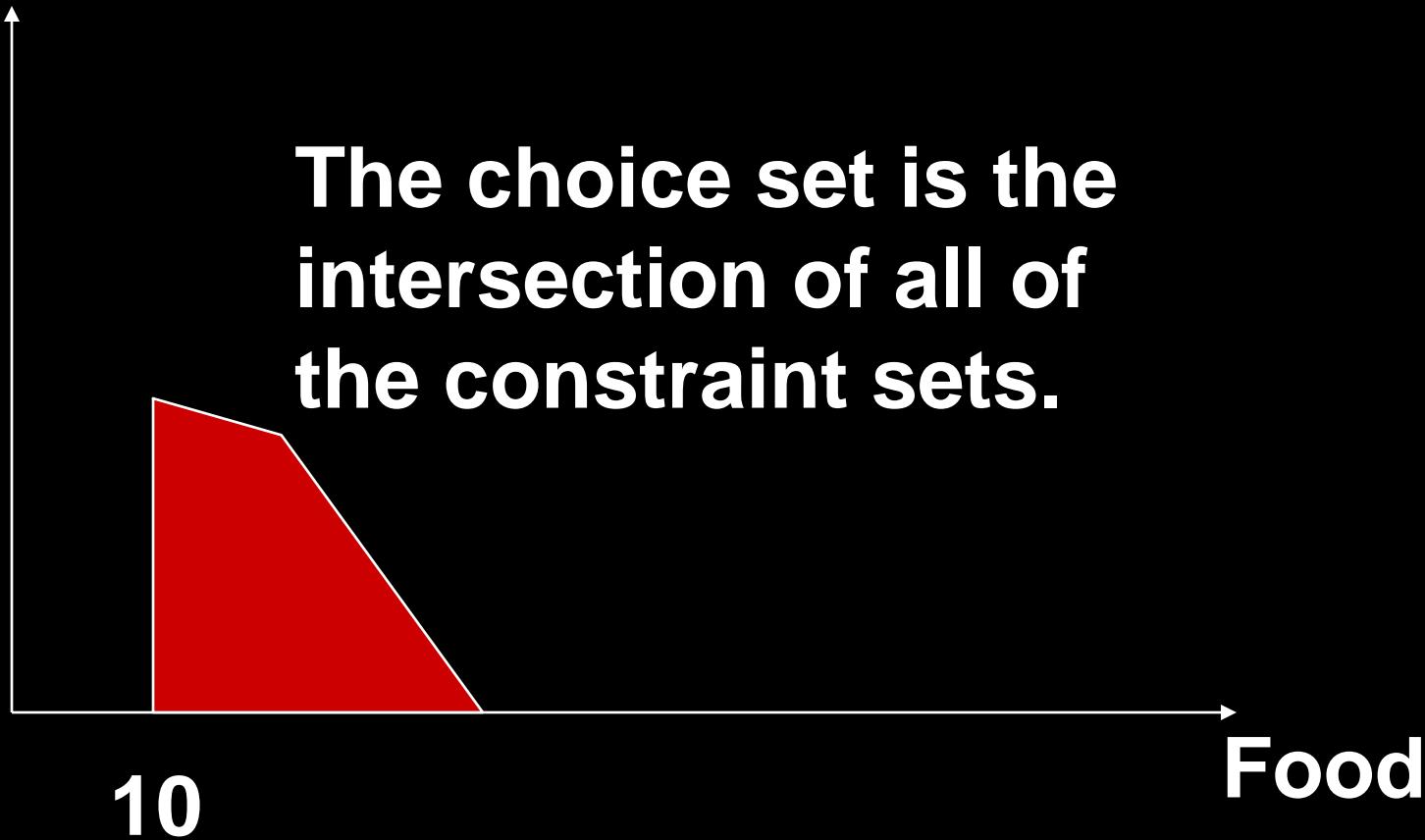
Other Stuff



More General Choice Sets

Other Stuff

The choice set is the intersection of all of the constraint sets.



Utility Maximization

Let the consumer has a utility function of the form $U = f(x, y)$ and the total income available to her is m while the prices are P_x and P_y . The consumer's problem is choose the affordable bundle that maximizes her utility.

The feasible set: The consumer cannot spend more than the total income m . Thus,

$$P_x * x + P_y * y \leq m \quad (1)$$

Since *monotonicity*, i.e., *more is better* holds for the consumer's choice of bundle, so the inequality of eq.2 becomes equality

$$P_x * x + P_y * y = m \quad (2)$$

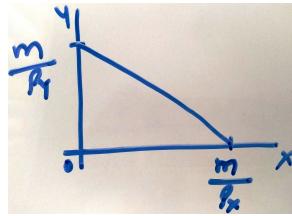


Figure 1: The Budget Constraint (Feasible Set)

The slope of the budget constraint is given as:

$$\text{slope} = -\frac{P_x}{P_y} \quad (3)$$

We know that the indifference curve exhibit *diminishing marginal rate of substitution* and this is reflected in the slope of the indifference curves. The slope is given by

$$MRS_{yx} = -\frac{dy}{dx}|du = 0 \quad (4)$$

i.e., the marginal rate of substitution of y for x is the negative of the slope of the indifference curve in figure 2.

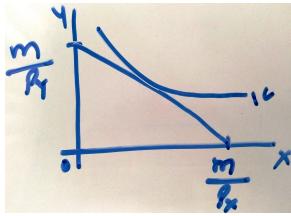


Figure 2: Consumer's Equilibrium

Also, we know that:

$$MRS_{yx} = \frac{MU_x}{MU_y} \quad (5)$$

The optimal bundle for the consumer is one where the following two conditions are fulfilled:

- a.** The bundle must lie on the budget line;
- b.** The indifference curve must be tangent to the budget line at the point of optimal bundle.

From (3), (4), and (5), we get that at point of consumer's equilibrium (ignoring the negative signs):

$$MRS_{yx} = \frac{P_x}{P_y} = \frac{MU_x}{MU_y} \quad (6)$$

Using Lagrange multiplier to find consumer's equilibrium:

Let the Utility function of the consumer be given by $U = f(x, y)$ and the feasible set by $P_x * x + P_y * y = m$.

We set the Lagrange function as:

$$\mathcal{L} = U(x, y) + \lambda(m - P_x * x - P_y * y) \quad (7)$$

getting the first order conditions for the eq.7 and setting it equal to zero shall give us values of x and y that are in the optimal bundle.

Example: Let $U = x_1^{0.25}x_2^{0.75}$, $m = Rs100$; $Px_1 = Rs2$ and $Px_2 = Rs4$. Find the optimal bundle of x_1 and x_2 for the consumer.

Solution:

Set the Lagrangian function as:

$$\mathcal{L} = x_1^{0.25}x_2^{0.75} + \lambda(m - Px_1 * x_1 - Px_2 * x_2) \quad (8)$$

Setting the *first order conditions* equal to zero, we get:

$$\frac{\partial \mathcal{L}}{\partial x_1} = 0.25x_1^{-0.75}x_2^{0.75} - 2\lambda = 0 \quad (9)$$

and,

$$\frac{\partial \mathcal{L}}{\partial x_2} = 0.75x_1^{0.25}x_2^{-0.25} - 4\lambda = 0 \quad (10)$$

and,

$$\frac{\partial \mathcal{L}}{\partial \lambda} = 100 - 2x_1 - 4x_2 = 0 \quad (11)$$

Solving eq. 9 and 10 gives $x_2 = \frac{3}{2}x_1$.

Substituting value of x_2 in eq. 11 gives $x_1^* = 12.5$ and $x_2^* = 18.75$.

The Production Process: The Behavior of Profit-Maximizing Firms

Prepared by:

Fernando & Yvonn Quijano



The Production Process: The Behavior of Profit-Maximizing Firms

7

Chapter Outline

The Behavior of Profit-Maximizing Firms

Profits and Economic Costs
Short-Run versus Long-Run Decisions

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

The Production Process

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

Production Functions with Two Variable Factors of Production

Choice of Technology

Looking Ahead: Cost and Supply

Appendix: Isoquants and Isocosts

THE PRODUCTION PROCESS: THE BEHAVIOR OF PROFIT-MAXIMIZING FIRMS

CHAPTER 7: The Production Process: The Behavior of Profit-Maximizing Firms

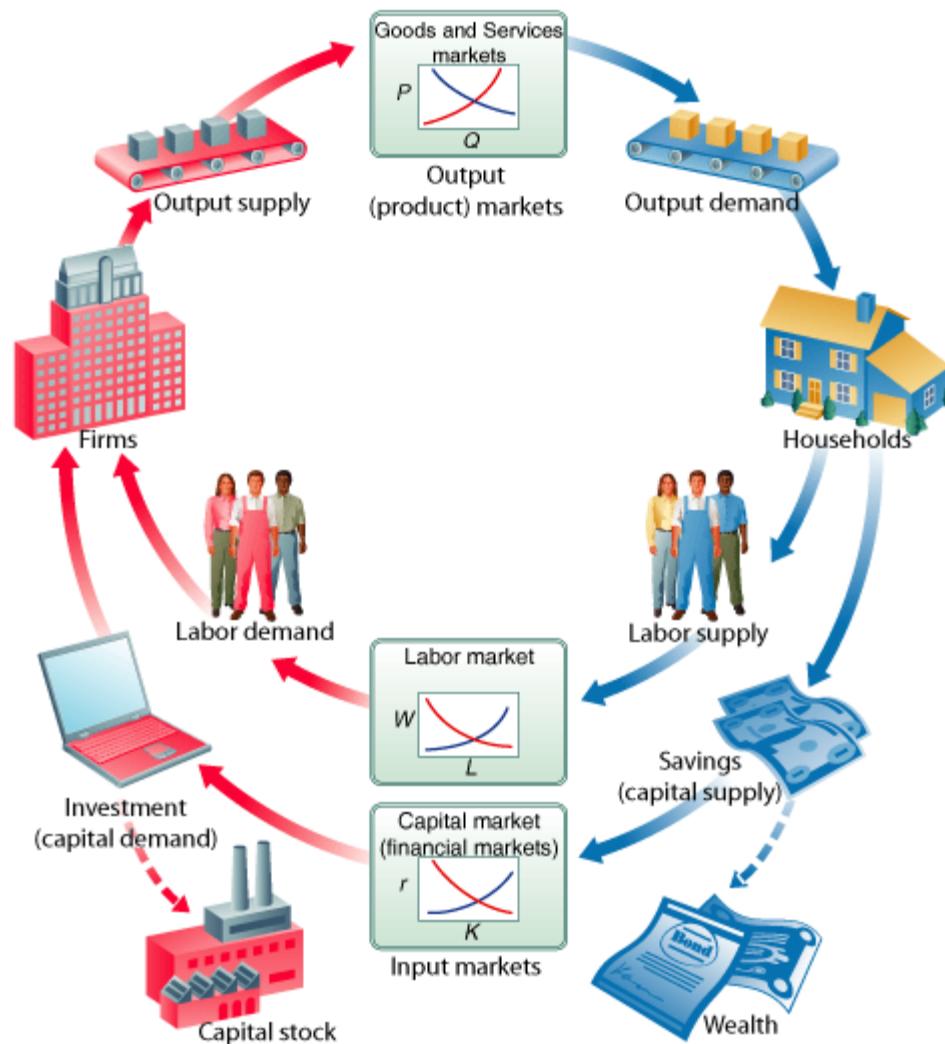


FIGURE 7.1 Firm and Household Decisions

THE PRODUCTION PROCESS: THE BEHAVIOR OF PROFIT-MAXIMIZING FIRMS

Although Chapters 7 through 12 describe the behavior of perfectly competitive firms, much of what we say in these chapters also applies to firms that are not perfectly competitive. For example, when we turn to monopoly in Chapter 13, we will be describing firms that are similar to competitive firms in many ways. All firms, whether competitive or not, demand inputs, engage in production, and produce outputs. All firms have an incentive to maximize profits and thus to minimize costs.

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

THE PRODUCTION PROCESS: THE BEHAVIOR OF PROFIT-MAXIMIZING FIRMS

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 PRODUCTION PROCESS: THE BEHAVIOR OF PROFIT-MAXIMIZING FIRMS

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.

THE PRODUCTION PROCESS: THE BEHAVIOR OF PROFIT-MAXIMIZING FIRMS

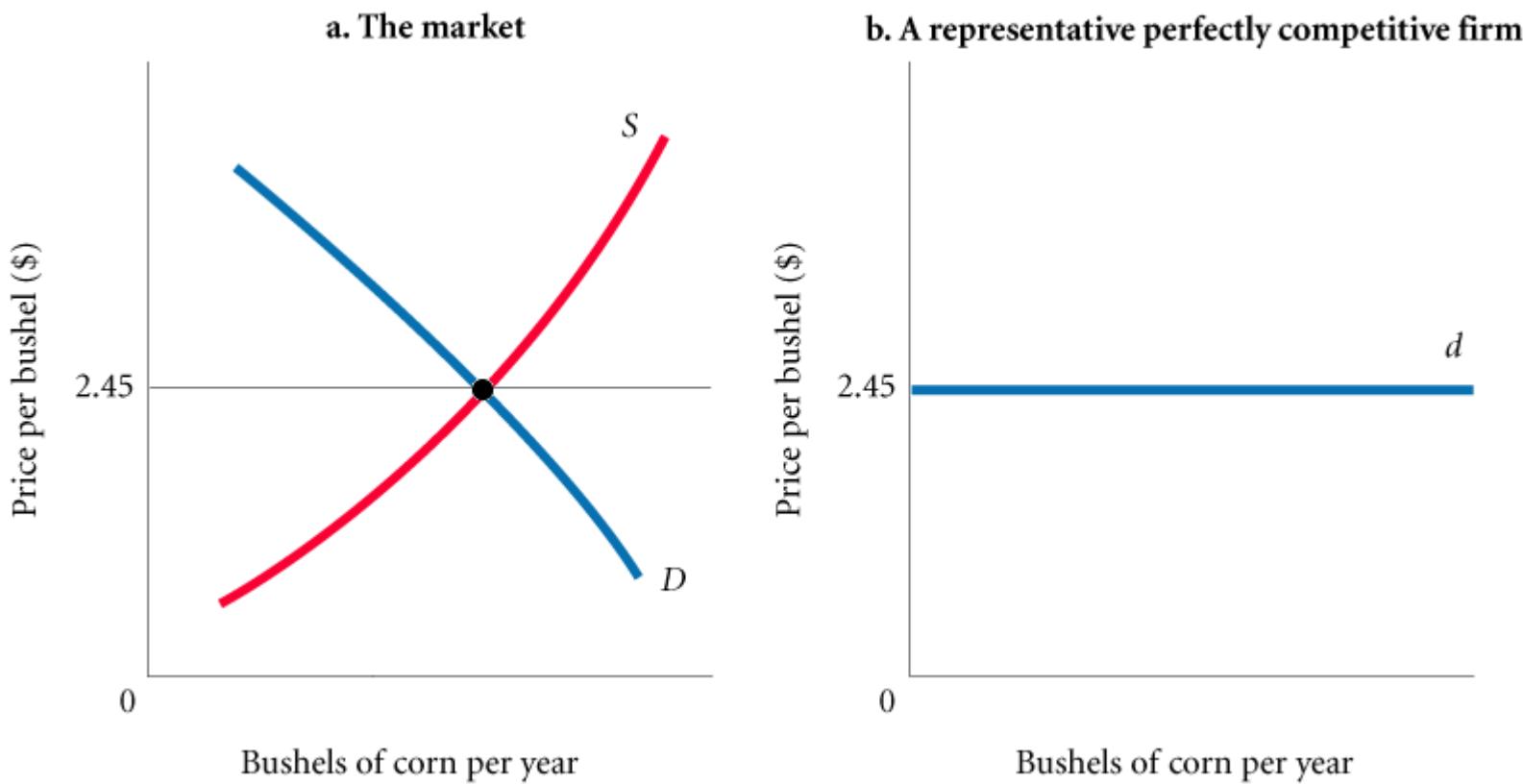


FIGURE 7.2 Demand Facing a Single Firm in a Perfectly Competitive Market

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.

1. **How much output to supply**
2. **Which production technology to use**
3. **How much of each input to demand**

FIGURE 7.3 The Three Decisions That All Firms Must Make

THE BEHAVIOR OF PROFIT-MAXIMIZING FIRMS

PROFITS AND ECONOMIC COSTS

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

$$\text{profit} = \text{total revenue} - \text{total cost}$$

total revenue The amount received from the sale of the product ($q \times P$).

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

$$\text{economic profit} = \text{total revenue} - \text{total economic cost}$$

THE BEHAVIOR OF PROFIT-MAXIMIZING FIRMS

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.

TABLE 7.1 Calculating Total Revenue, Total Cost, and Profit

INITIAL INVESTMENT:	\$20,000
MARKET INTEREST RATE AVAILABLE:	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

The bases of decision making:

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

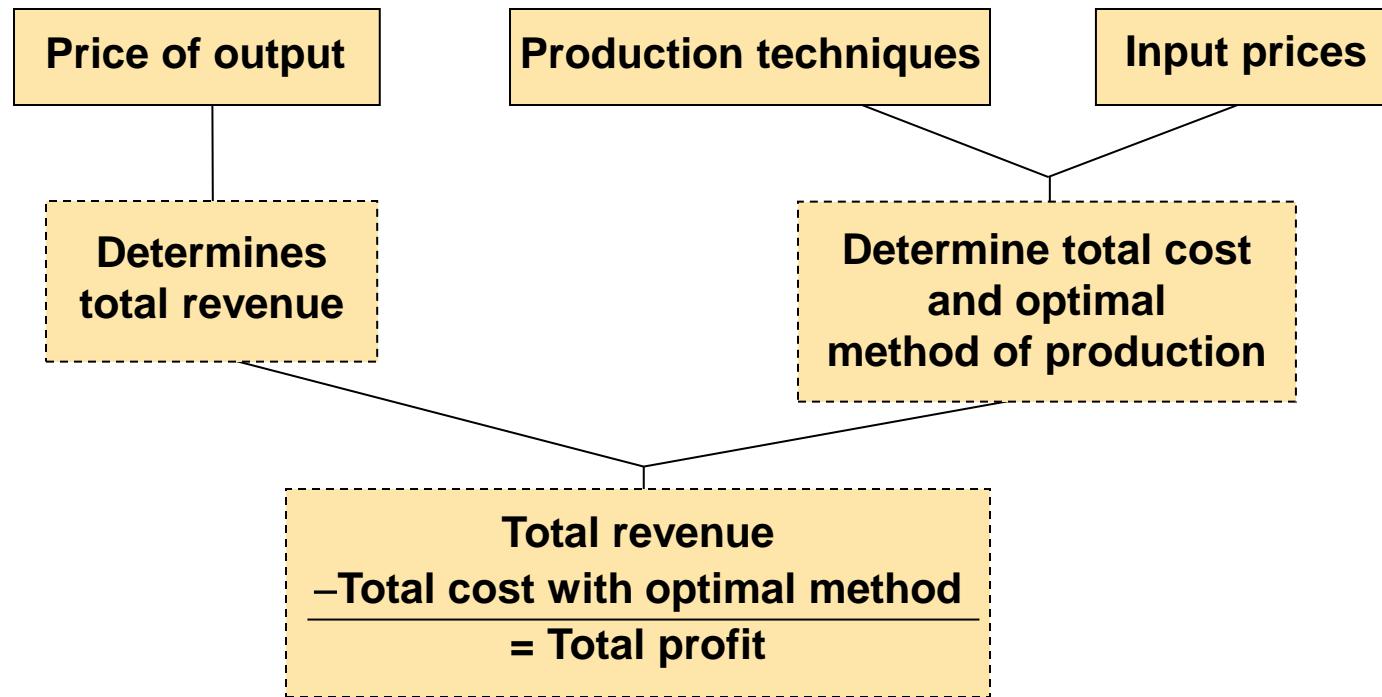


FIGURE 7.4 Determining the Optimal Method of Production

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.

THE PRODUCTION PROCESS

TABLE 7.2 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

CHAPTER 7: The Production Process: The Behavior of Profit-Maximizing Firms

THE PRODUCTION PROCESS

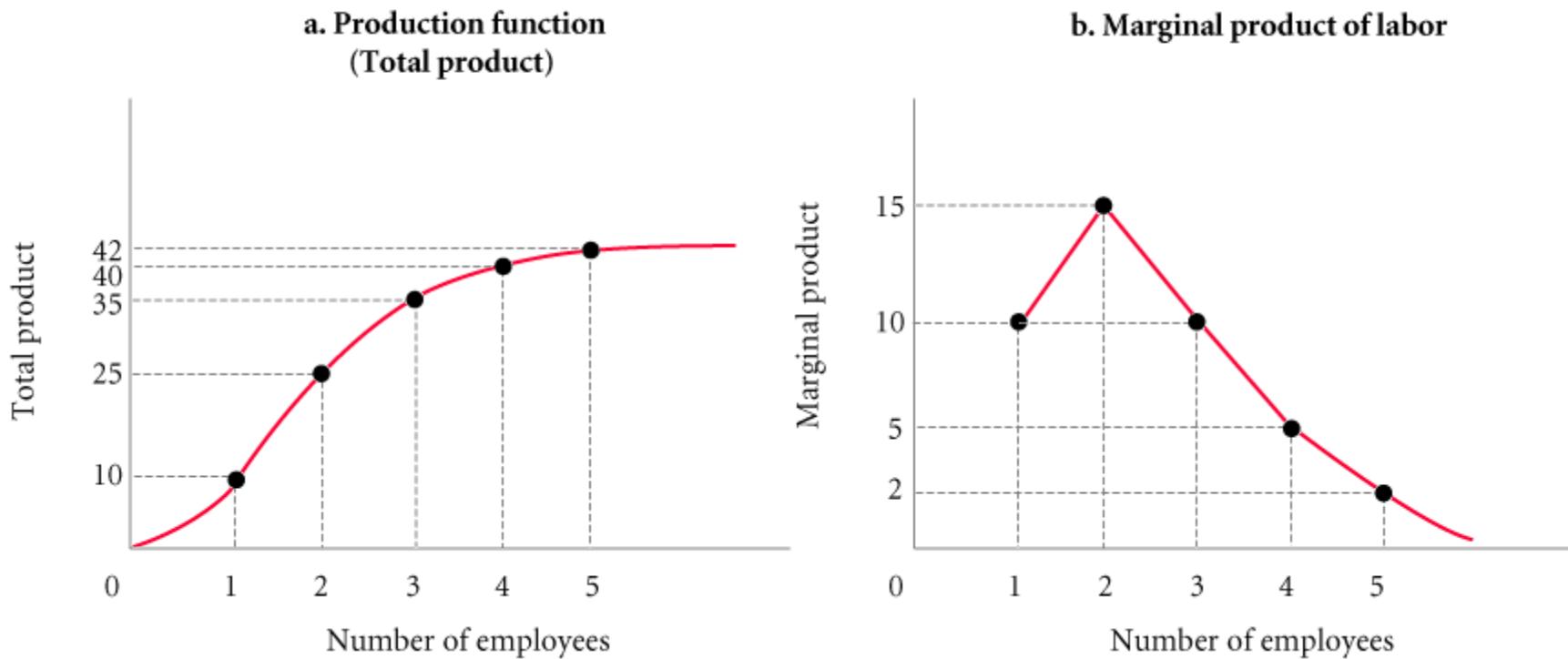


FIGURE 7.5 Production Function for Sandwiches

THE PRODUCTION PROCESS

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

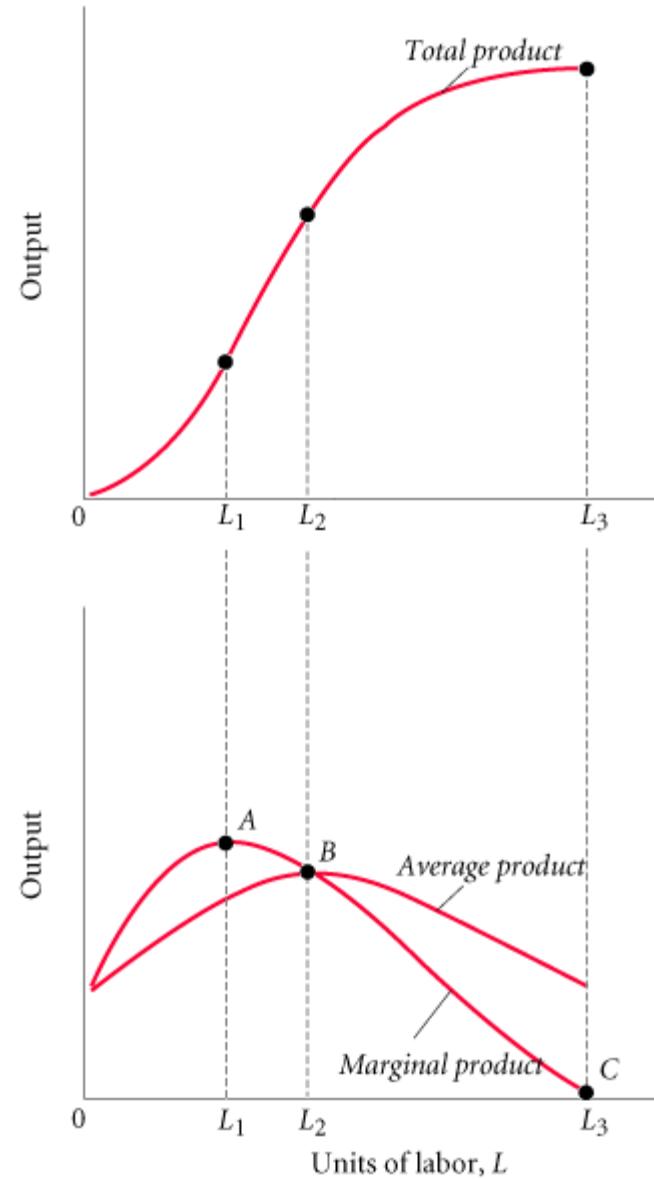
Marginal Product versus Average Product

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

FIGURE 7.6 Total Average and Marginal Product



THE PRODUCTION PROCESS

PRODUCTION FUNCTIONS WITH TWO VARIABLE FACTORS OF PRODUCTION

In general, additional capital increases the productivity of labor. Because capital—buildings, machines, and so on—is of no use without people to operate it, we say that capital and labor are *complementary inputs*.



