FRANKFURT UNIVERSITY OF APPLIED SCIENCES

VOLKSWIRTSCHAFTSLEHRE

MARKUS HEILIG

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General:

- 5 ECTS
- Modulprüfung Klausur (K90)
- Focus / Core of the Exam:
  - Demand & Supply (Elasticity)
  - Government Influence on Prices
  - Household Consumption Decisions (Indifference Curves and Budget Lines)
  - Costs, Perfect Competition and Monopoly
  - Macroeconomic Variables: GDP, GDP per Capita, Inflation, Unemployment, Exchange-Rates
- Date of Exam???

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Literatur:

Must read (or you understood all topics in lecture):

- Mankiw, N. Gregory/Taylor Mark P. (2021), Grundzüge der Volkswirtschaftslehre, 8. Aufl., Schäffer-Poeschel, Stuttgart.

Nice to read:

- Freakonomics; Levitt, Dubner 2005
- Outliers; Gladwell 2008
- 1493; Charles C. Mann 2011
- Hillbilly Elegy; J.D. Vance 2016
- Inequality; Atkinson, A.B. 2015
- Guns Germs and Steel; and Upheaval; Diamonds J.;1997, 1999, 2017
- Human Race; Mortimer I. 2014
- Living with the Gods; Mac Gregor N.; 2017
- The Weirdest People in the World; Henrich J.; 2020
- Die Protestantische Ethik und der Geist des Kapitalismus, Weber M. 1904/ 05
- …

Hans-Georg Gadamer zitiert Georg Wilhelm Friedrich Hegel

zu Bildung:

„Bildung heißt, sich die Dinge vom Standpunkt eines Anderen ansehen können.“

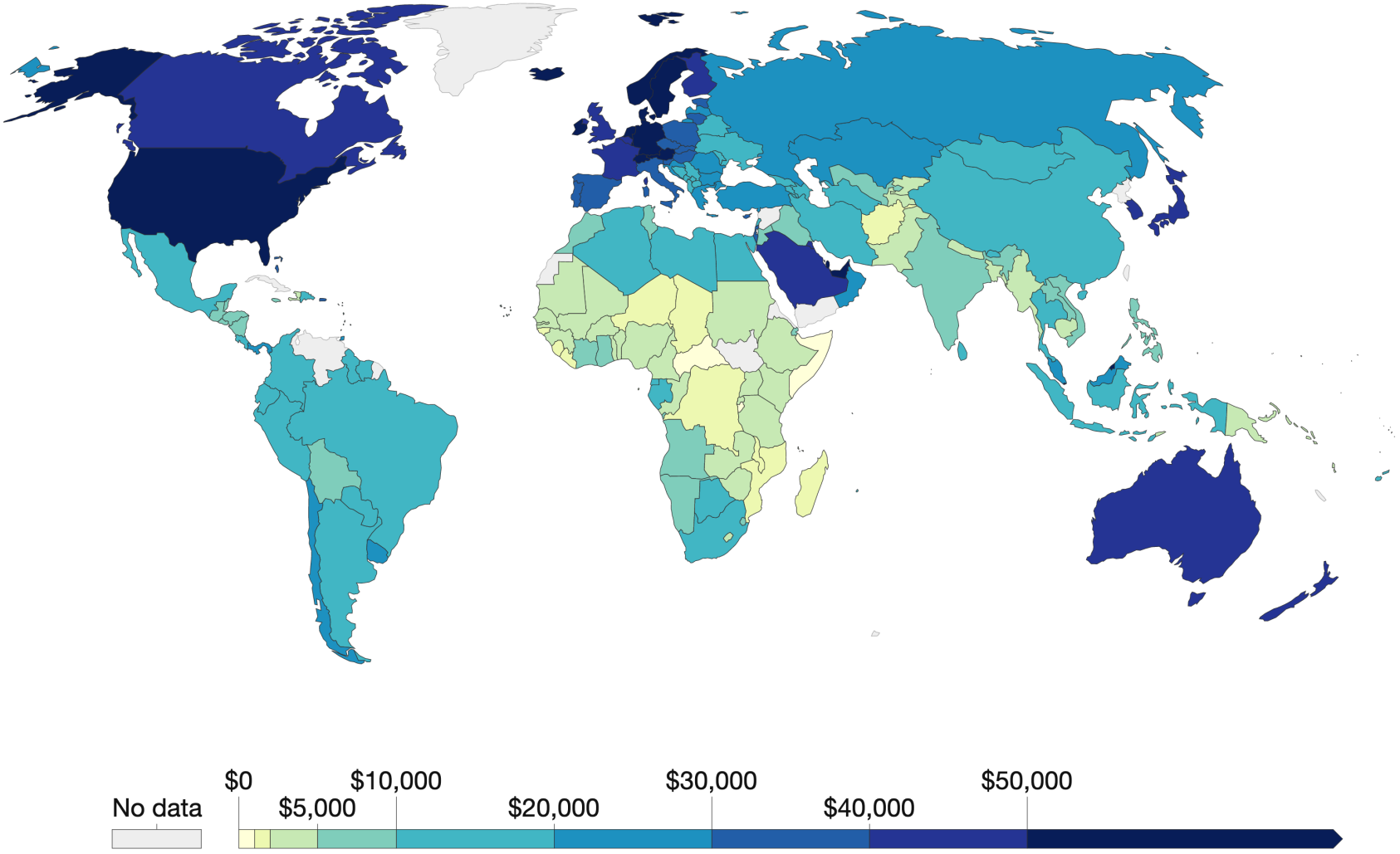
„Wissen ist Freiheit.“

ECONOMICS

GDP per capita, 2020

Measured in constant international-$.

Our World in Data



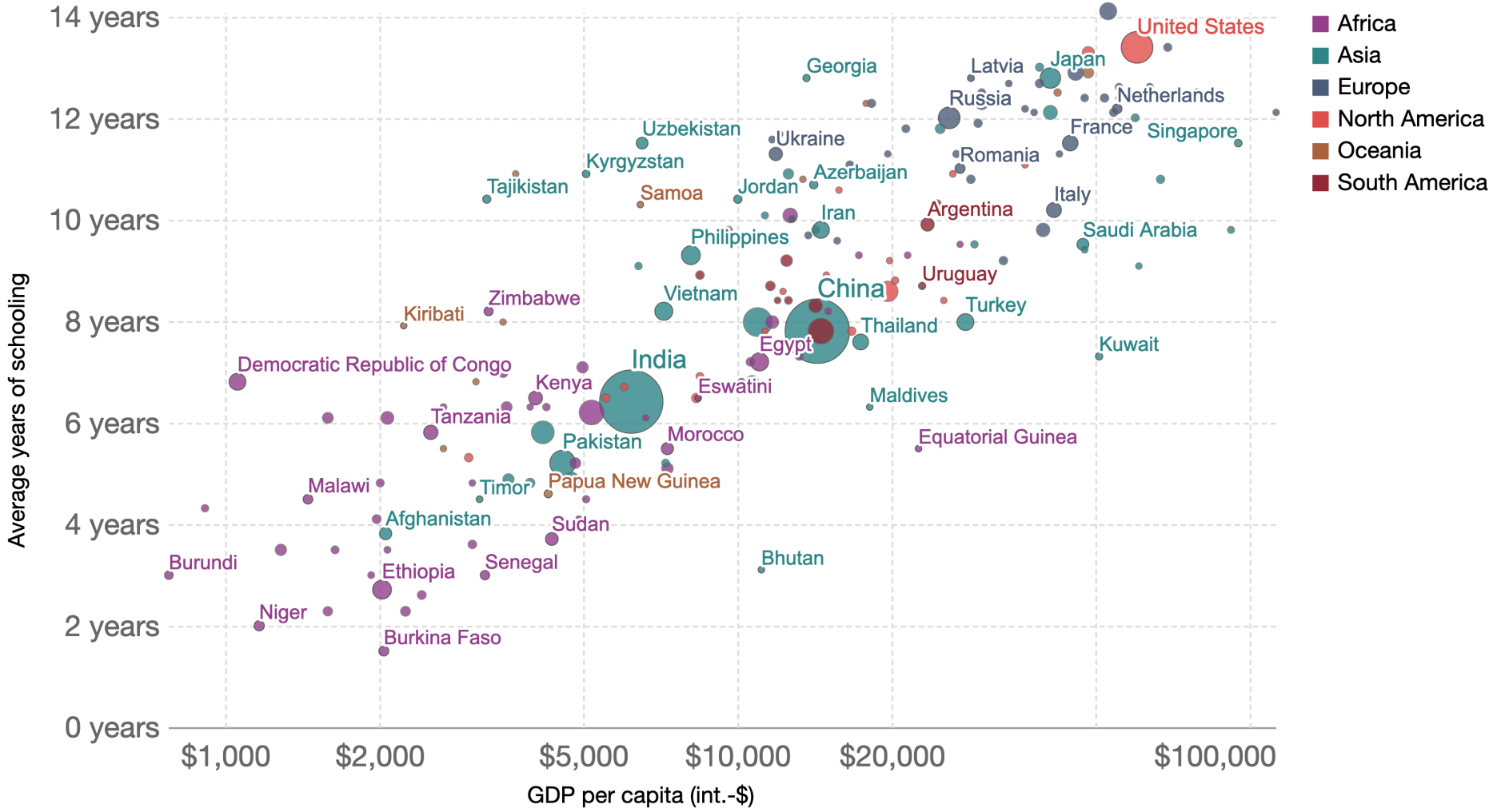
Source: Data compiled from multiple sources by World Bank

OurWorldInData.org/economic-growth • CC BY

Average years of schooling vs. GDP per capita, 2017

Average number of years the population older than 25 participated in formal education. GDP per capita is measured in constant international-$. This means it is adjusted for price differences between countries and adjusted for inflation to allow comparisons between countries and over time.