CHOICE OF TECHNOLOGY

TABLE 7.3 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

CHOICE OF TECHNOLOGY

TABLE 7.4 Cost-Minimizing Choice Among Alternative Technologies (100 Diapers)

(1) TECHNOLOGY	(2) UNITS OF CAPITAL (K)	(3) UNITS OF LABOR (L)	(4)	(5)
A	2	10	$\text{Cost} = (L \times P_L) + (K \times P_K)$	
B	3	6	$P_L = \$1$	$P_L = \$5$
C	4	4	$P_K = \$1$	$P_K = \$1$
D	6	3		
E	10	2		

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.

REVIEW TERMS AND CONCEPTS

average product

capital-intensive technology
firm

homogeneous products

labor-intensive technology

law of diminishing returns

long run

marginal product

normal rate of return

optimal method of
production

perfect competition
production

production function or total
product function

production technology

profit (economic profit)

short run

total cost (total economic cost)

total revenue

1. Profit = total revenue - total cost

2. Average product of labor = $\frac{\text{total product}}{\text{total units of labor}}$

Appendix

ISOQUANTS AND ISOCOSTS

NEW LOOK AT TECHNOLOGY: ISOQUANTS

TABLE 7A.1 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

Appendix

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

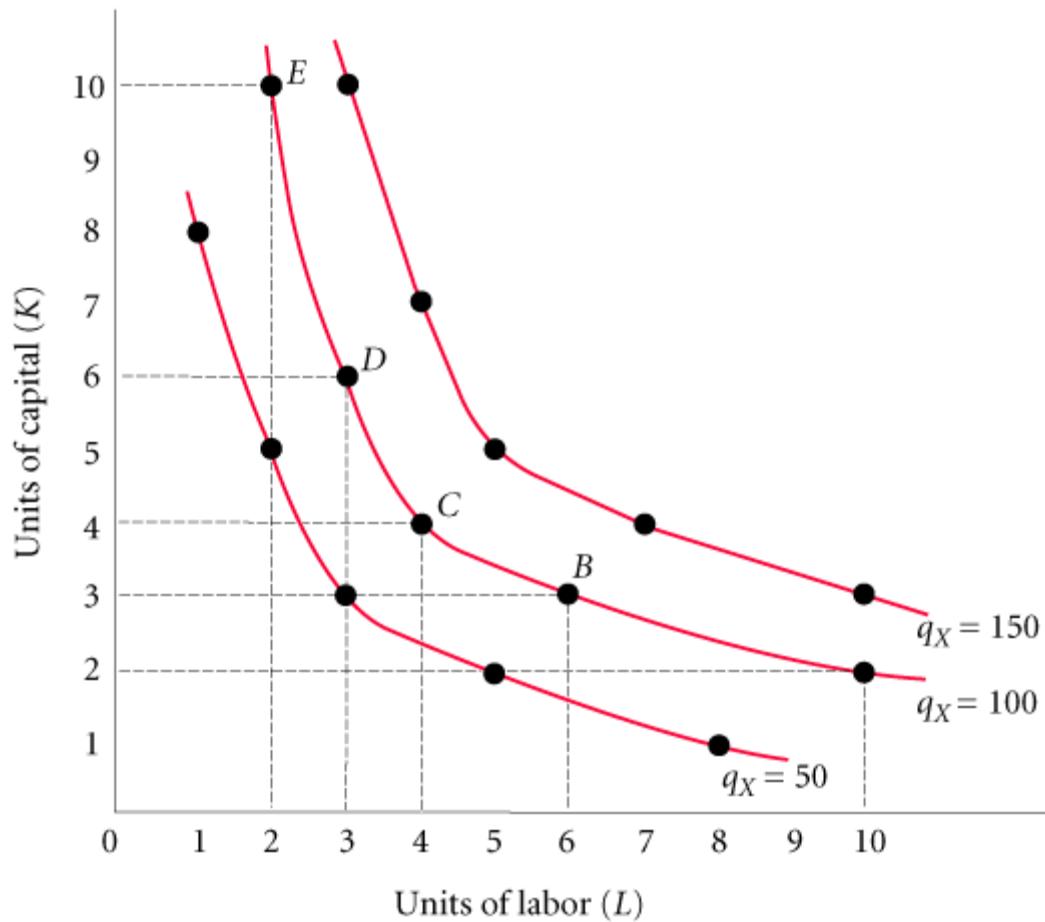


FIGURE 7A.1 Isoquants Showing All Combinations of Capital and Labor That Can Be Used to Produce 50, 100, and 150 Units of Output

Appendix

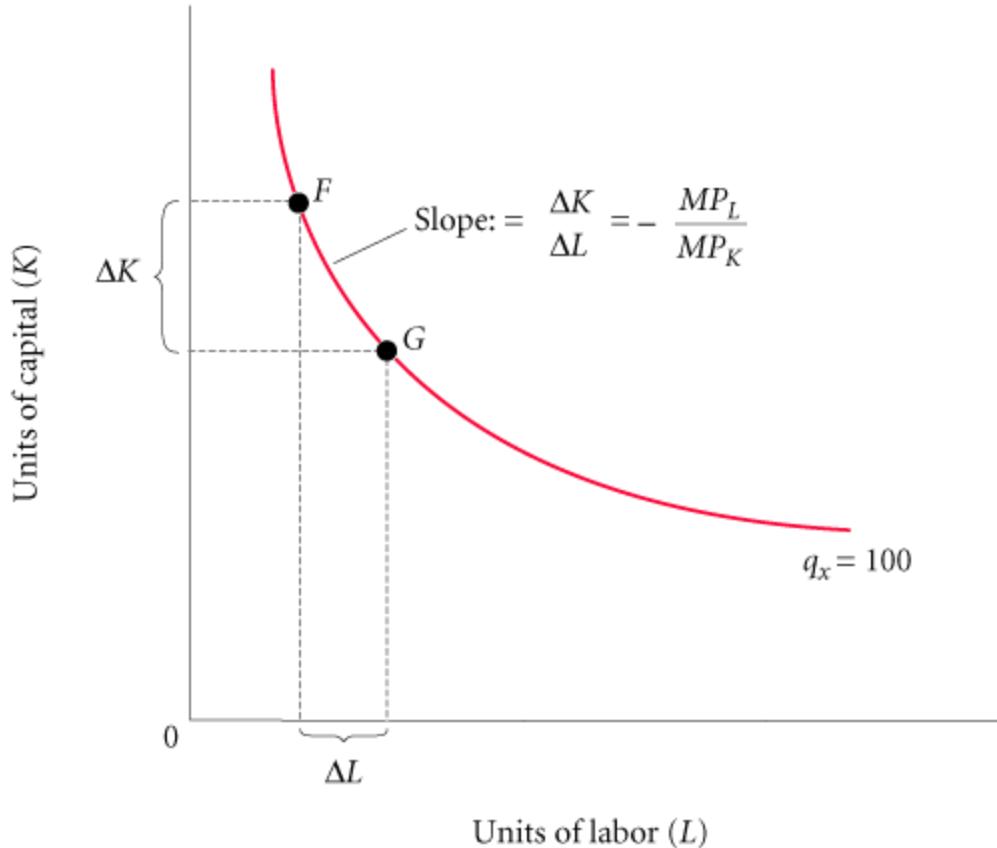


FIGURE 7A.2 The Slope of an Isoquant Is Equal to the Ratio of MP_L to MP_K

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.

Appendix

FACTOR PRICES AND INPUT COMBINATIONS: ISOCOSTS

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

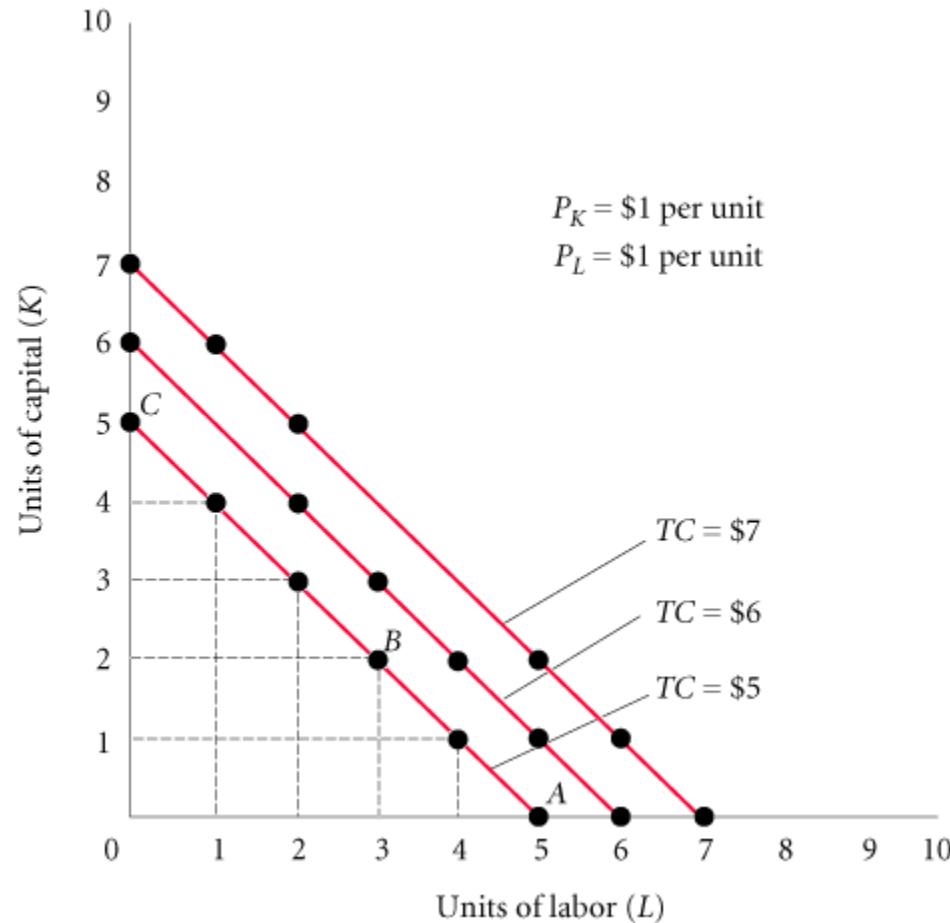


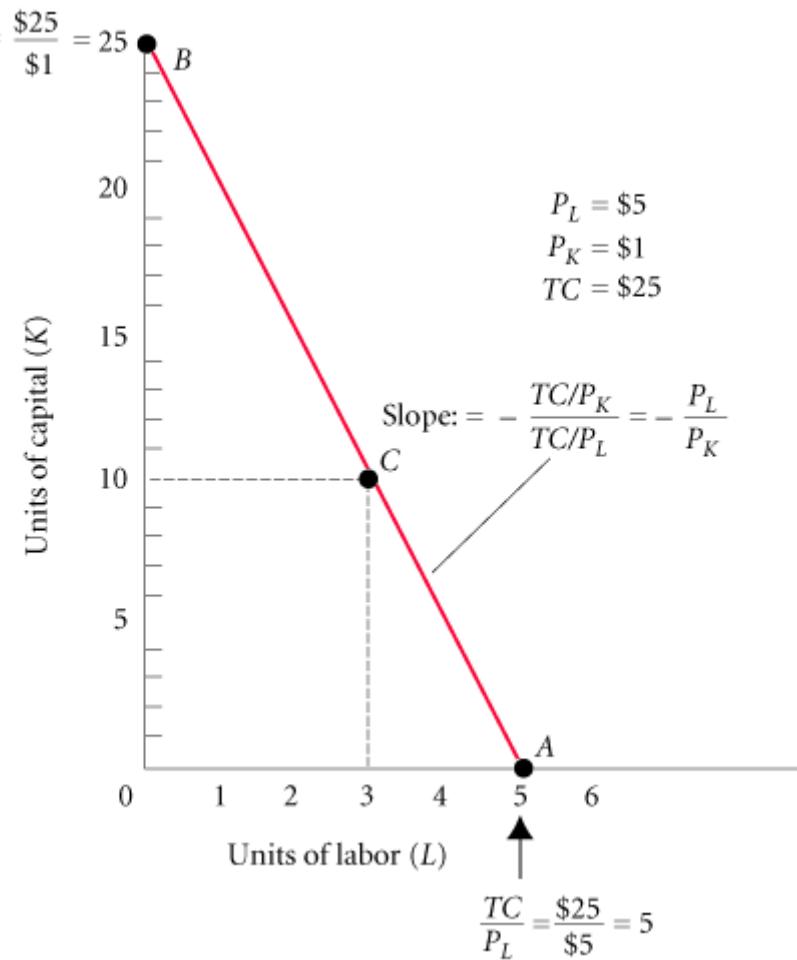
FIGURE 7A.3 Isocost Lines Showing the Combinations of Capital and Labor Available for \$5, \$6, and \$7

Appendix

FIGURE 7A.4 Isocost Line Showing All Combinations of Capital and Labor Available for \$25

Slope of isocost line:

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

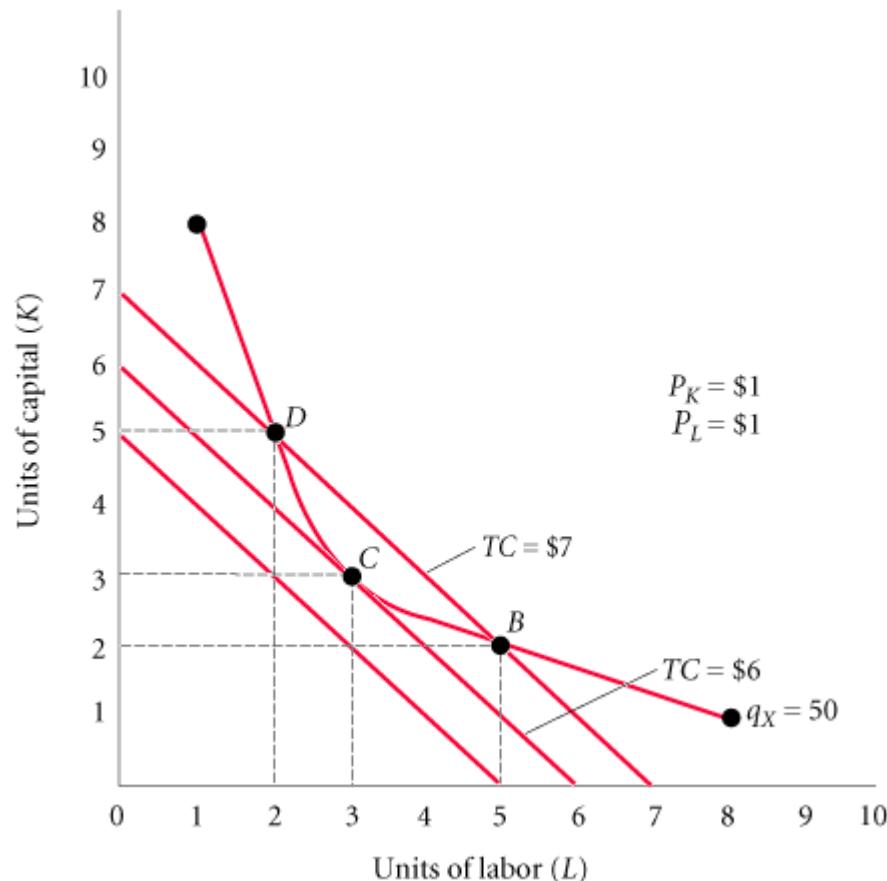


Appendix

FINDING THE LEAST-COST TECHNOLOGY WITH ISOQUANTS AND ISOCOSTS

FIGURE 7A.5 Finding the Least-Cost Combination of Capital and Labor to Produce 50 Units of Output

The firm will choose the combination of inputs that is least costly. The least costly way to produce any given level of output is indicated by the point of tangency between an isocost line and the isoquant corresponding to that level of output.



CHAPTER 7: The Production Process: The Behavior of Profit-Maximizing Firms

Appendix

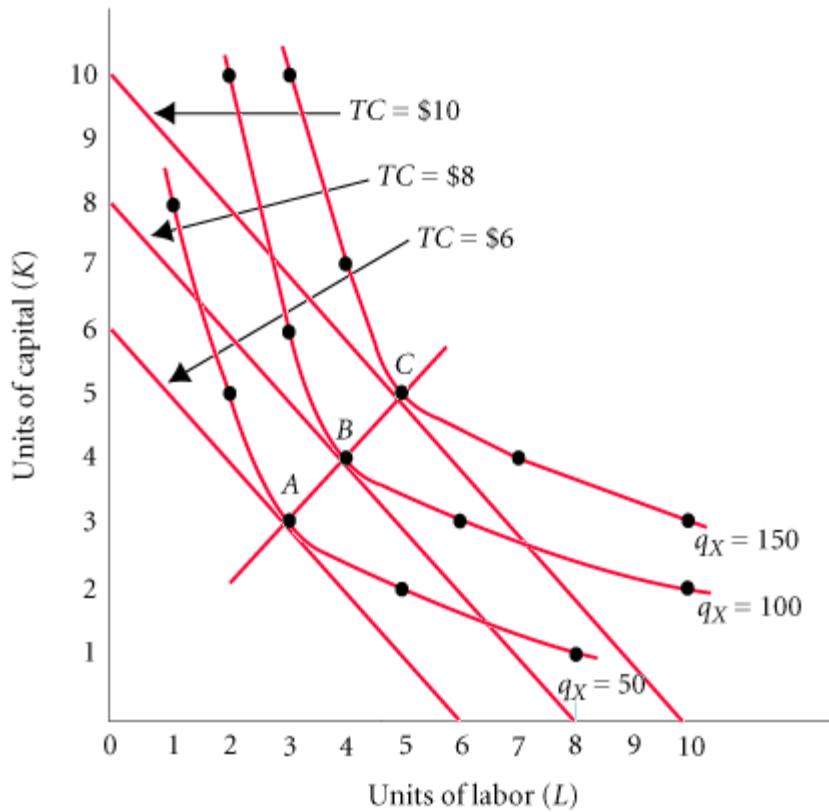


FIGURE 7A.6 Minimizing Cost of Production for $q_X = 50$, $q_X = 100$, and $q_X = 150$

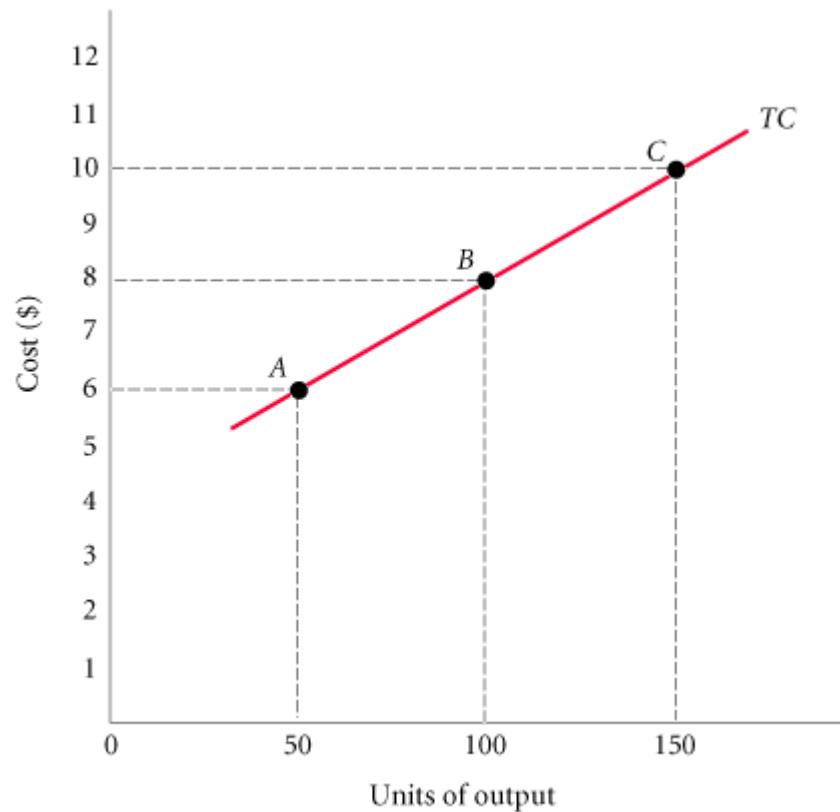


FIGURE 7A.7 A Cost Curve Shows the *Minimum Cost of Producing Each Level of Output*

Appendix

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

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

COSTS IN THE SHORT RUN

Accounting cost : Accounting cost is also known as explicit cost; that is explicitly paid for factors of production such as salary, raw material, electricity , insurance, taxes , ...etc.

Opportunity cost : Opportunity cost is also known as implicit cost ; cost that is not actually paid for the factors of production, but it sacrificed for the sake of using existing factors of production available at the work place

COSTS IN THE SHORT RUN

Example of Opportunity cost : If a company owns a warehouse and uses it to store products, the company will not pay rent for the usage of this warehouse because the company owns it.

The opportunity cost of using the warehouse is renting, and benefiting from the rent.

COSTS IN THE SHORT RUN

So,

Accounting Cost = Explicit cost only

Economic cost = Explicit cost + Implicit Cost

If **Implicit Cost = 0**, Accounting cost = Economic cost

COSTS IN THE SHORT RUN

Normal and Economic Profits

Normal Profits is the Accounting profits

Accounting Profits = Total Revenue – Accounting Cost

Accounting Profits = TR – Explicit Cost

Economic Profits = Total Revenue – Economics Cost

Economic Profits = TR – (Explicit Cost + Implicit Cost)

1. If $TR > \text{Economics Cost}$, the company gains economic profits
2. If $TR < \text{Economics Cost}$, the company gains economic loss
3. If $TR = \text{Economics Cost}$, economic profits = 0 and the company gains only normal profits.

COSTS IN THE SHORT RUN

fixed cost Any cost that does not depend on the firm's level of output. These costs are incurred even if the firm is producing nothing.

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

total cost (TC) Fixed costs + variable costs.

COSTS IN THE SHORT RUN

FIXED COSTS

Total Fixed Cost (TFC)

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

TABLE 8.1 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

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.

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

CHAPTER 8: Short-Run Costs and Output Decisions

COSTS IN THE SHORT RUN

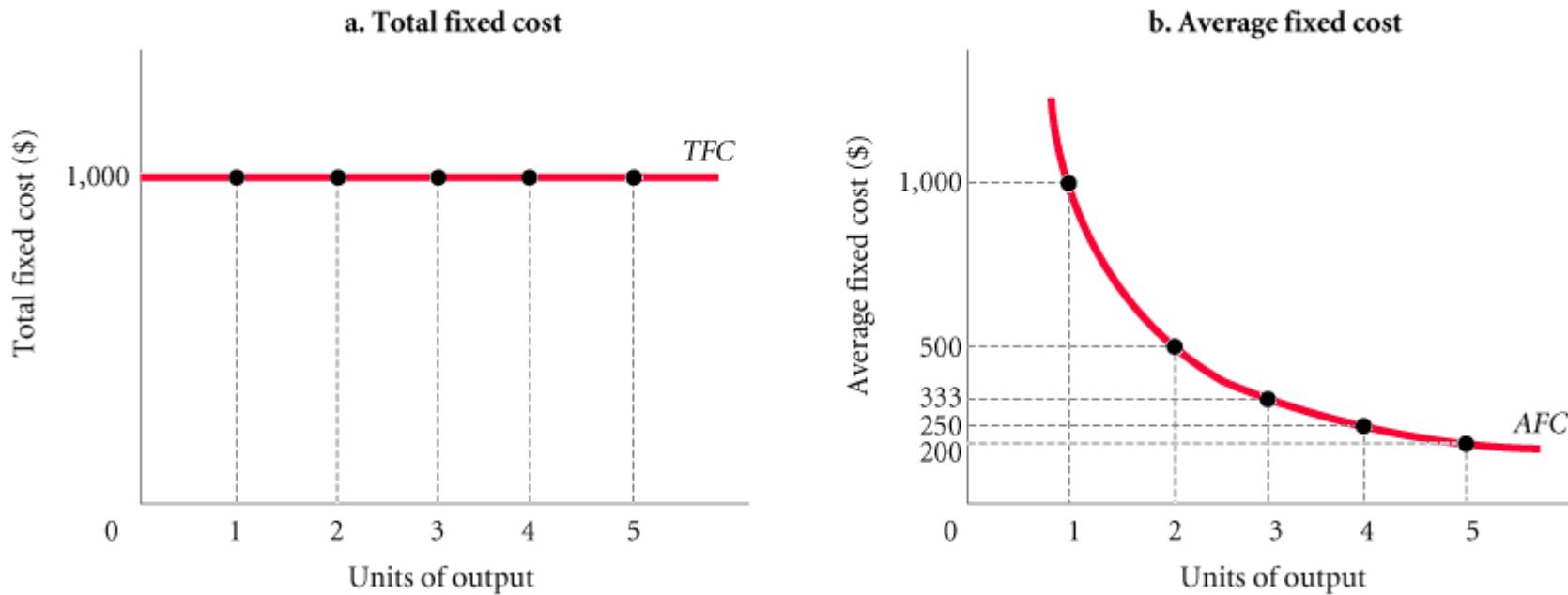


FIGURE 8.2 Short-Run Fixed Cost (Total and Average) of a Hypothetical Firm

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.

CHAPTER 8: Short-Run Costs and Output Decisions

COSTS IN THE SHORT RUN

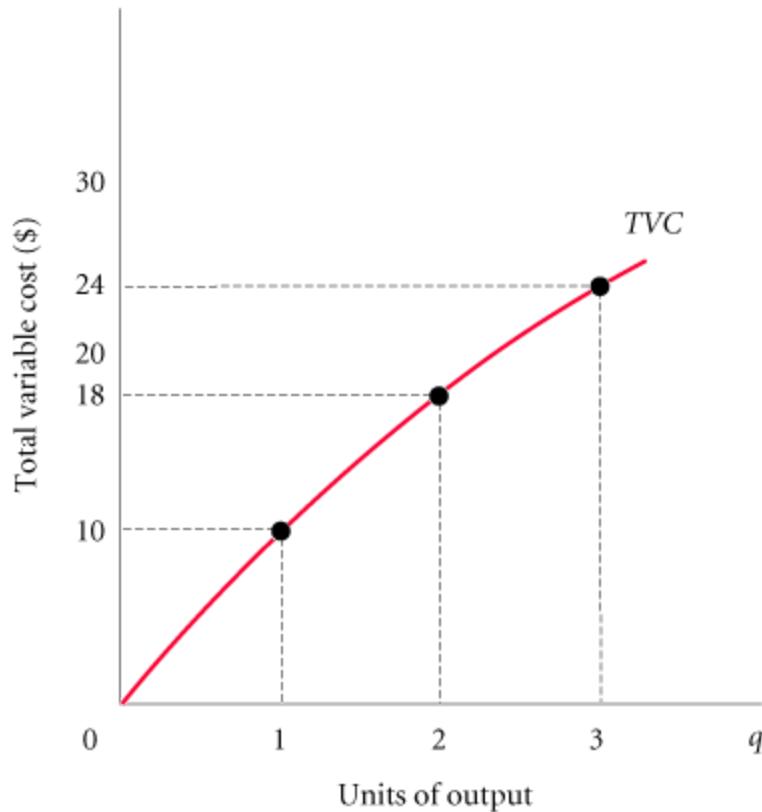


FIGURE 8.3 Total Variable Cost Curve

The total variable cost curve embodies information about both factor, or input, prices and technology. It shows the cost of production using the best available technique at each output level given current factor prices.

COSTS IN THE SHORT RUN

Marginal Cost (*MC*)

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

COSTS IN THE SHORT RUN

Average Variable Cost (AVC)

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

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

CHAPTER 8: Short-Run Costs and Output Decisions

COSTS IN THE SHORT RUN

Q	TFC	TVC	TC	AFC	AVC	ATC	MC
0	60	0					
1	60	7					
2	60	8					
3	60	9					
4	60	16					
5	60	30					
6	60	72					
7	60	133					
8	60	224					
9	60	351					
10	60	520					

CHAPTER 8: Short-Run Costs and Output Decisions

COSTS IN THE SHORT RUN

Q	TFC	TVC	TC	AFC	AVC	ATC	MC
0	60	0	60	-	-	-	-
1	60	7	67	60	7	67	7
2	60	8	68	30	4	34	1
3	60	9	69	20	3	23	1
4	60	16	76	15	4	19	7
5	60	30	90	12	6	18	14
6	60	72	132	10	12	22	42
7	60	133	193	8.6	19	27.6	61
8	60	224	284	7.5	28	35.5	91
9	60	351	411	6.7	39	45.7	127
10	60	520	580	6	52	58	169

COSTS IN THE SHORT RUN

TOTAL COSTS

CHAPTER 8: Short-Run Costs and Output Decisions

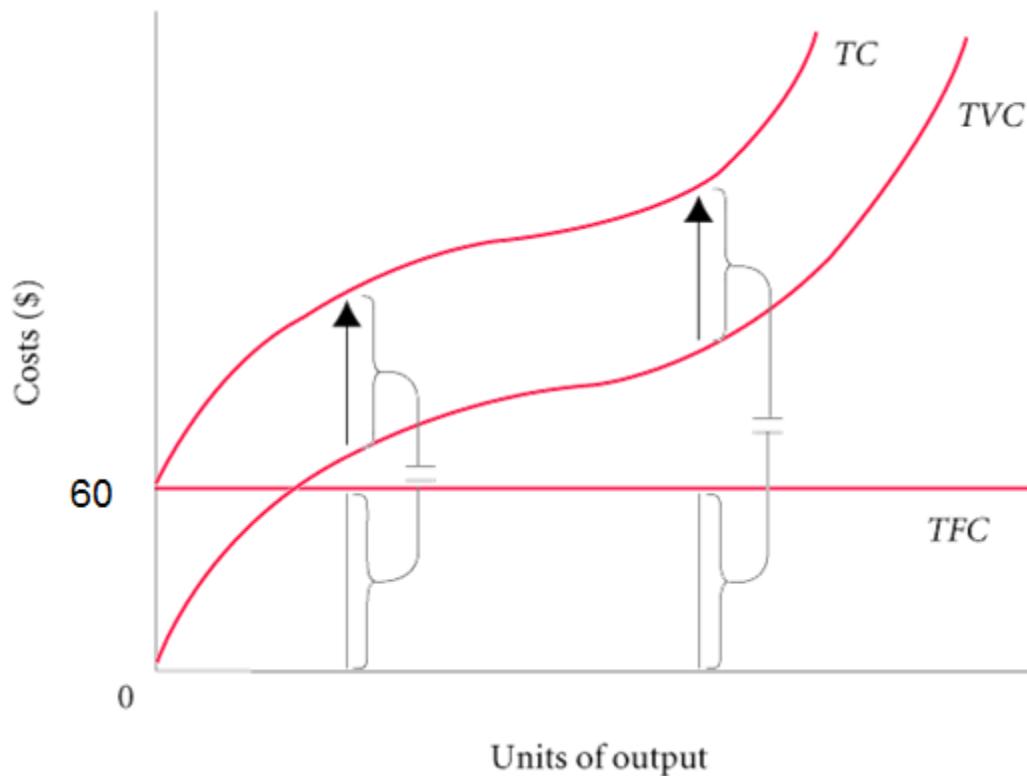


FIGURE 8.7 **Total Cost = Total Fixed Cost + Total Variable Cost**

The following could be concluded

1. When the AVC curve is $>$ MC, AVC is decreasing
2. When the AVC curve is $<$ MC, AVC is increasing
3. The same speech is applied for ATC and MC
4. AVC crosses the MC curve at its lowest point (Shut-down point) at that point **AVC = \$3**, and **Q = 3** units which is the least AVC value.
5. The shut-down point enables the firm to minimize the losses to the minimum.

6. ATC crosses the MC curve at its lowest point (the Breakeven point) when $TR = TC$ at $Q = 5$ and $ATC = \$18$
7. The ATC curve always remains higher than the AVC curve, the more the production increases, the more curves get closer but never touch.
8. The vertical distance between ATC and AVC is the AFC.
9. The AFC curve descends downwards to the right hand side and get close to the horizontal axis without touching it. This means that AFC is decreasing but never equal zero
10. As long as the AFC curve doesn't touch the horizontal axis, both the ATC and AVC will not touch

The Relationship between Cost and Production Curves in the Short Run

Average Variable Cost (AVC) and Average Production of Labour (APL)

$$TVC = W * L$$

$$AVC = TVC / Q$$

$$AVC = W * L / Q$$

The Relationship between Cost and Production Curves in the Short Run

$$\therefore APL = Q / L$$

and

$$AVC = W \cdot (L / Q)$$

$$\therefore AVC = W / APL$$

CHAPTER 8: Short-Run Costs and Output Decisions

If the wage per worker a month = \$ 300

L	$Q = TPL$	MPL	APL	$TVC = W.L$	AVC	MC	TFC	TC
0	0							
1	100							
2	300							
3	700							
4	1000							1600
5	1200							
6	1300							
7	1350							

CHAPTER 8: Short-Run Costs and Output Decisions

If the wage per worker a month = \$ 300

L	$Q = TPL$	MPL	APL	$TVC = W.L$	AVC	MC	TFC	TC
0	0	-	-	0	-	-	400	400
1	100	100	100	300	3	3	400	700
2	300	200	150	600	2	1.5	400	1000
3	700	400	233.3	900	1.26	0.75	400	1300
4	1000	300	250	1200	1.20	1	400	1600
5	1200	200	240	1500	1.25	1.5	400	1900
6	1300	100	216.7	1800	1.38	3	400	2200
7	1350	50	192.9	2100	1.56	6	400	2500

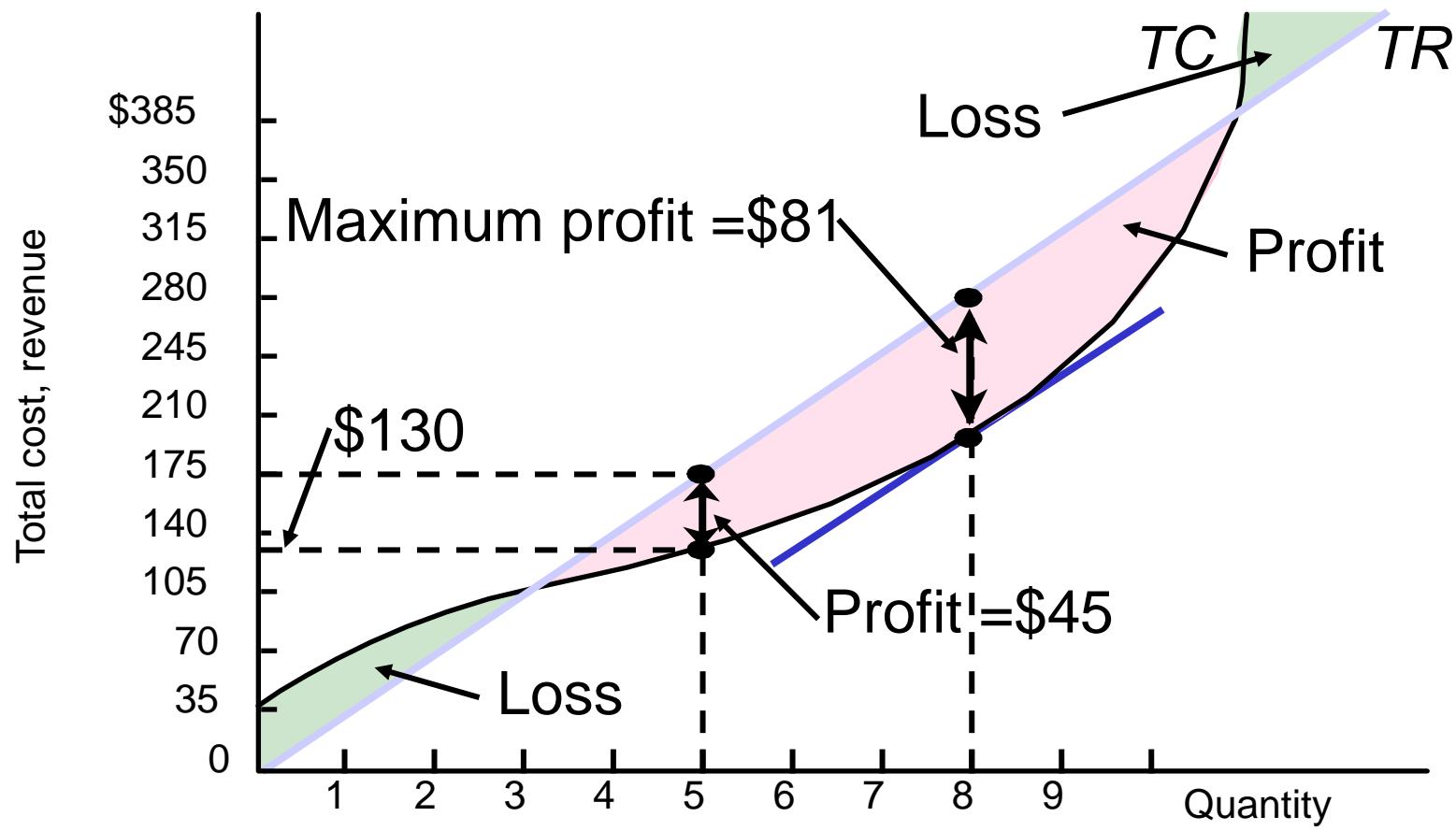
Profit Maximization: The Numbers

MR=MC

Q	P	TR	TC	TP = TR-TC	MR	MC	ATC
0	\$1	\$0	\$1.00	-\$1.00	\$1		
1	\$1	\$1	\$2.00	-\$1.00	\$1	\$1.00	\$2.00
2	\$1	\$2	\$2.80	-\$0.80	\$1	\$0.80	\$1.40
3	\$1	\$3	\$3.50	-\$0.50	\$1	\$0.70	\$1.17
4	\$1	\$4	\$4.00	\$0.00	\$1	\$0.50	\$1.00
5	\$1	\$5	\$4.50	\$0.50	\$1	\$0.50	\$0.90
6	\$1	\$6	\$5.20	\$0.80	\$1	\$0.70	\$0.87
7	\$1	\$7	\$6.00	\$1.00	\$1	\$0.80	\$0.86
8	\$1	\$8	\$6.86	\$1.14	\$1	\$0.96	\$0.86
9	\$1	\$9	\$7.86	\$1.14	\$1	\$1.00	\$0.87
	\$1	\$10	\$9.36	\$0.64	\$1	\$1.50	\$0.94
	\$1	\$11	\$12.00	-\$1.00	\$1	\$2.64	\$1.09

CHAPTER 8: Short-Run Costs and Output Decisions

Profit Determination Using Total Cost and Revenue Curves



Long-Run Costs and Output Decisions

Prepared by:

Fernando & Yvonn Quijano

Long-Run Costs and Output Decisions



9

Chapter Outline

Short-Run Conditions and Long-Run Directions

Maximizing Profits

Minimizing Losses

The Short-Run Industry Supply Curve

Long-Run Directions: A Review

Long-Run Costs: Economies and Diseconomies of Scale

Increasing Returns to Scale

Constant Returns to Scale

Decreasing Returns to Scale

Long-Run Adjustments to Short-Run Conditions

Short-Run Profits: Expansion to Equilibrium

Short-Run Losses: Contraction to Equilibrium

The Long-Run Adjustment Mechanism:

Investment Flows toward Profit Opportunities

Output Markets: A Final Word

Appendix: External Economies and

Diseconomies and the Long-Run Industry Supply Curve

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.

SHORT-RUN CONDITIONS AND LONG-RUN DIRECTIONS

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

MAXIMIZING PROFITS

Example: The Blue Velvet Car Wash

TABLE 9.1 Blue Velvet Car Wash Weekly Costs

TOTAL FIXED COSTS (TFC)	TOTAL VARIABLE COSTS (TVC) (800 WASHES)	TOTAL COSTS (TC = TFC + TVC)	
1. Normal return to investors 2. Other fixed costs (maintenance contract, insurance, etc.)	1,000 1,000 \$ 2,000	1. Labor 2. Materials \$ 1,600	Total revenue (TR) at $P = \$5$ (800 x \$5) Profit ($TR - TC$) \$ 4,000 \$ 400

SHORT-RUN CONDITIONS AND LONG-RUN DIRECTIONS

CHAPTER 9: Long-Run Costs and Output Decisions

Graphic Presentation

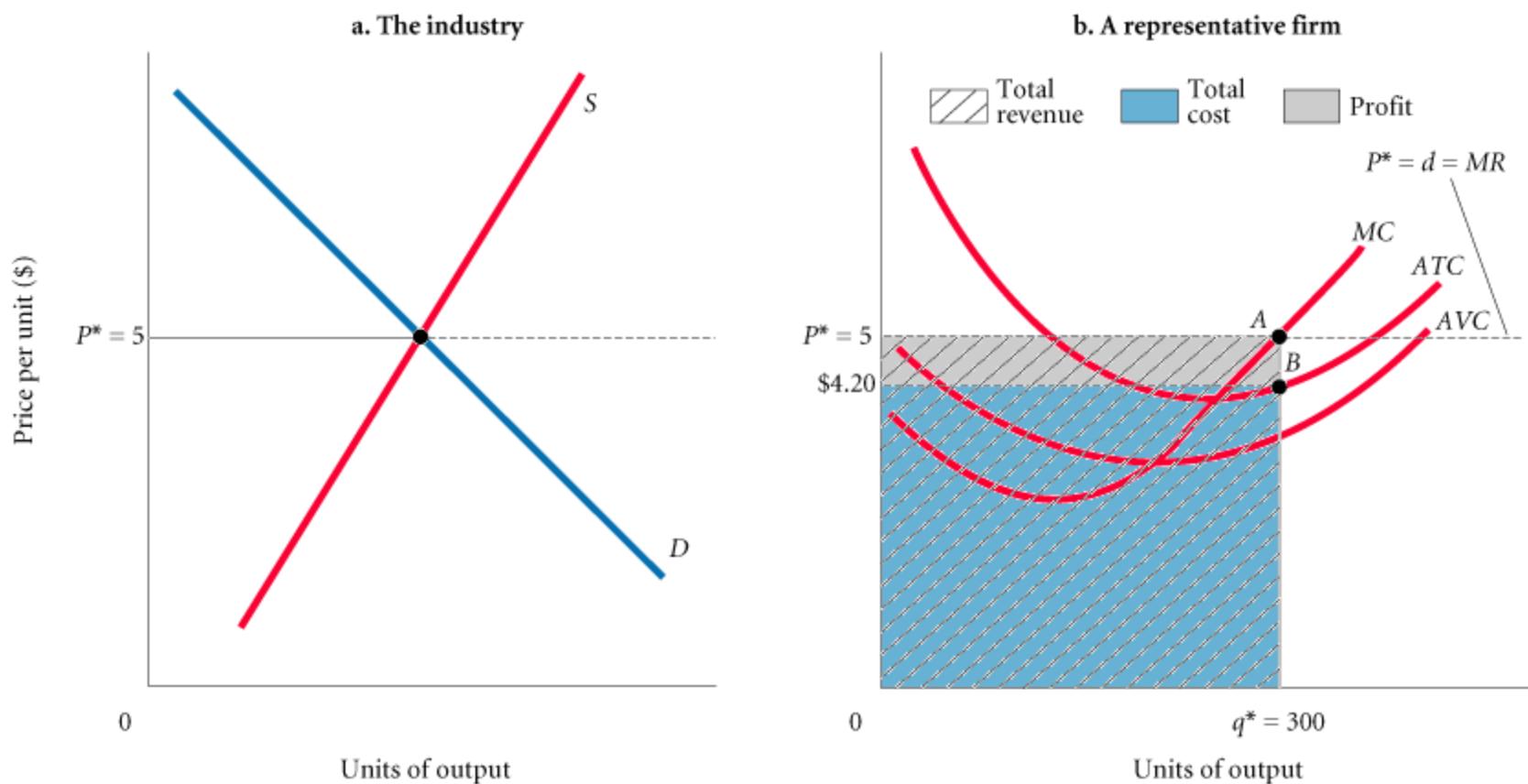


FIGURE 9.1 Firm Earning Positive Profits in the Short Run

SHORT-RUN CONDITIONS AND LONG-RUN DIRECTIONS

MINIMIZING LOSSES

operating profit (or loss) or net

operating revenue Total revenue minus total variable cost ($TR - TVC$).

In general,

- 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

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

TABLE 9.2 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
Fixed costs	\$ 2,000
Variable costs	+ 0
Total costs	\$ 2,000
Profit/loss ($TR - TC$)	- \$ 2,000
Total Revenue ($\$3 \times 800$)	\$ 2,400
Fixed costs	\$ 2,000
Variable costs	+ 1,600
Total costs	\$ 3,600
Operating profit/loss ($TR - TVC$)	\$ 800
Total profit/loss ($TR - TC$)	- \$ 1,200

CHAPTER 9: Long-Run Costs and Output Decisions

SHORT-RUN CONDITIONS AND LONG-RUN DIRECTIONS

Graphic Presentation

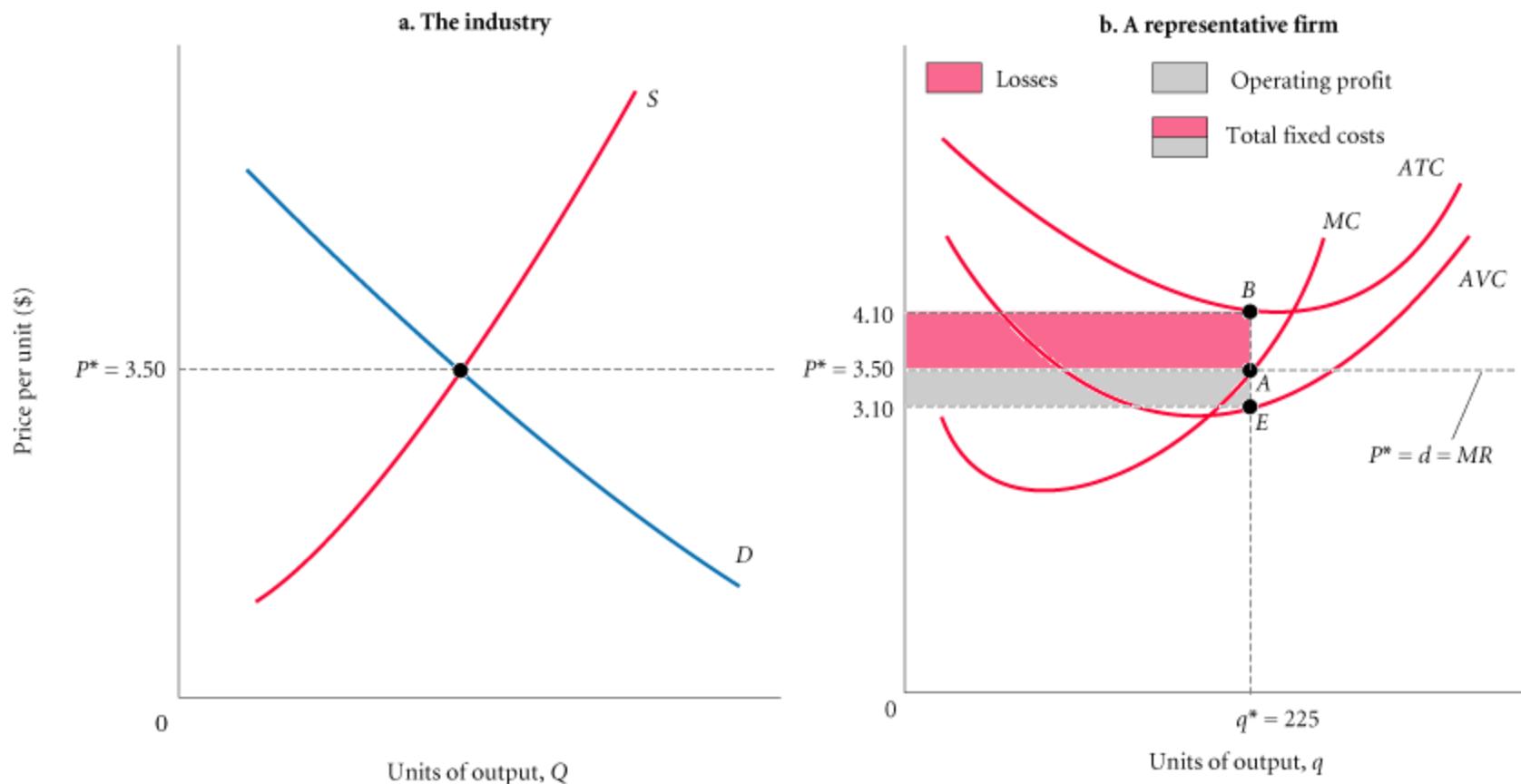


FIGURE 9.2 Firm Suffering Losses but Showing an Operating Profit in the Short Run

SHORT-RUN CONDITIONS AND LONG-RUN DIRECTIONS

Remember that average total cost is equal to average fixed cost plus average variable cost. This means that at every level of output, average fixed cost is the difference between average total and average variable cost:

$$ATC = AFC + AVC$$

or

$$AFC = ATC - AVC = \$4.10 - \$3.10 = \$1.00$$

As long as price (which is equal to average revenue per unit) is sufficient to cover average variable costs, the firm stands to gain by operating instead of shutting down.

SHORT-RUN CONDITIONS AND LONG-RUN DIRECTIONS

Shutting Down to Minimize Loss

TABLE 9.3 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
Fixed costs	\$ 2,000
Variable costs	+ <u>0</u>
Total costs	\$ 2,000
Profit/loss ($TR - TC$):	– \$ 2,000
Total revenue ($\$1.50 \times 800$)	\$ 1,200
Fixed costs	\$ 2,000
Variable costs	+ <u>1,600</u>
Total costs	\$ 3,600
Operating profit/loss ($TR - TVC$)	– \$ 400
Total profit/loss ($TR - TC$)	– \$ 2,400

Any time that price (average revenue) is below the minimum point on the average variable cost curve, total revenue will be less than total variable cost, and operating profit will be negative—that is, there will be a loss on operation. In other words, when price is below all points on the average variable cost curve, the firm will suffer operating losses at any possible output level the firm could choose. When this is the case, the firm will stop producing and bear losses equal to fixed costs. This is why the bottom of the average variable cost curve is called the shut-down point. At all prices above it, the marginal cost curve shows the profit-maximizing level of output. At all prices below it, optimal short-run output is zero.

SHORT-RUN CONDITIONS AND LONG-RUN DIRECTIONS

shut-down point The lowest point on the average variable cost curve. When price falls below the minimum point on AVC, total revenue is insufficient to cover variable costs and the firm will shut down and bear losses equal to fixed costs.

The short-run supply curve of a competitive firm is that portion of its marginal cost curve that lies above its average variable cost curve (Figure 9.3).

SHORT-RUN CONDITIONS AND LONG-RUN DIRECTIONS

CHAPTER 9: Long-Run Costs and Output Decisions

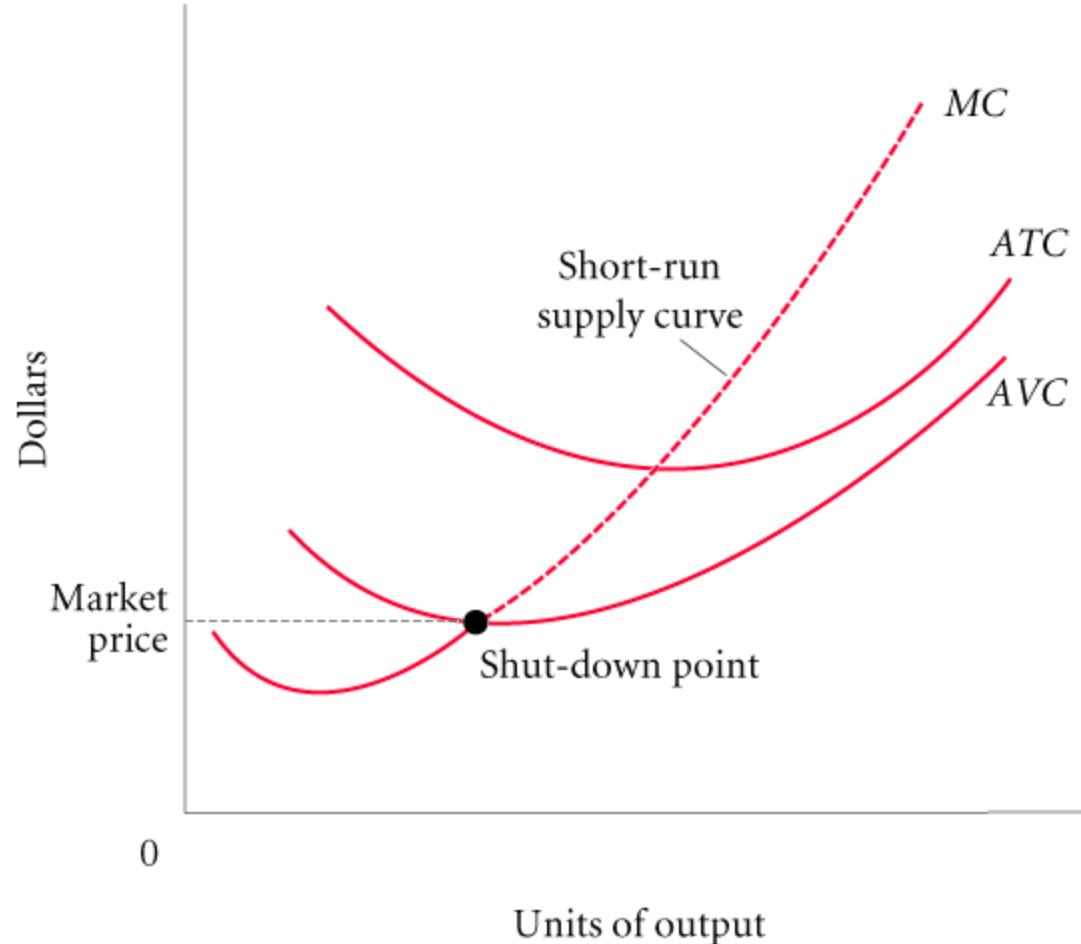


FIGURE 9.3 Short-Run Supply Curve of a Perfectly Competitive Firm

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.

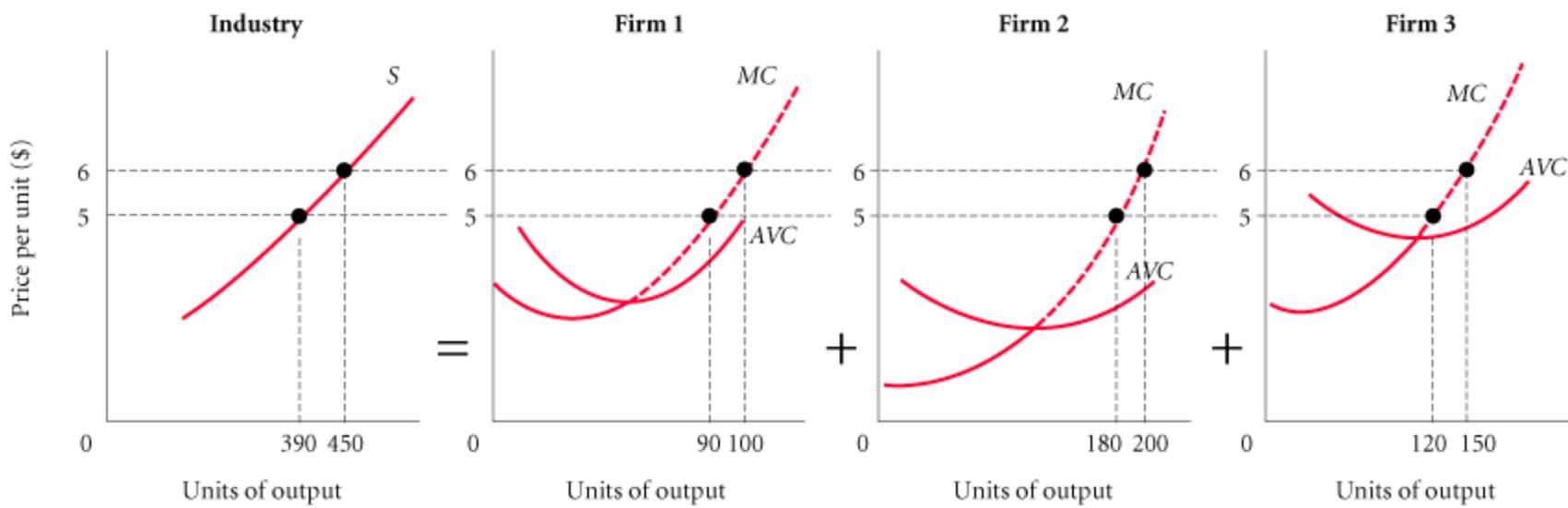


FIGURE 9.4 The Industry Supply Curve in the Short Run Is the Horizontal Sum of the Marginal Cost Curves (above AVC) of All the Firms in an Industry

SHORT-RUN CONDITIONS AND LONG-RUN DIRECTIONS

LONG-RUN DIRECTIONS: A REVIEW

TABLE 9.4 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 $(TR \geq TVC)$	$P = MC$: operate (losses < fixed costs)	Contract: firms exit
	2. With operating losses $(TR < TVC)$	Shut down: losses = fixed costs	Contract: firms exit

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

The Sources of Economies of Scale

Most of the economies of scale that immediately come to mind are technological in nature.

Some economies of scale result not from technology but from sheer size.

LONG-RUN COSTS: ECONOMIES AND DISECONOMIES OF SCALE

Example: Economies of Scale in Egg Production

TABLE 9.5 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
	<hr/>
	\$177
Total output	2,400 eggs
Average cost	\$.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
	<hr/>
	\$30,904
Total output	1,600,000 eggs
Average cost	\$.019 per egg

LONG-RUN COSTS: ECONOMIES AND DISECONOMIES OF SCALE

Graphic Presentation

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.

CHAPTER 9: Long-Run Costs and Output Decisions

LONG-RUN COSTS: ECONOMIES AND DISECONOMIES OF SCALE

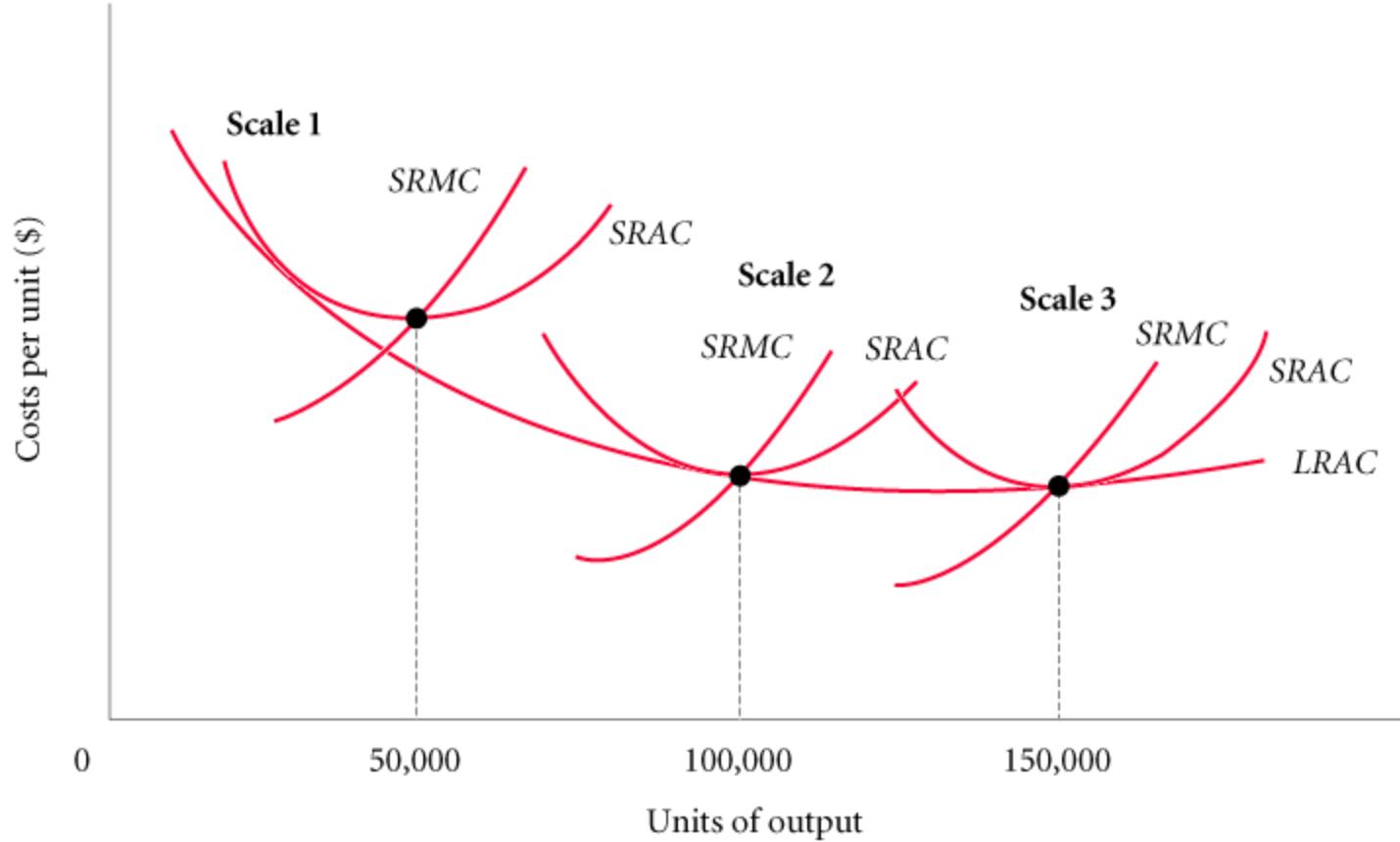


FIGURE 9.5 A Firm Exhibiting Economies of Scale

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

CHAPTER 9: Long-Run Costs and Output Decisions

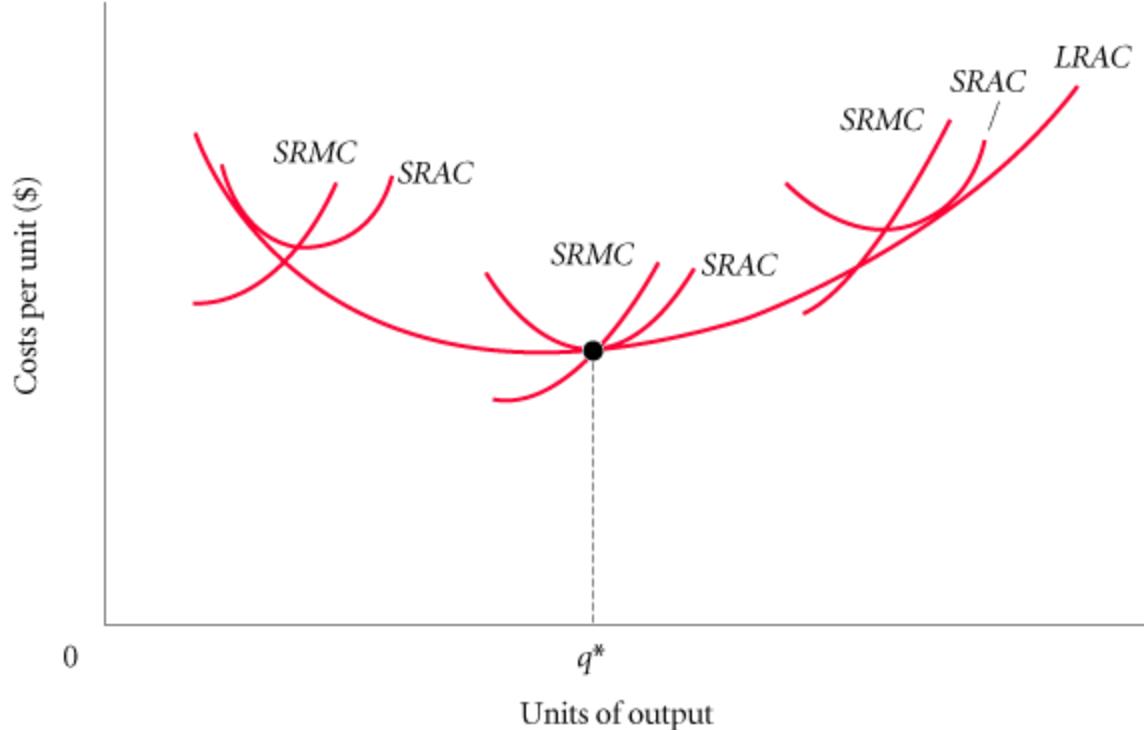


FIGURE 9.6 A Firm Exhibiting Economies and Diseconomies of Scale

All short-run average cost curves are U-shaped, because we assume a fixed scale of plant that constrains production and drives marginal cost upward as a result of diminishing returns. In the long run, we make no such assumption; instead, we assume that scale of plant can be changed.

LONG-RUN COSTS: ECONOMIES AND DISECONOMIES OF SCALE

It is important to note that economic efficiency requires taking advantage of economies of scale (if they exist) and avoiding diseconomies of scale.

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

LONG-RUN ADJUSTMENTS TO SHORT-RUN CONDITIONS

THE LONG-RUN ADJUSTMENT MECHANISM: INVESTMENT FLOWS TOWARD PROFIT OPPORTUNITIES

In efficient markets, investment capital flows toward profit opportunities. The actual process is complex and varies from industry to industry.



When firms in an industry are making positive profits, capital is likely to flow into that industry. Entrepreneurs start new firms, and firms producing entirely different products may join the competition. The success of Ben and Jerry's has inspired a slew of imitators to compete in the ice cream industry.

REVIEW TERMS AND CONCEPTS

breaking even

constant returns to scale

decreasing returns to scale,
or diseconomies of scale

increasing returns to scale,
or economies of scale

long-run average cost curve
(*LRAC*)

operating profit (or loss) or net
operating revenue

optimal scale of plant

short-run industry supply curve

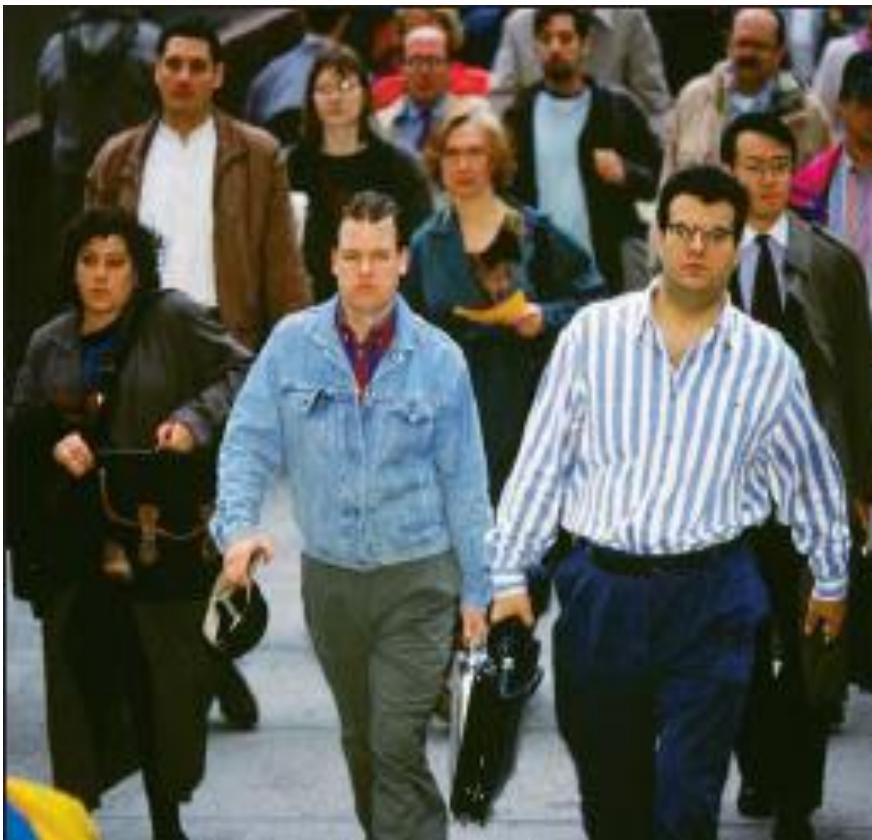
shut-down point

Input Demand: The Labor and Land Markets

Prepared by:

Fernando & Yvonn Quijano

Input Demand: The Labor and Land Markets



10

Chapter Outline

Input Markets: Basic Concepts

Demand for Inputs: A Derived Demand
Inputs: Complementary and Substitutable
Diminishing Returns
Marginal Revenue Product

Labor Markets

A Firm Using Only One Variable Factor of Production: Labor
A Firm Employing Two Variable Factors of Production in the Short and Long Run
Many Labor Markets

Land Markets

Rent and the Value of Output Produced on Land

The Firm's Profit-Maximization Condition in Input Markets

Input Demand Curves

Shifts in Factor Demand Curves

Resource Allocation and the Mix of Output in Competitive Markets

The Distribution of Income

Looking Ahead

INPUT DEMAND: THE LABOR AND LAND MARKETS

CHAPTER 10: Input Demand: The Labor and Land Markets

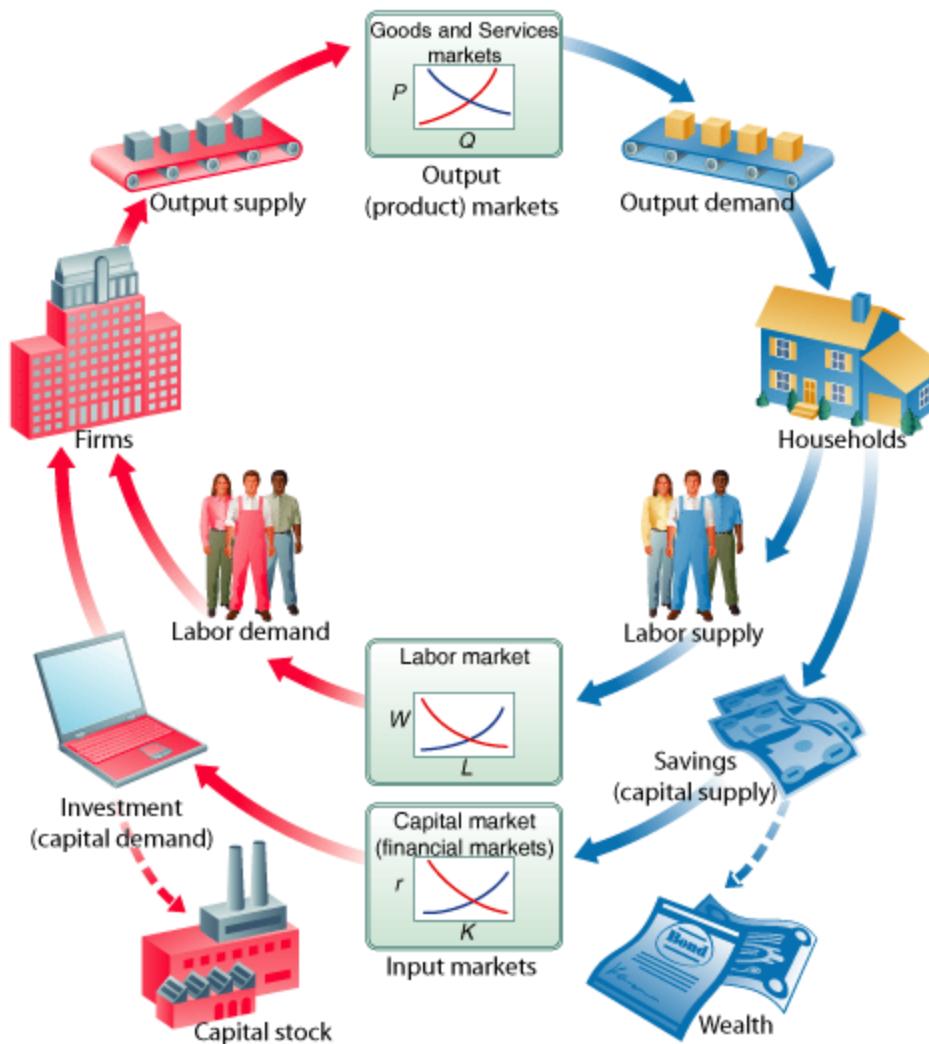


FIGURE 10.1 Firm and Household Decisions

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*.

DIMINISHING RETURNS

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

INPUT MARKETS: BASIC CONCEPTS

CHAPTER 10: Input Demand: The Labor and Land Markets

TABLE 10.1 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 ($MP_L \times P_x$) (PER HOUR)
0	0	—	—	—
1	10	10	\$.50	\$ 5.00
2	25	15	.50	7.50
3	35	10	.50	5.00
4	40	5	.50	2.50
5	42	2	.50	1.00
6	42	0	.50	0

^aThe “price” is essentially profit per sandwich; see discussion in text.

INPUT MARKETS: BASIC CONCEPTS

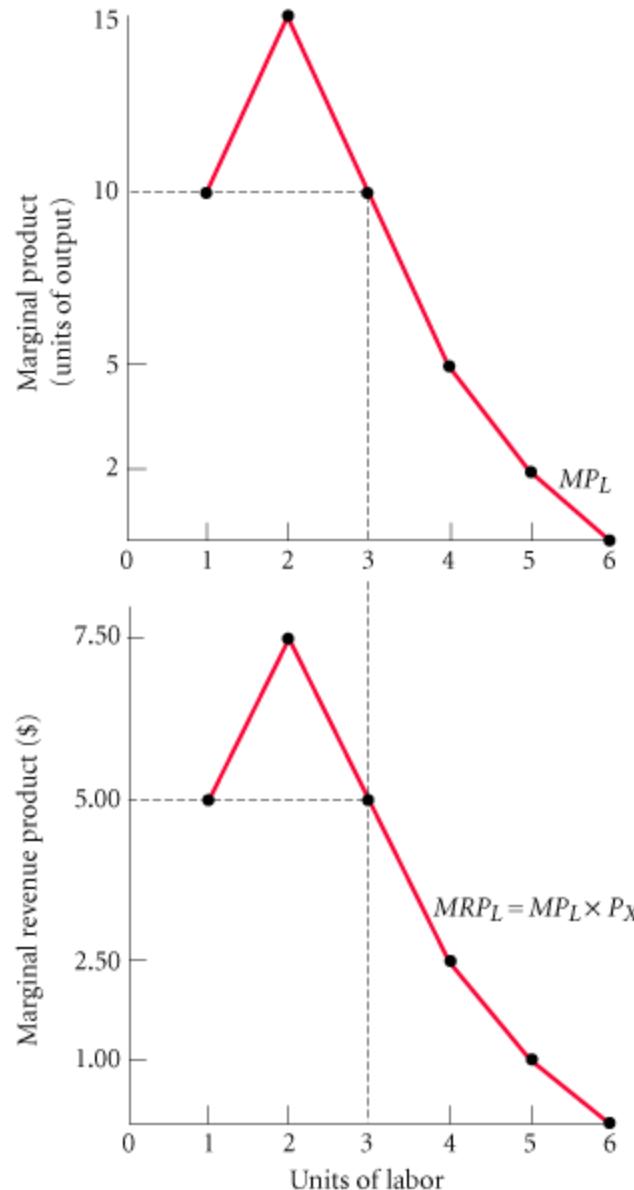
MARGINAL REVENUE PRODUCT

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

$$MRP_L = MP_L \times P_X$$

INPUT MARKETS: BASIC CONCEPTS

FIGURE 10.2 Deriving a Marginal Revenue Product Curve from Marginal Product



LABOR MARKETS

A FIRM USING ONLY ONE VARIABLE FACTOR OF PRODUCTION: LABOR

A profit-maximizing firm will add inputs—in the case of labor, it will hire workers—as long as the marginal revenue product of that input exceeds the market price of that input—in the case of labor, the wage.

CHAPTER 10: Input Demand: The Labor and Land Markets

LABOR MARKETS

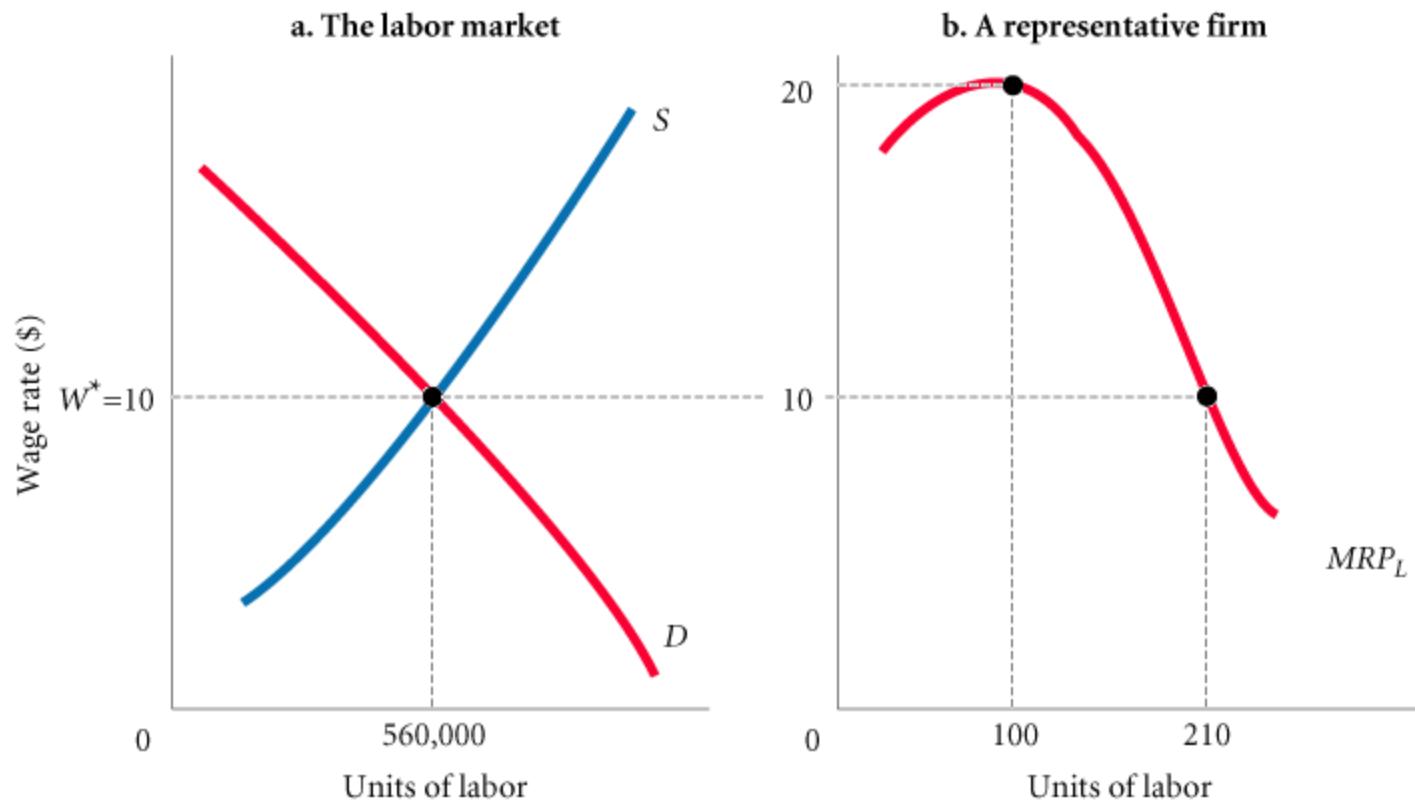


FIGURE 10.3 Marginal Revenue Product and Factor Demand for a Firm Using One Variable Input (Labor)

When a firm uses only one variable factor of production, that factor's marginal revenue product curve is the firm's demand curve for that factor in the short run.

LABOR MARKETS

Comparing Marginal Revenue and Marginal Cost to Maximize Profits

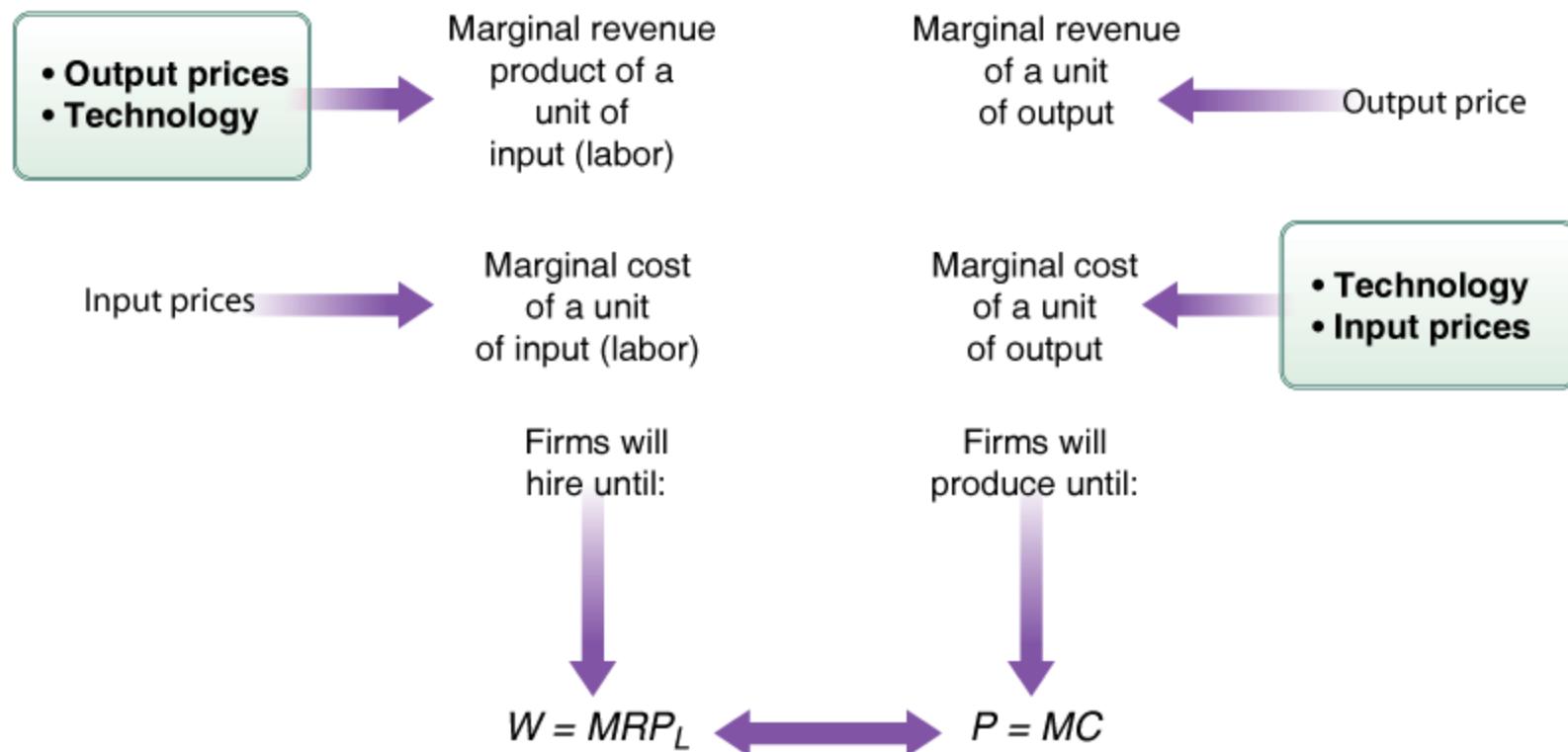


FIGURE 10.4 The Two Profit-Maximizing Conditions Are Simply Two Views of the Same Choice Process

LABOR MARKETS

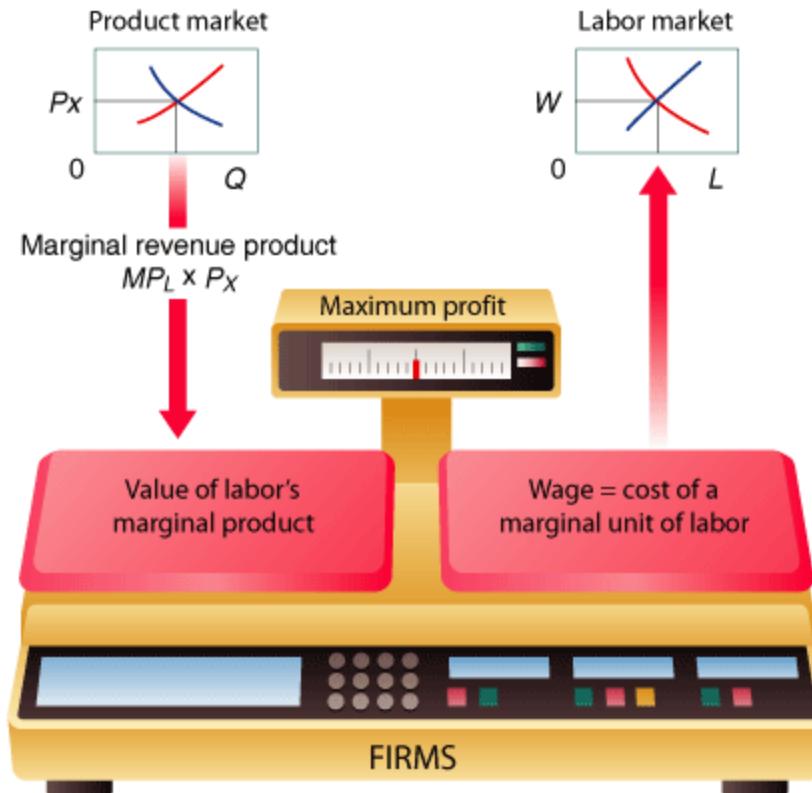


FIGURE 10.5 The Trade-Off Facing Firms

Assuming that labor is the only variable input, if society values a good more than it costs firms to hire the workers to produce that good, the good will be produced. In general, the same logic also holds for more than one input. Firms weigh the value of outputs as reflected in output price against the value of inputs as reflected in marginal 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.

LABOR MARKETS

Substitution and Output Effects of a Change in Factor Price

TABLE 10.2 Response of a Firm to an Increasing Wage Rate

TECHNOLOGY	INPUT REQUIREMENTS PER UNIT OF OUTPUT		$P_L = \$1$ $P_K = \$1$ $(P_L \times L) + (P_K \times K)$	$P_L = \$2$ $P_K = \$1$ $(P_L \times L) + (P_K \times K)$
	K	L		
A (capital intensive)	10	5	\$15	\$20
B (labor intensive)	3	10	\$13	\$23

LABOR MARKETS

TABLE 10.3 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

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

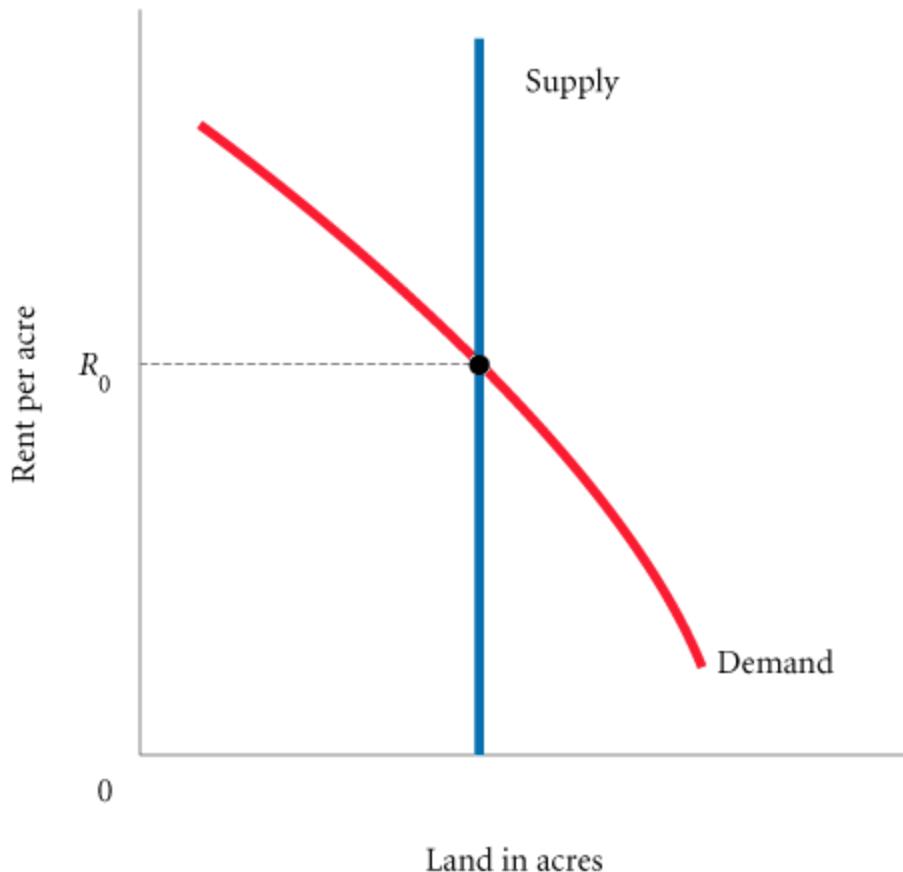


FIGURE 10.6 The Rent on Land Is Demand Determined

The supply of land of a *given quality* at a *given location* is truly fixed in supply. Its value is determined exclusively by the amount that the highest bidder is willing to pay for it. Because land cannot be reproduced, supply is perfectly inelastic.

LAND MARKETS

RENT AND THE VALUE OF OUTPUT PRODUCED ON LAND



The demand for land is a derived demand. Agricultural or even desert land will be developed when there is a demand for housing because land is a key input used in the production of housing.

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).

THE FIRM'S PROFIT-MAXIMIZATION CONDITION IN INPUT MARKETS

Profit-maximizing condition for the perfectly competitive firm is

$$P_L = MRP_L = (MP_L \times P_X)$$

$$P_K = MRP_K = (MP_K \times P_X)$$

$$P_A = MRP_A = (MP_A \times P_X)$$

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

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.

Technological change can and does have a powerful influence on factor demands. As new products and new techniques of production are born, so are demands for new inputs and new skills. As old products become obsolete, so, too, do the labor skills and other inputs needed to produce them.

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.

LOOKING AHEAD

We have now completed our discussion of competitive labor and land markets. The next chapter takes up the complexity of what we have been loosely calling the “capital market.” There we discuss the relationship between the market for physical capital and financial capital markets, and look at some of the ways that firms make investment decisions.

REVIEW TERMS AND CONCEPTS

demand determined price

derived demand

factor substitution effect

marginal product of labor
(*MPL*)

marginal productivity theory
of income distribution

marginal revenue product
(*MRP*)

output effect of a factor price
increase (decrease)

productivity of an input
pure rent

technological change

Equations:

$$MRP_L = MP_L \times P_X$$

$$W^* = MRP_L$$

Input Demand: The Capital Market and the Investment Decision

Prepared by:

Fernando & Yvonn Quijano



Input Demand: The Capital Market and the Investment Decision

11

Chapter Outline

Capital, Investment, and Depreciation

Capital

Investment and Depreciation

The Capital Market

Capital Income: Interest and Profits

Financial Markets in Action

Capital Accumulation and Allocation

The Demand for New Capital and the Investment Decision

Forming Expectations

Comparing Costs and Expected Return

A Final Word on Capital

Appendix: Calculating Present Value

CAPITAL, INVESTMENT, AND DEPRECIATION

CAPITAL

capital Those goods produced by the economic system that are used as inputs to produce other goods and services in the future.

Capital goods are those goods produced by the economic system that are used as inputs to produce other goods and services in the future. Capital goods thus yield valuable productive services over time.

CAPITAL, INVESTMENT, AND DEPRECIATION

Tangible Capital

physical, or tangible, capital Material things used as inputs in the production of future goods and services. The major categories of physical capital are nonresidential structures, durable equipment, residential structures, and inventories.

CAPITAL, INVESTMENT, AND DEPRECIATION

Social Capital: Infrastructure

social capital, or infrastructure Capital that provides services to the public. Most social capital takes the form of public works (roads and bridges) and public services (police and fire protection).

CAPITAL, INVESTMENT, AND DEPRECIATION

Intangible Capital

intangible capital Nonmaterial things that contribute to the output of future goods and services.

human capital A form of intangible capital that includes the skills and other knowledge that workers have or acquire through education and training and that yields valuable services to a firm over time.

CAPITAL, INVESTMENT, AND DEPRECIATION

The Time Dimension

The value of capital is only as great as the value of the services it will render over time.

Measuring Capital

capital stock For a single firm, the current market value of the firm's plant, equipment, inventories, and intangible assets.

When we speak of capital, we refer not to money or to financial assets such as bonds and stocks, but instead to the firm's physical plant, equipment, inventory, and intangible assets.

CAPITAL, INVESTMENT, AND DEPRECIATION

INVESTMENT AND DEPRECIATION

investment New capital additions to a firm's capital stock. Although capital is measured at a given point in time (a stock), investment is measured over a period of time (a flow). The flow of investment increases the capital stock.

CAPITAL, INVESTMENT, AND DEPRECIATION

TABLE 11.1 Private Investment in the U.S. Economy, 2004

GDP = 11,734.3

Gross private domestic investment = 1,928.1

	BILLIONS OF CURRENT DOLLARS	AS A PERCENTAGE OF TOTAL GROSS INVESTMENT	AS A PERCENTAGE OF GDP
Nonresidential structures	298.4	15.5	2.5
Equipment and software	900.4	46.7	7.7
Change in inventories	55.4	2.9	0.5
Residential structures and equipment	<u>673.8</u>	<u>34.9</u>	<u>5.7</u>
Total gross private investment	1928.1	100.0	21.0
– depreciation	<u>– 1206.2</u>	<u>– 62.6</u>	<u>– 10.3</u>
Net investment = gross investment – depreciation	721.9	37.4	6.2

depreciation The decline in an asset's economic value over time.

THE CAPITAL MARKET

capital market The market in which households supply their savings to firms that demand funds to buy capital goods.

The funds that firms use to buy capital goods come, directly or indirectly, from households. When a household decides not to consume a portion of its income, it saves. Investment by firms is the *demand for capital*. Saving by households is the *supply of capital*. Various financial institutions facilitate the transfer of households' savings to firms that use them for capital investment.

CHAPTER 11: Input Demand: The Capital Market and the Investment Decision

THE CAPITAL MARKET

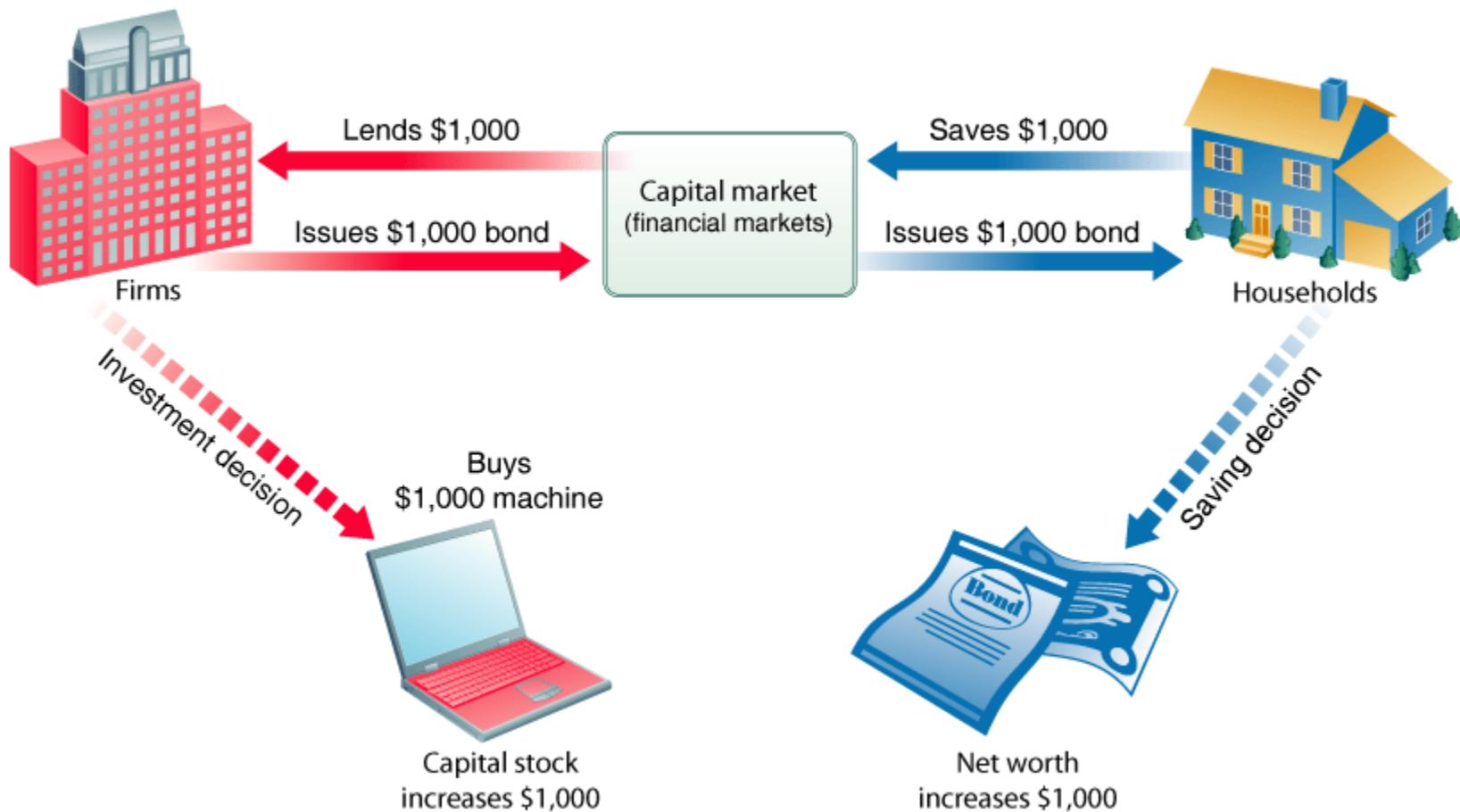


FIGURE 11.1 \$1,000 in Savings Becomes \$1,000 of Investment

In general, projects are undertaken as long as the revenues likely to be realized from the investment are sufficient to cover the interest payments to the household.

THE CAPITAL MARKET

interest rate A fee paid annually expressed as a percentage of the loan or deposit.

bond A contract between a borrower and a lender, in which the borrower agrees to pay the loan at some time in the future, along with interest payments along the way.

financial capital market The part of the capital market in which savers and investors interact through intermediaries.

THE CAPITAL MARKET

CAPITAL INCOME: INTEREST AND PROFITS

capital income Income earned on savings that have been put to use through financial capital markets.

Interest

interest The payments made for the use of money.

THE CAPITAL MARKET

Profits

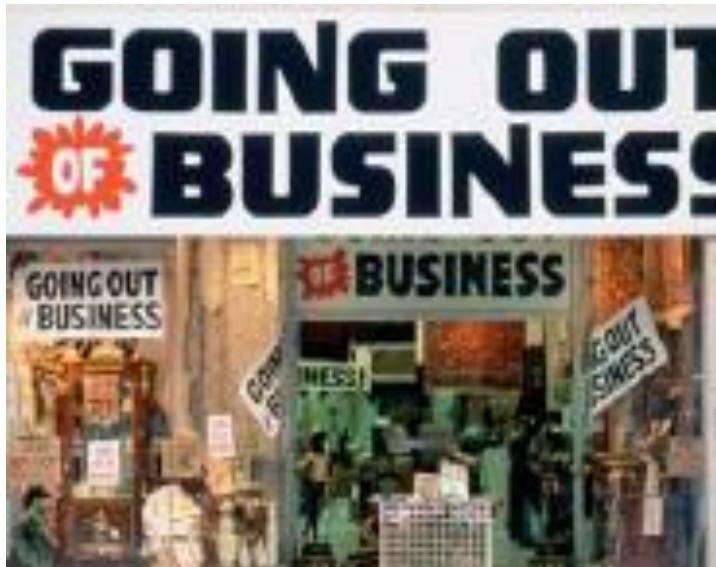
share of common stock A certificate that represents the ownership of a share of a business, almost always a corporation.

dividend Profits that are paid directly to shareholders.

profit The excess of revenues over cost in a given period.

THE CAPITAL MARKET

Functions of Interest and Profit



A business that cannot cover the interest payments on its loans or a firm that does not generate a normal rate of return to its owners will likely exit the industry in the long run.

THE CAPITAL MARKET

FINANCIAL MARKETS IN ACTION

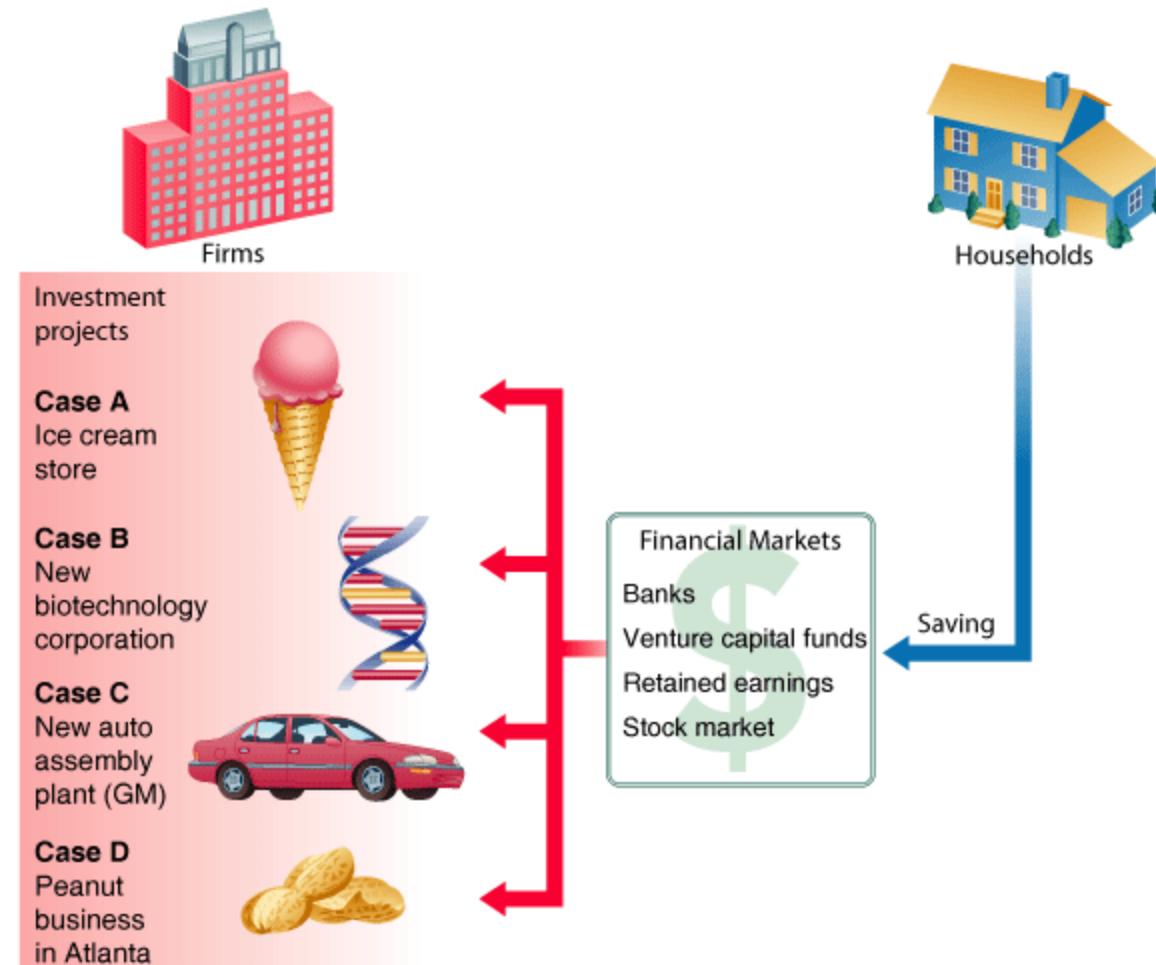


FIGURE 11.2 Financial Markets Link Household Saving and Investment by Firms

THE CAPITAL MARKET

CAPITAL ACCUMULATION AND ALLOCATION

In modern industrial societies, investment decisions (capital production decisions) are made primarily by firms. Households decide how much to save, and in the long run saving imposes a limit, or constraint, on the amount of investment that firms can undertake. The capital market exists to direct savings into profitable investment projects.

THE DEMAND FOR NEW CAPITAL AND THE INVESTMENT DECISION

Firms have an incentive to expand in industries that earn positive profits—that is, a rate of return above normal—and in industries in which economies of scale lead to lower average costs at higher levels of output. Positive profits in an industry stimulate the entry of new firms. The expansion of existing firms and the creation of new firms both involve investment in new capital.

THE DEMAND FOR NEW CAPITAL AND THE INVESTMENT DECISION

FORMING EXPECTATIONS

The Expected Benefits of Investments

The investment process requires that the potential investor evaluate the expected flow of future productive services that an investment project will yield.

The Expected Costs of Investments

The ability to lend at the market rate of interest means that there is an *opportunity cost* associated with every investment project. The evaluation process thus involves not only estimating future benefits but also comparing them with the possible alternative uses of the funds required to undertake the project. At a minimum, those funds could earn interest in financial markets.

THE DEMAND FOR NEW CAPITAL AND THE INVESTMENT DECISION

COMPARING COSTS AND EXPECTED RETURN

expected rate of return The annual rate of return that a firm expects to obtain through a capital investment.

The expected rate of return on an investment project depends on the price of the investment, the expected length of time the project provides additional cost savings or revenue, and the expected amount of revenue attributable each year to the project.

THE DEMAND FOR NEW CAPITAL AND THE INVESTMENT DECISION

TABLE 11.2 Potential Investment Projects and Expected Rates of Return for a Hypothetical Firm, Based on Forecasts of Future Profits Attributable to the Investment

PROJECT	(1) TOTAL INVESTMENT (DOLLARS)	(2) EXPECTED RATE OF RETURN (PERCENT)
A. New computer network	400,000	25
B. New branch plant	2,600,000	20
C. Sales office in another state	1,500,000	15
D. New automated billing system	100,000	12
E. Ten new delivery trucks	400,000	10
F. Advertising campaign	1,000,000	7
G. Employee cafeteria	100,000	5

THE DEMAND FOR NEW CAPITAL AND THE INVESTMENT DECISION

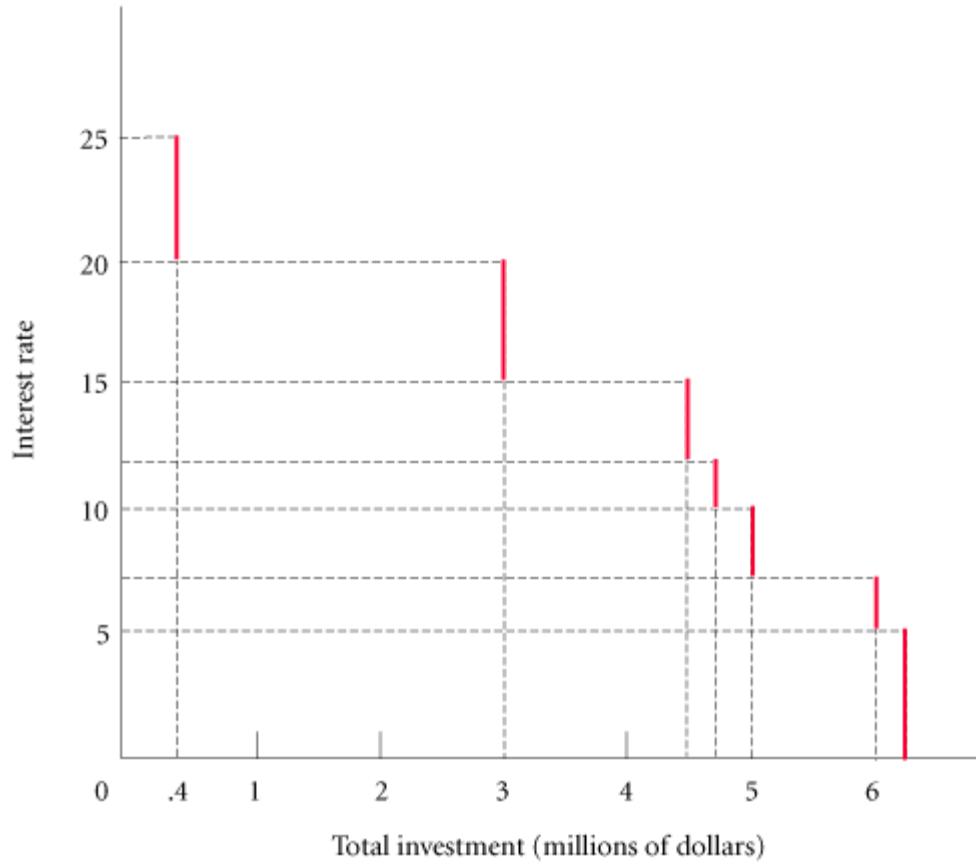


FIGURE 11.3 Total Investment as a Function of the Market Interest Rate

THE DEMAND FOR NEW CAPITAL AND THE INVESTMENT DECISION

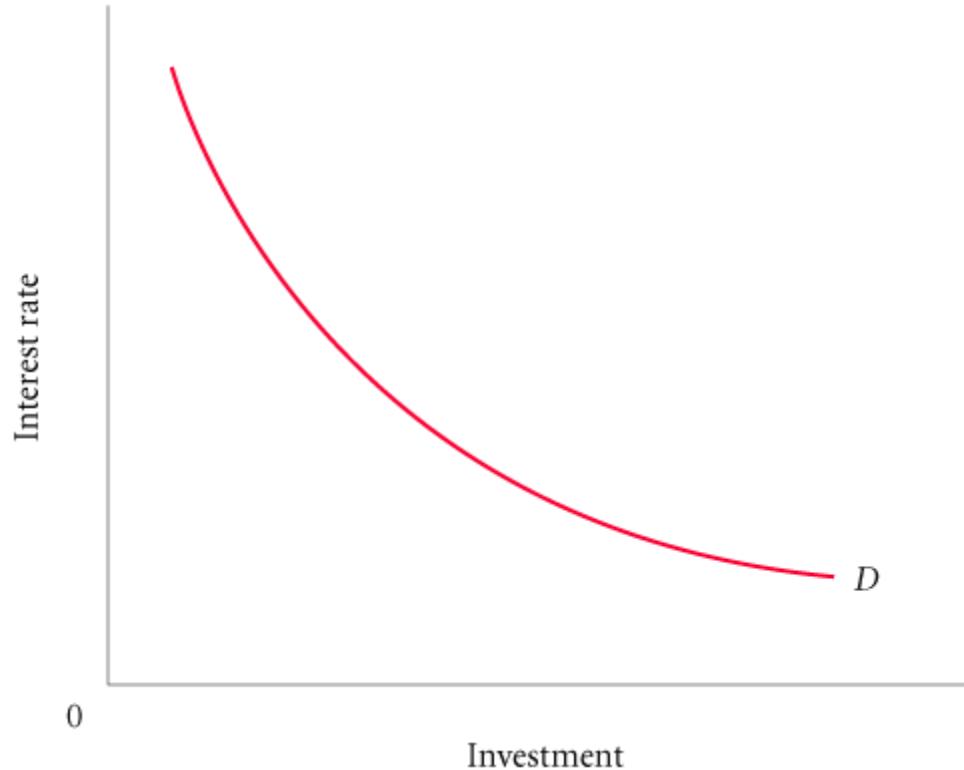


FIGURE 11.4 Investment Demand

Only those investment projects in the economy that are expected to yield a rate of return higher than the market interest rate will be funded. At lower market interest rates, more investment projects are undertaken.

THE DEMAND FOR NEW CAPITAL AND THE INVESTMENT DECISION

The Expected Rate of Return and the Marginal Revenue Product of Capital

A perfectly competitive profit-maximizing firm will keep investing in new capital up to the point at which the expected rate of return is equal to the interest rate. This is analogous to saying that the firm will continue investing up to the point at which the marginal revenue product of capital is equal to the price of capital, or $MRP_K = P_K$, which is what we learned in Chapter 10.

A FINAL WORD ON CAPITAL

The concept of capital is one of the central ideas in economics. Capital is produced by the economic system itself. Capital generates services over time, and it is used as an input in the production of goods and services.

REVIEW TERMS AND CONCEPTS

bond	human capital
capital	intangible capital
capital income	interest
capital market	interest rate
capital stock	investment
depreciation	physical, or tangible, capital
dividend	profit
expected rate of return	share of common stock
financial capital market	social capital, infrastructure

Appendix

CALCULATING PRESENT VALUE PRESENT VALUE

TABLE 11A.1 Expected Profits from a \$1,200 Investment Project

Year 1	\$100
Year 2	100
Year 3	400
Year 4	500
Year 5	500
All later years	0
Total	1,600

The **discount rate** used to evaluate an investment project is the interest rate that you could earn by investing a similar amount of money in an alternative investment of comparable risk.

Appendix

present discounted value (PDV), or present value (PV) The present discounting value of R dollars to be paid t years in the future is the amount you need to pay today, at current interest rates, to ensure that you end up with R dollars t years from now. It is the current market value of receiving R dollars in t years.

$$PV = \frac{R}{(1 + r)^t}$$

Appendix

PRESENT VALUE

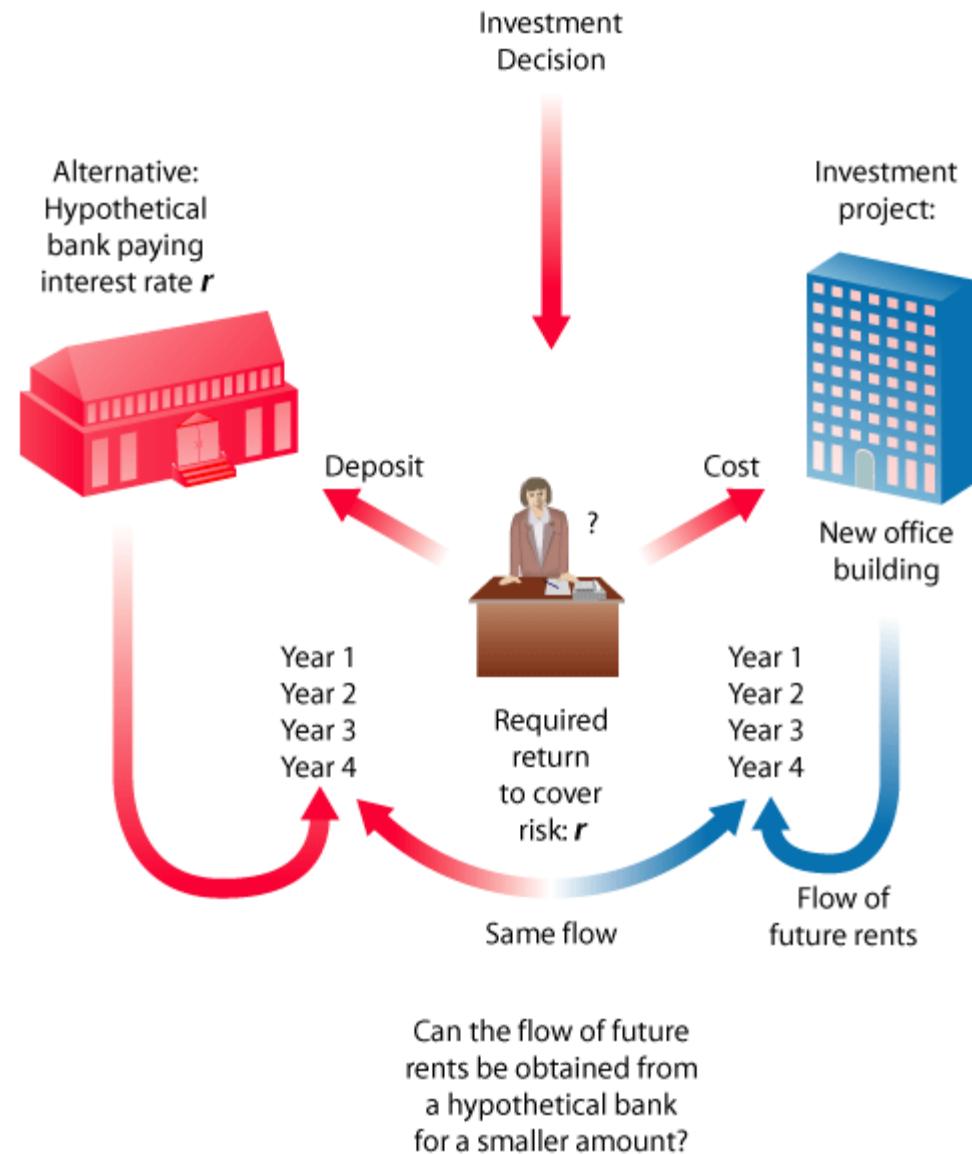
TABLE 11A.2 Calculation of Total Present Value of a Hypothetical Investment Project (Assuming $r = 10$ Percent)

END OF...	$\$(r)$	DIVIDED BY $(1 + r)^t$	=	PRESENT VALUE (\$)
Year 1	100	(1.1)		90.91
Year 2	100	$(1.1)^2$		82.65
Year 3	400	$(1.1)^3$		300.53
Year 4	500	$(1.1)^4$		341.51
Year 5	500	$(1.1)^5$		<u>310.46</u>
Total Present Value				1,126.06

If the present value of the income stream associated with an investment is less than the full cost of the investment project, the investment should not be undertaken.

Appendix

FIGURE 11A.1 Investment Project:
Go or No?
A Thinking Map



Appendix

LOWER INTEREST RATES, HIGHER PRESENT VALUES

TABLE 11A.3 Calculation of Total Present Value of a Hypothetical Investment Project (Assuming $r = 5$ Percent)

END OF...	\$	DIVIDED BY $(1 + r)^t$	=	PRESENT VALUE (\$)
Year 1	100	(1.05)		95.24
Year 2	100	$(1.05)^2$		90.70
Year 3	400	$(1.05)^3$		345.54
Year 4	500	$(1.05)^4$		411.35
Year 5	500	$(1.05)^5$		391.76
Total Present Value				1,334.59

Appendix

If the present value of an expected stream of earnings from an investment exceeds the cost of the investment necessary to undertake it, then the investment should be undertaken. However, if the present value of an expected stream of earnings falls short of the cost of the investment, then the financial market can generate the same stream of income for a smaller initial investment, and the investment should not be undertaken.

Monopoly and Antitrust Policy

Prepared by:

Fernando & Yvonn Quijano

PART III MARKET IMPERFECTIONS AND THE ROLE OF GOVERNMENT

Monopoly and Antitrust Policy



13

Chapter Outline

Imperfect Competition and Market Power: Core Concepts

Defining Industry Boundaries

Barriers to Entry

Price: The Fourth Decision Variable

Price and Output Decisions in Pure Monopoly Markets

Demand in Monopoly Markets

Perfect Competition and Monopoly Compared

Collusion and Monopoly Compared

The Social Costs of Monopoly

Inefficiency and Consumer Loss

Rent-Seeking Behavior

Price Discrimination

Examples of Price Discrimination

Remedies for Monopoly: Antitrust Policy

The Development of Antitrust Law: Historical Background

Landmark Antitrust Legislation

The Enforcement of Antitrust Law

Initiating Antitrust Actions

Sanctions and Remedies

Criminal Actions

A Natural Monopoly

Do Natural Monopolies Still Exist?

Imperfect Markets: A Review and a Look Ahead

IMPERFECT COMPETITION AND MARKET POWER: CORE CONCEPTS

imperfectly competitive industry An industry in which single 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 does not mean that *no* competition exists in the market. In some imperfectly competitive markets competition occurs in *more* arenas than in perfectly competitive markets. Firms can differentiate their products, advertise, improve quality, market aggressively, cut prices, and so forth.

IMPERFECT COMPETITION AND MARKET POWER: CORE CONCEPTS

DEFINING INDUSTRY BOUNDARIES

The ease with which consumers can substitute for a product limits the extent to which a monopolist can exercise market power. The more broadly a market is defined, the more difficult it becomes to find substitutes.

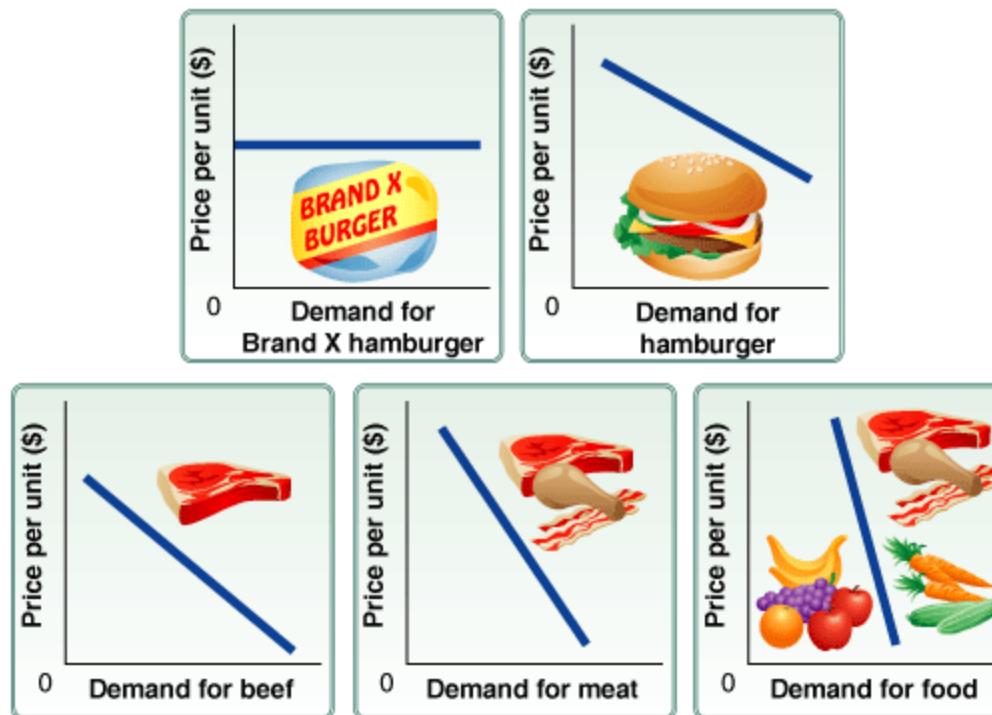


FIGURE 13.1 The Boundary of a Market and Elasticity

IMPERFECT COMPETITION AND MARKET POWER: CORE CONCEPTS

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

BARRIERS TO ENTRY

barrier to entry Something that prevents new firms from entering and competing in imperfectly competitive industries.

Government Franchises

government franchise A monopoly by virtue of government directive.

IMPERFECT COMPETITION AND MARKET POWER: CORE CONCEPTS

Patents

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

Economies of Scale and Other Cost Advantages

Ownership of a Scarce Factor of Production



The DeBeers Company of South Africa controls about 80 percent of the market for uncut diamonds.

IMPERFECT COMPETITION AND MARKET POWER: CORE CONCEPTS

PRICE: THE FOURTH DECISION VARIABLE

Regardless of the source of market power, output price is not taken as given by the firm. Instead:

Price is a decision variable for imperfectly competitive firms. Firms with market power must decide not only (1) how much to produce, (2) how to produce it, and (3) how much to demand in each input market (see Figure 7.3), but also (4) *what price to charge for their output.*

PRICE AND OUTPUT DECISIONS IN PURE MONOPOLY MARKETS

To analyze monopoly behavior, we make two assumptions:

- (1) that entry to the market is blocked, and
- (2) that firms act to maximize profits.

PRICE AND OUTPUT DECISIONS IN PURE MONOPOLY MARKETS

DEMAND IN MONOPOLY MARKETS

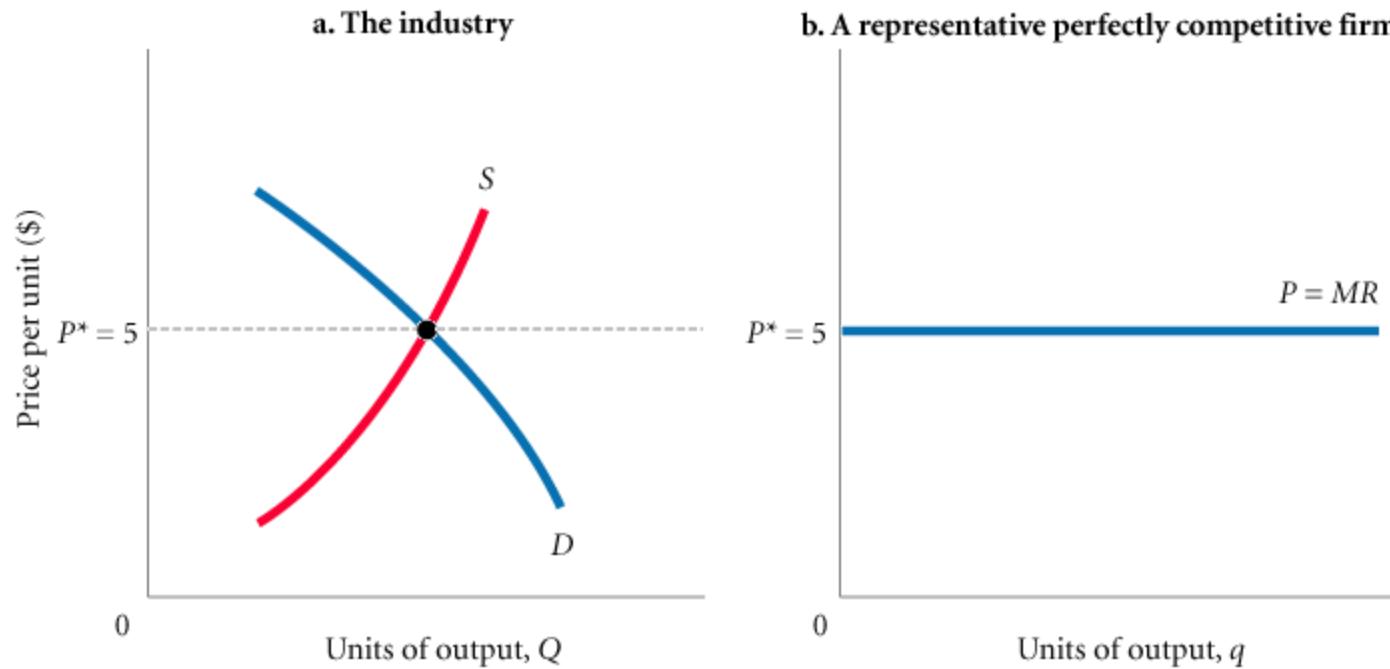


FIGURE 13.2 The Demand Curve Facing a Perfectly Competitive Firm Is Perfectly Elastic; in a Monopoly, the Market Demand Curve Is the Demand Curve Facing the Firm

With one firm in a monopoly market, there is no distinction between the firm and the industry. In a monopoly, the firm is the industry. The market demand curve is the demand curve facing the firm, and the total quantity supplied in the market is what the firm decides to produce.

PRICE AND OUTPUT DECISIONS IN PURE MONOPOLY MARKETS

Marginal Revenue and Market Demand

TABLE 13.1 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

For a monopolist, an increase in output involves not just producing more and selling it, but also reducing the price of its output to sell it.

PRICE AND OUTPUT DECISIONS IN PURE MONOPOLY MARKETS

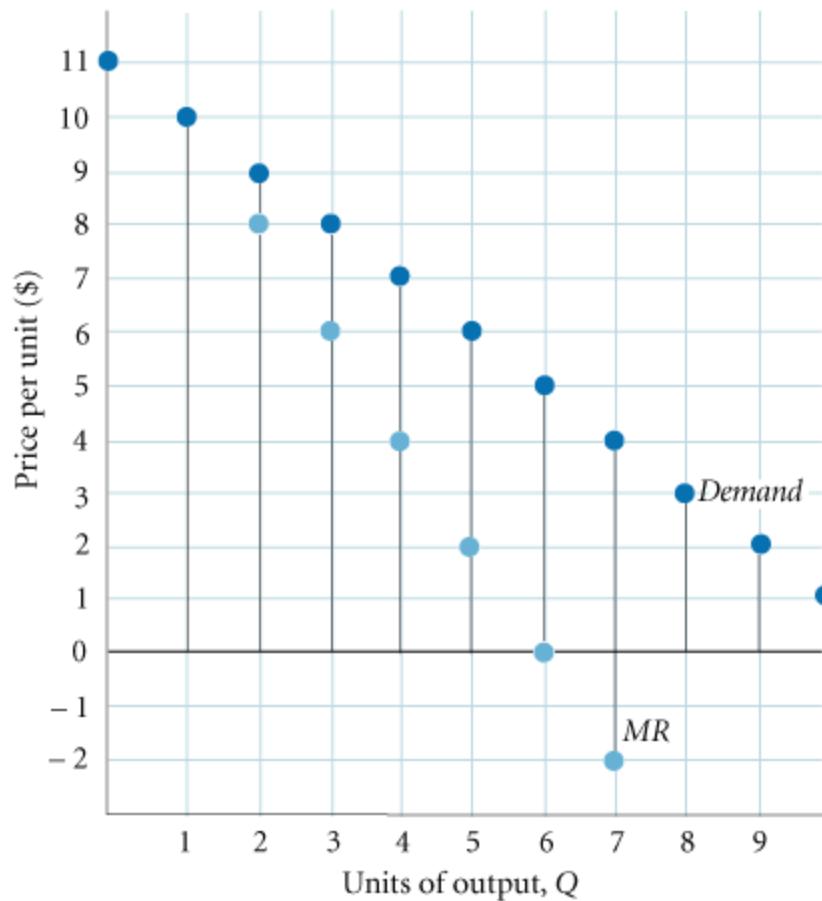
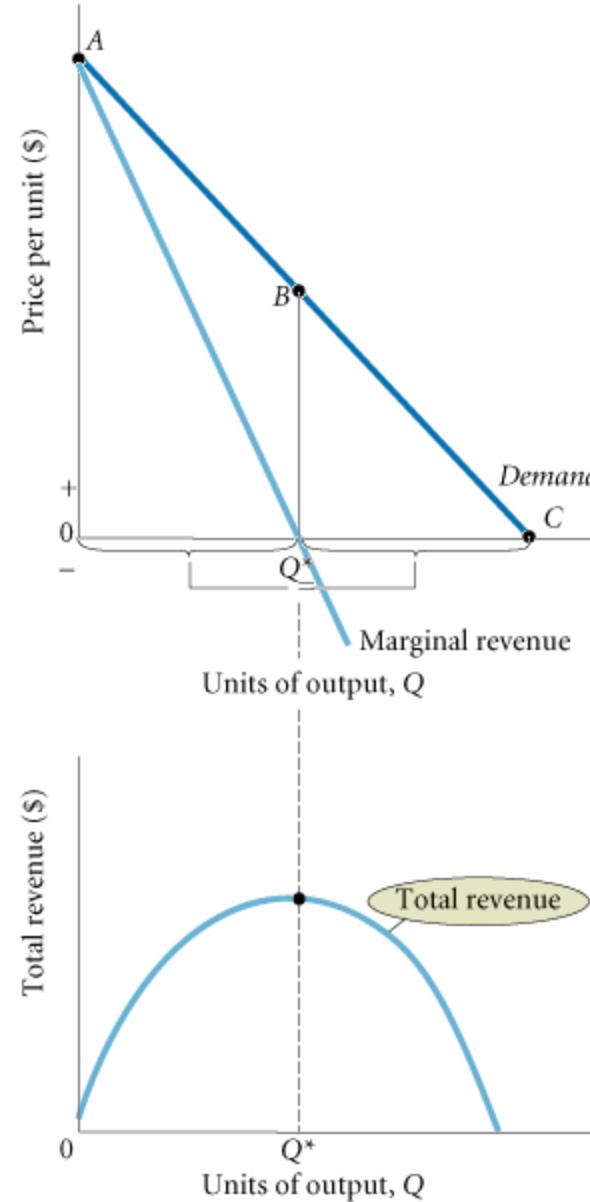


FIGURE 13.3 Marginal Revenue Curve Facing a Monopolist

PRICE AND OUTPUT DECISIONS IN PURE MONOPOLY MARKETS

FIGURE 13.4 Marginal Revenue and Total Revenue

A monopoly's marginal revenue curve shows the change in total revenue that results as a firm moves along the segment of the demand curve that lies directly above it.



PRICE AND OUTPUT DECISIONS IN PURE MONOPOLY MARKETS

The Monopolist's Profit-Maximizing Price and Output

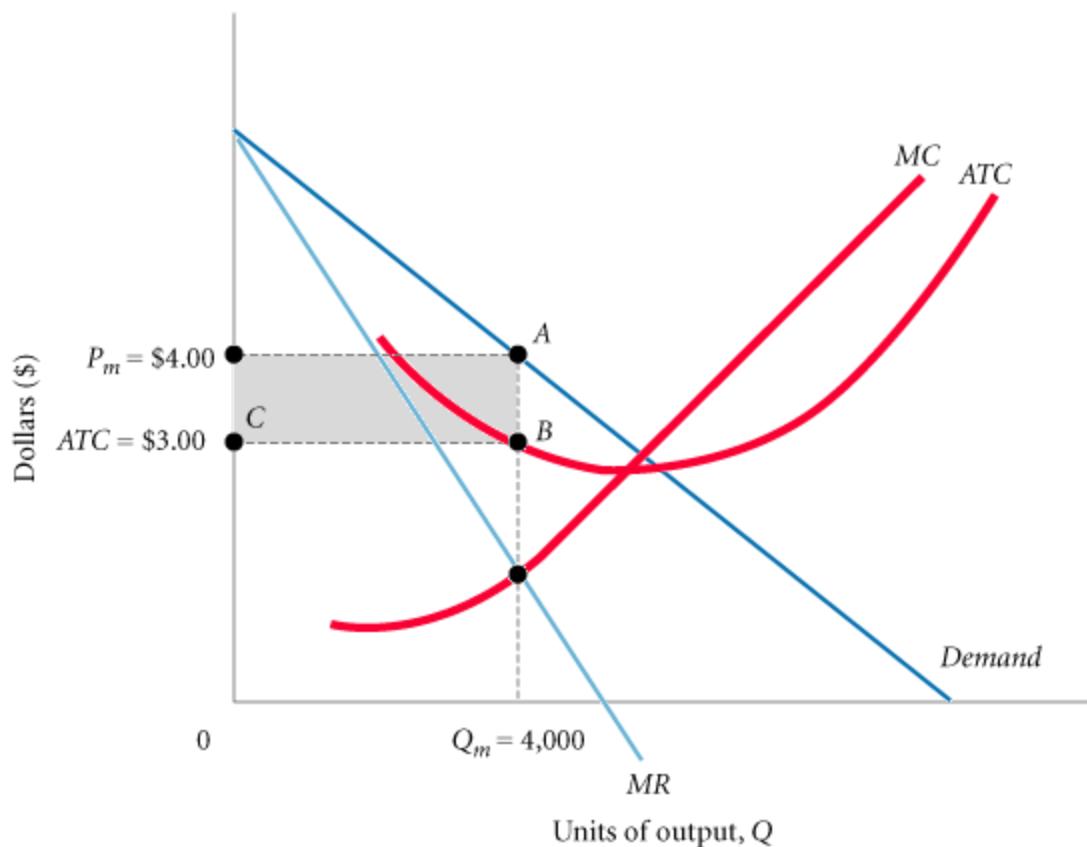


FIGURE 13.5 Price and Output Choice for a Profit-Maximizing Monopolist

PRICE AND OUTPUT DECISIONS IN PURE MONOPOLY MARKETS

All firms, including monopolies, raise output as long as marginal revenue is greater than marginal cost. Any positive difference between marginal revenue and marginal cost can be thought of as marginal profit.

The profit-maximizing level of output for a monopolist is the one at which marginal revenue equals marginal cost: $MR = MC$.

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

Monopoly in the Long and Short Run

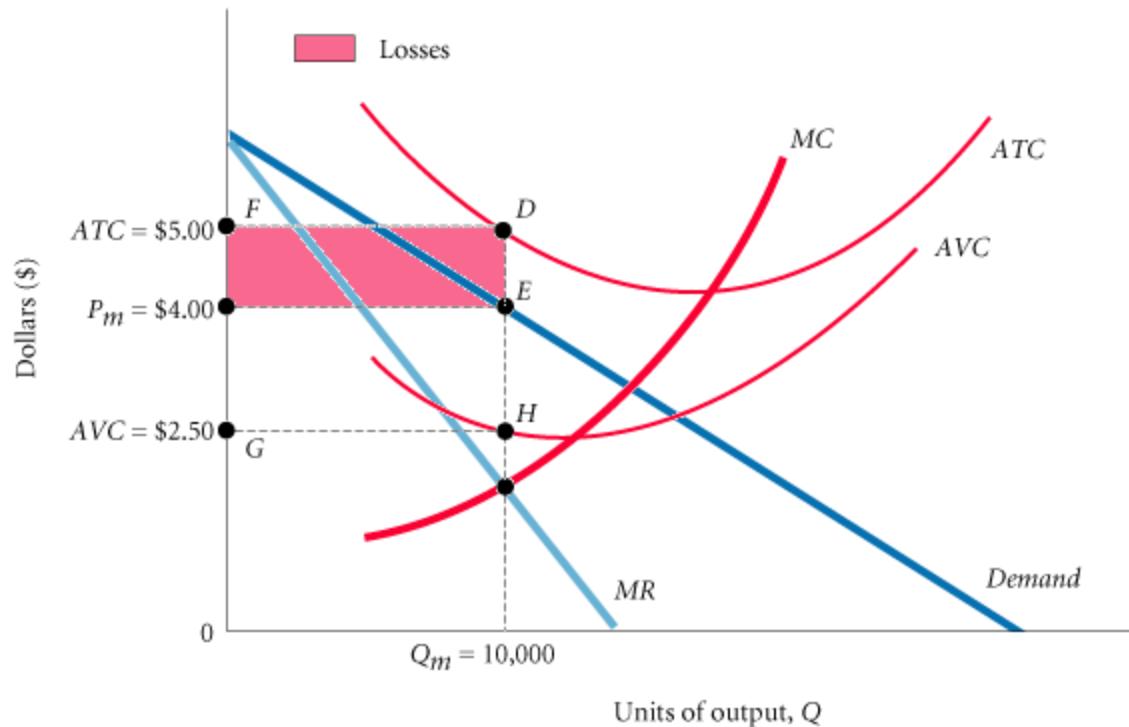


FIGURE 13.6 Price and Output Choice for a Monopolist Suffering Losses in the Short Run

If a firm can reduce its losses by operating in the short run, it will do so.

PRICE AND OUTPUT DECISIONS IN PURE MONOPOLY MARKETS

PERFECT COMPETITION AND MONOPOLY COMPARED

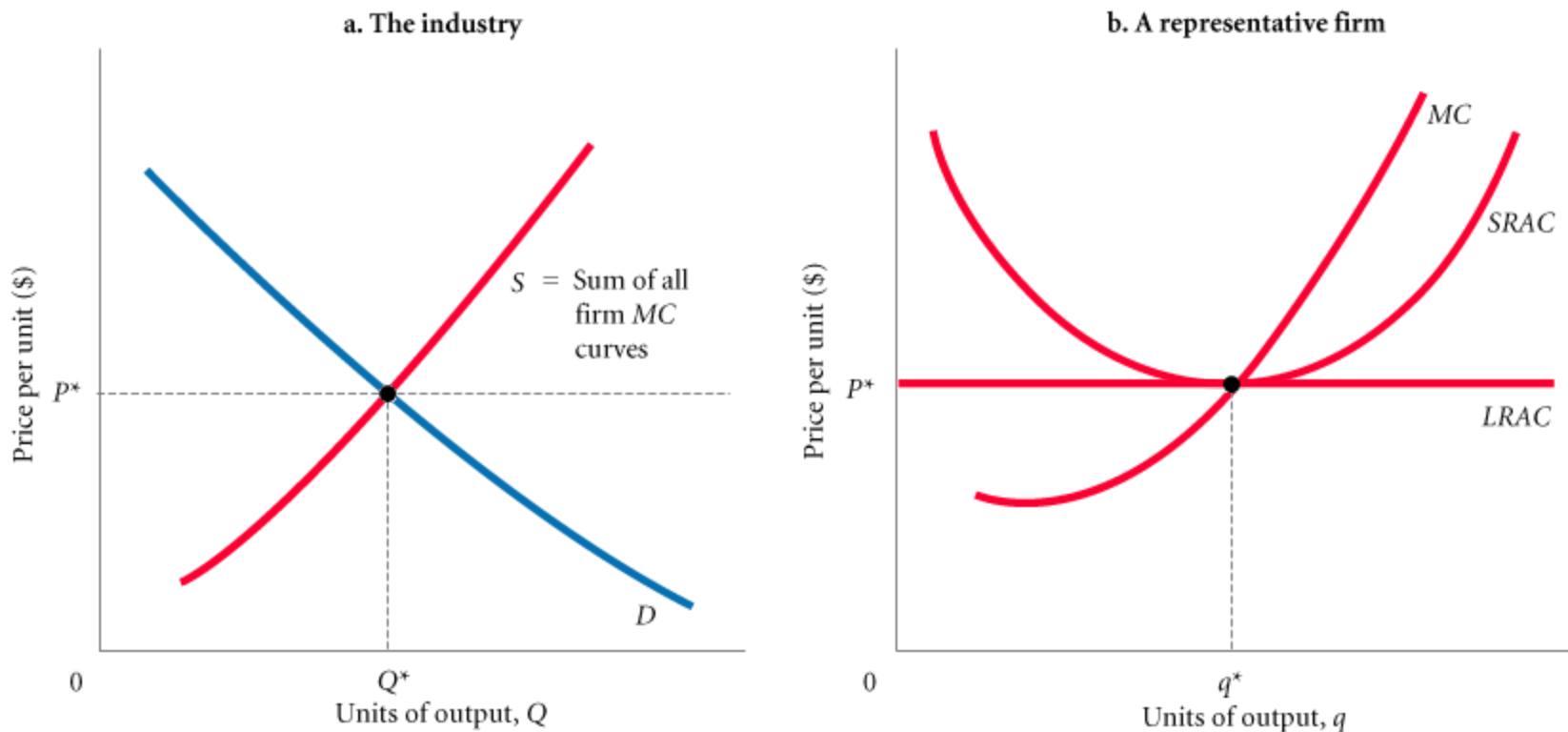


FIGURE 13.7 A Perfectly Competitive Industry in Long-run Equilibrium

PRICE AND OUTPUT DECISIONS IN PURE MONOPOLY MARKETS

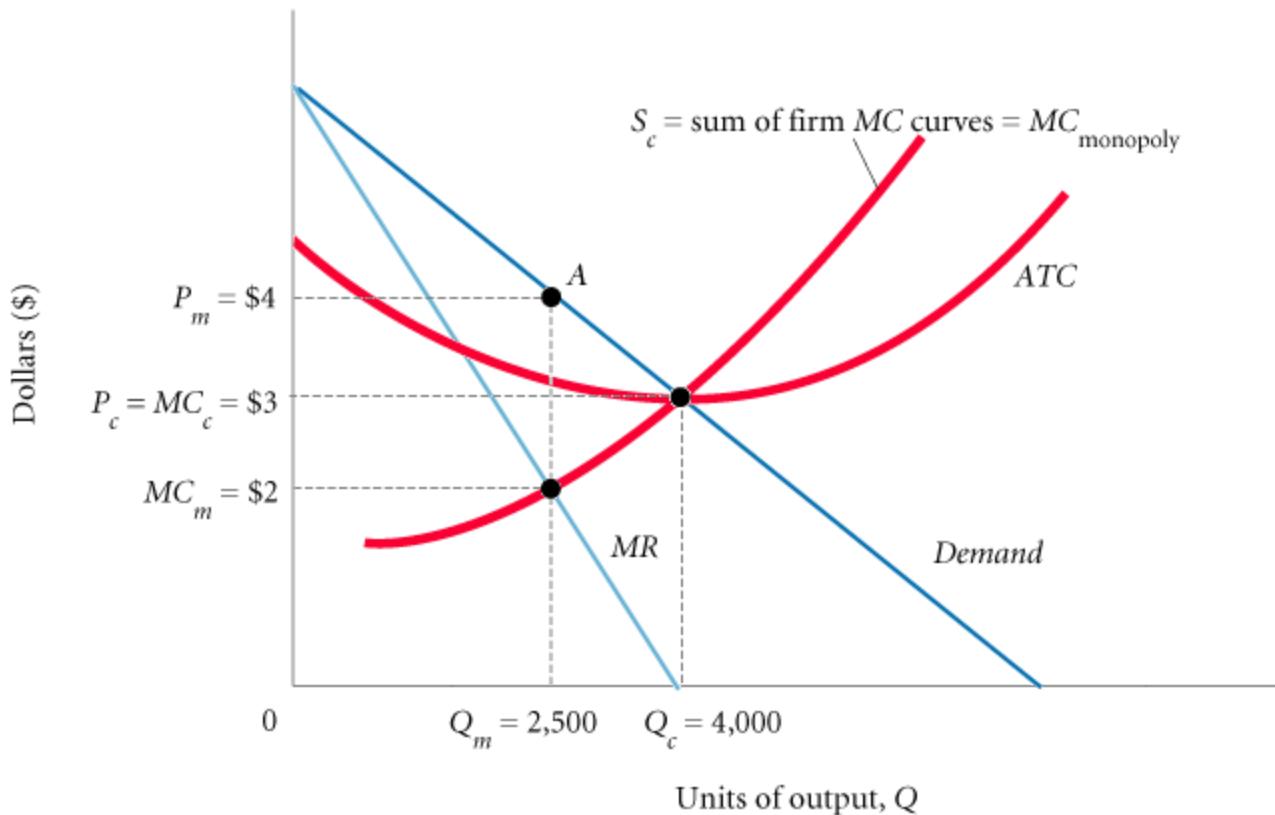


FIGURE 13.8 Comparison of Monopoly and Perfectly Competitive Outcomes for a Firm with Constant Returns to Scale

Relative to a perfectly competitive industry, a monopolist restricts output, charges higher prices, and earns positive profits.

PRICE AND OUTPUT DECISIONS IN PURE MONOPOLY MARKETS

COLLUSION AND MONOPOLY COMPARED

collusion The act of working with other producers in an effort to limit competition and increase joint profits.

THE SOCIAL COSTS OF MONOPOLY

INEFFICIENCY AND CONSUMER LOSS

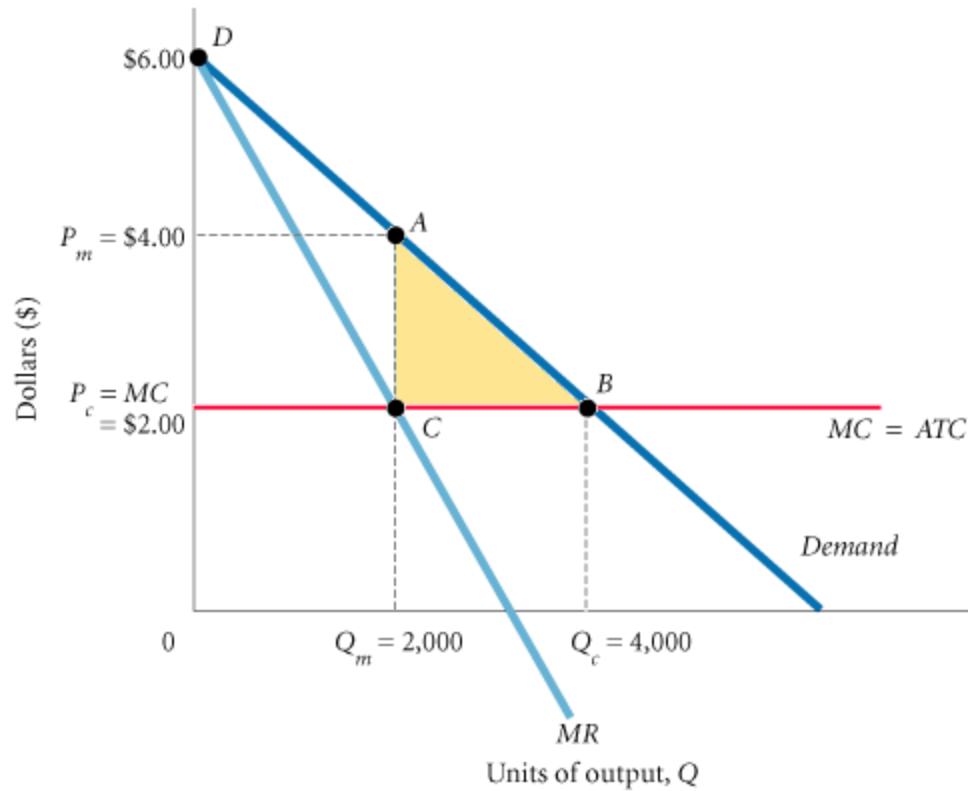


FIGURE 13.9 Welfare Loss from Monopoly

Monopoly leads to an inefficient mix of output.

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

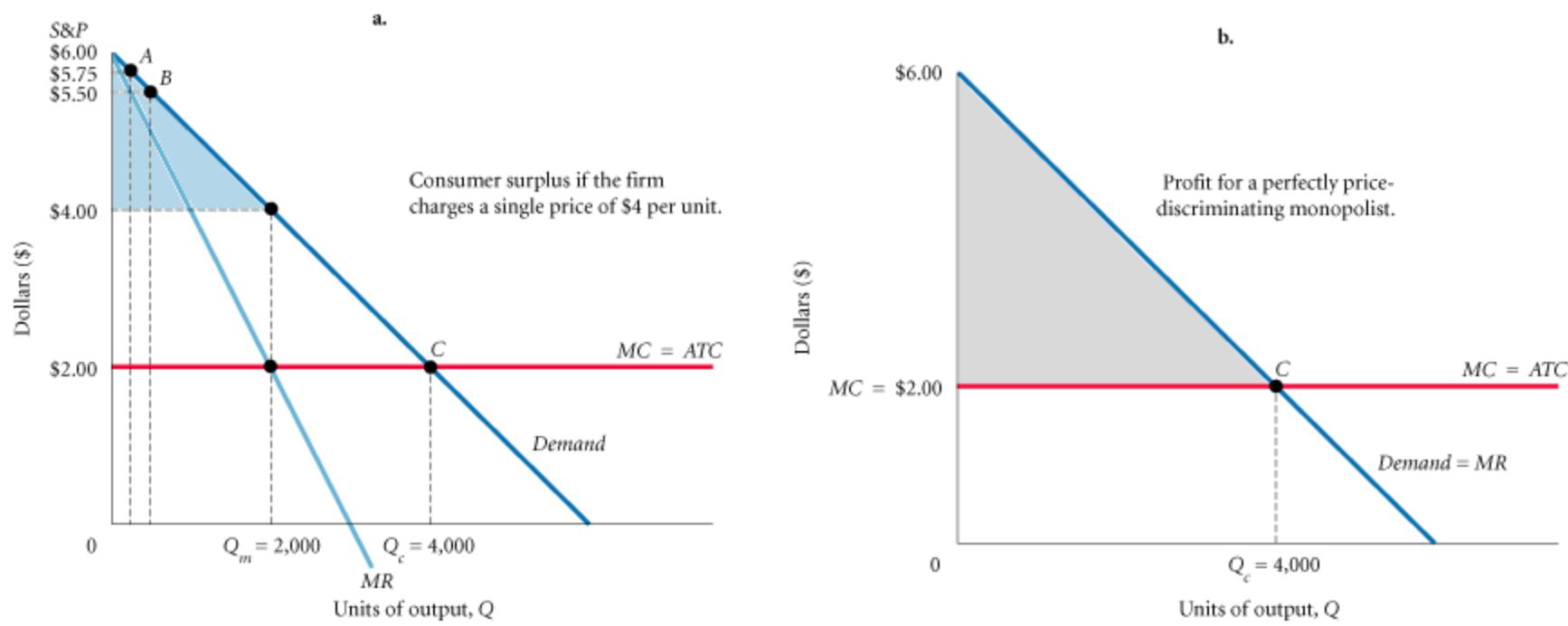


FIGURE 13.10 Price Discrimination

EXAMPLES OF PRICE DISCRIMINATION

Examples of price discrimination are all around us.

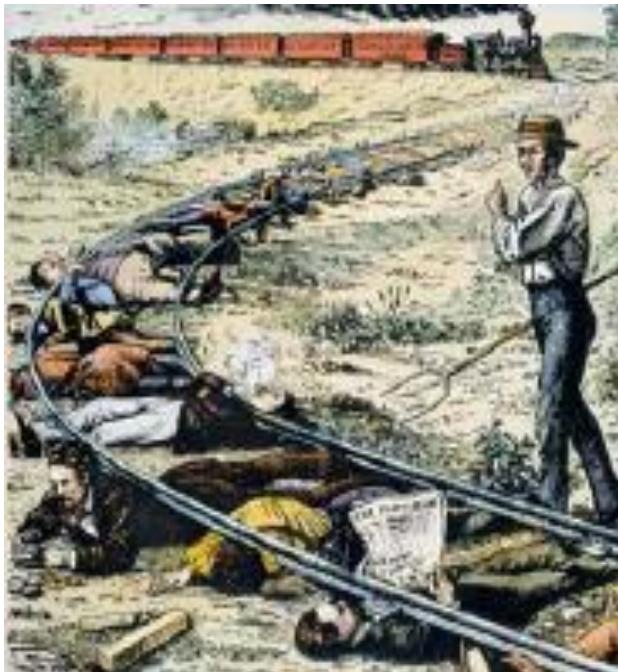
REMEDIES FOR MONOPOLY: ANTITRUST POLICY

Historically, governments in market economies have assumed two basic and seemingly contradictory roles with respect to imperfectly competitive industries:

- (1) They *promote* competition and restrict market power, primarily through antitrust laws, and
- (2) they *restrict* competition by regulating industries.

REMEDIES FOR MONOPOLY: ANTITRUST POLICY

THE DEVELOPMENT OF ANTITRUST LAW: HISTORICAL BACKGROUND



trust An arrangement in which shareholders of independent firms agree to give up their stock in exchange for trust certificates that entitle them to a share of the trust's common profits. A group of trustees then operates the trust as a monopoly, controlling output and setting price.

REMEDIES FOR MONOPOLY: ANTITRUST POLICY

LANDMARK ANTITRUST LEGISLATION

Interstate Commerce Commission (ICC) A federal regulatory group created by Congress in 1887 to oversee and correct abuses in the railroad industry.

Sherman Act Passed by Congress in 1890, the act declared every contract or conspiracy to restrain trade among states or nations illegal and declared any attempt at monopoly, successful or not, a misdemeanor. Interpretation of which specific behaviors were legal fell to the courts.

REMEDIES FOR MONOPOLY: ANTITRUST POLICY

The Sherman Act of 1890

rule of reason The criterion introduced by the Supreme Court in 1911 to determine whether a particular action was illegal (“unreasonable”) or legal (“reasonable”) within the terms of the Sherman Act.



Standard Oil controlled about 91 percent of the refining industry in 1911.

REMEDIES FOR MONOPOLY: ANTITRUST POLICY

The Clayton Act and the Federal Trade Commission, 1914

Clayton Act Passed by Congress in 1914 to strengthen the Sherman Act and clarify the rule of reason, the act outlawed specific monopolistic behaviors such as tying contracts, price discrimination, and unlimited mergers.

Federal Trade Commission (FTC) A federal regulatory group created by Congress in 1914 to investigate the structure and behavior of firms engaging in interstate commerce, to determine what constitutes unlawful “unfair” behavior, and to issue cease-and-desist orders to those found in violation of antitrust law.

REMEDIES FOR MONOPOLY: ANTITRUST POLICY

The Alcoa Case, 1945

per se rule A rule enunciated by the courts declaring a particular action or outcome to be a per se (intrinsic) violation of antitrust law, whether the result is reasonable or not.

THE ENFORCEMENT OF ANTITRUST LAW

INITIATING ANTITRUST ACTIONS

Government Actions: The Antitrust Division and the FTC

Wheeler-Lea Act (1938) Extended the language of the Federal Trade Commission Act to include “deceptive” as well as “unfair” methods of competition.

Antitrust Division (of the Department of Justice) One of two federal agencies empowered to act against violators of antitrust laws. It initiates action against those who violate antitrust laws and decides which cases to prosecute and against whom to bring criminal charges.

THE ENFORCEMENT OF ANTITRUST LAW

SANCTIONS AND REMEDIES

The courts are empowered to impose a number of remedies if they find that antitrust law has been violated. Specifically, the courts can

- “(1) forbid the continuation of illegal acts,
- (2) force the defendants to dispose of the fruits of their wrong, and
- (3) restore competitive conditions”

THE ENFORCEMENT OF ANTITRUST LAW

Consent Decrees

consent decrees Formal agreements on remedies among all the parties to an antitrust case that must be approved by the courts. Consent decrees can be signed before, during, or after a trial.

THE ENFORCEMENT OF ANTITRUST LAW

Criminal Actions

The practice of the Antitrust Division has been to limit criminal proceedings to outrageous violations, where intent to violate is clear.

Treble Damages

Any person or private company that sustains injury or financial loss because of an antitrust violation can recover damages from the guilty party over and above any fines levied.

A NATURAL MONOPOLY

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.

A NATURAL MONOPOLY

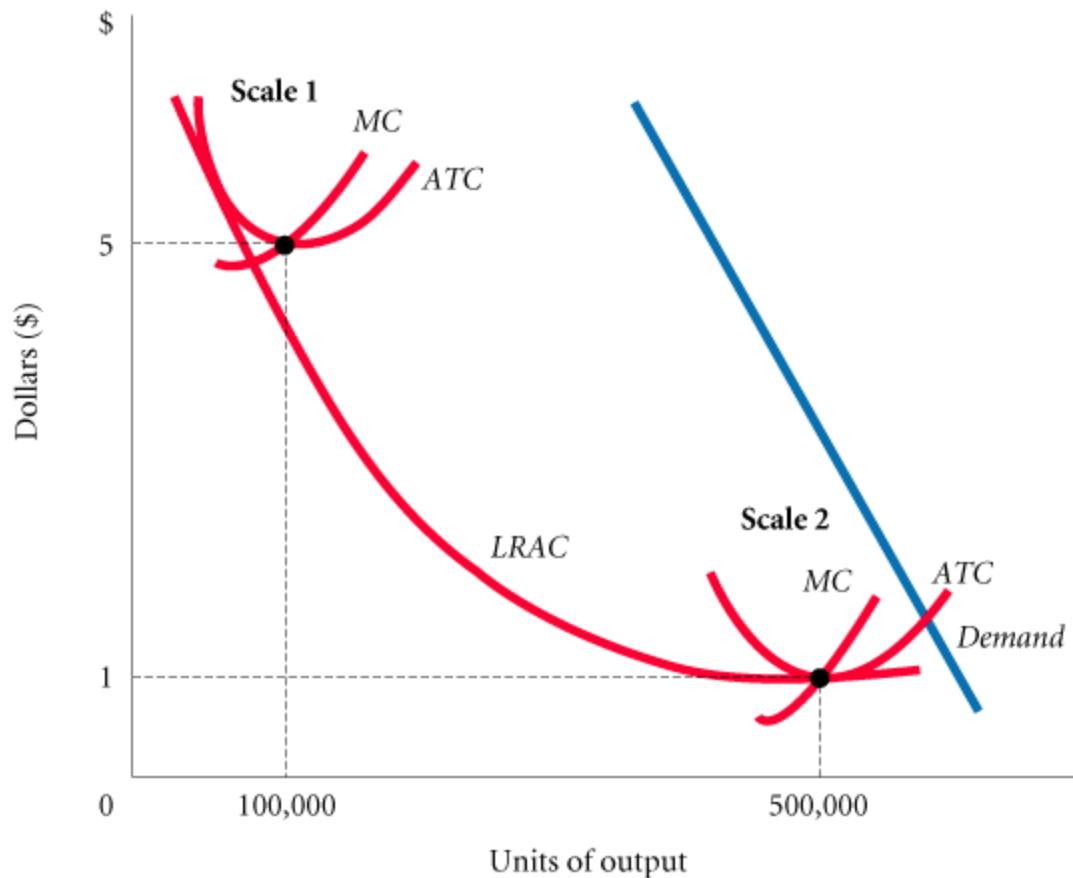


FIGURE 13.11 A Natural Monopoly

Economies of scale must be realized at a scale that is close to total demand in the market.

A NATURAL MONOPOLY

DO NATURAL MONOPOLIES STILL EXIST?

The classic examples of natural monopolies over the years have been public utilities.

Until very recently, state governments have allowed public utility companies to exist as monopolies subject to tight regulation of prices. Today everything is changing.

IMPERFECT MARKETS: A REVIEW AND A LOOK AHEAD

A firm has *market power* when it exercises some control over the price of its output or the prices of the inputs that it uses. The extreme case of a firm with market power is the pure monopolist. In a pure monopoly, a single firm produces a product for which there are no close substitutes in an industry in which all new competitors are barred from entry.

REVIEW TERMS AND CONCEPTS

Antitrust Division (of the
Department of Justice)

barrier to entry

Clayton Act

collusion

consent decree

Federal Trade Commission (FTC)

government failure

government franchise

imperfectly competitive industry

Interstate Commerce Commission
(ICC)

market power

natural monopoly

patent

perfect price discrimination

per se rule

price discrimination

public choice theory

pure monopoly

rent-seeking behavior

rule of reason

Sherman Act

trust

Wheeler-Lea Act