Our World in Data

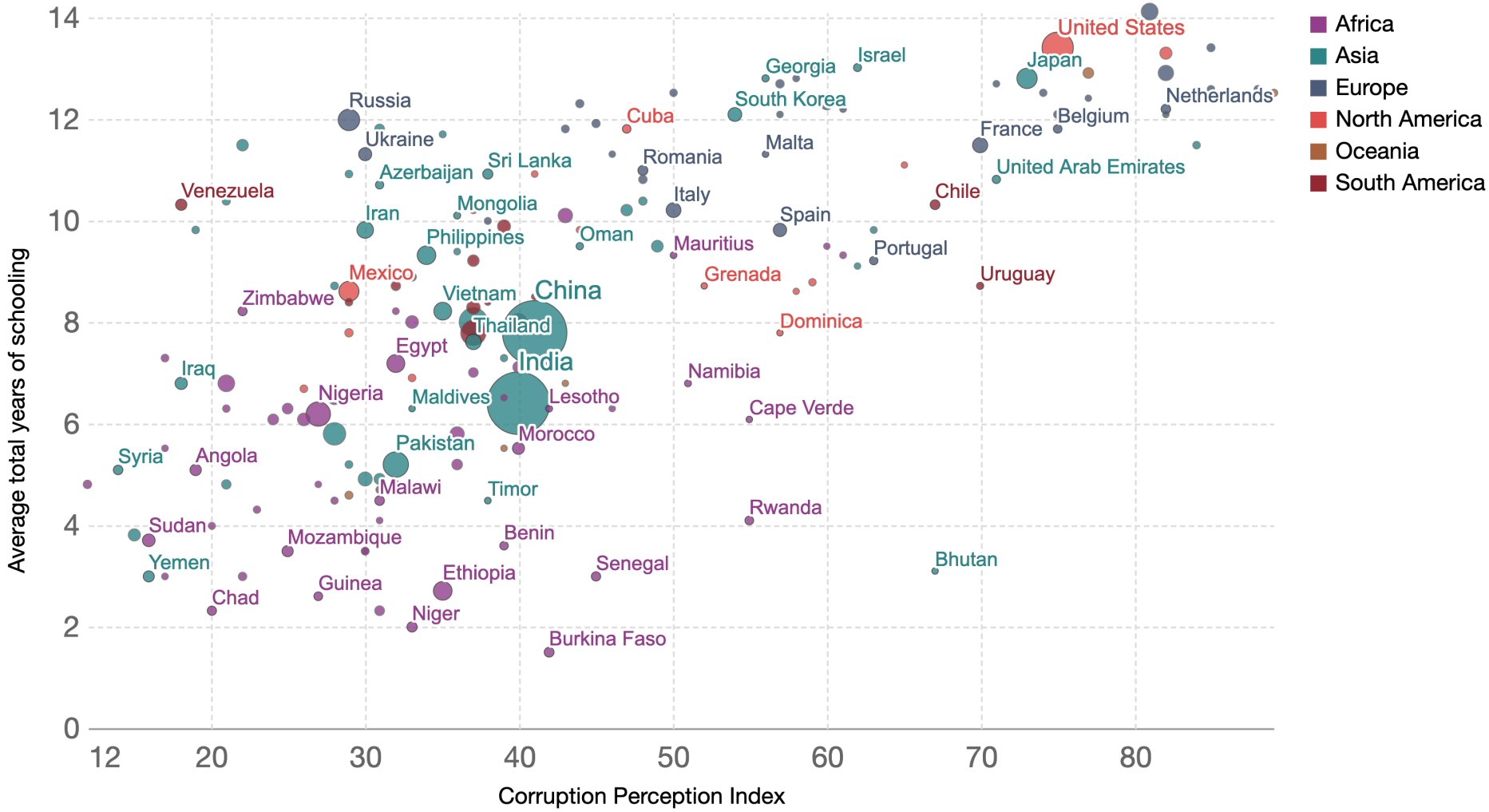


Source: Lee-Lee (2016), Barro-Lee (2018) and UNDP, HDR (2018), Data compiled from multiple sources by World Bank

CC BY

Average years of schooling vs. Corruption Perception Index, 2017

Education in the vertical axis is measured using average total years of schooling. Corruption in the horizontal axis is measured using Transparency International's Corruption Perception Index (lower values reflect higher perceived corruption). Colors reflect world regions.



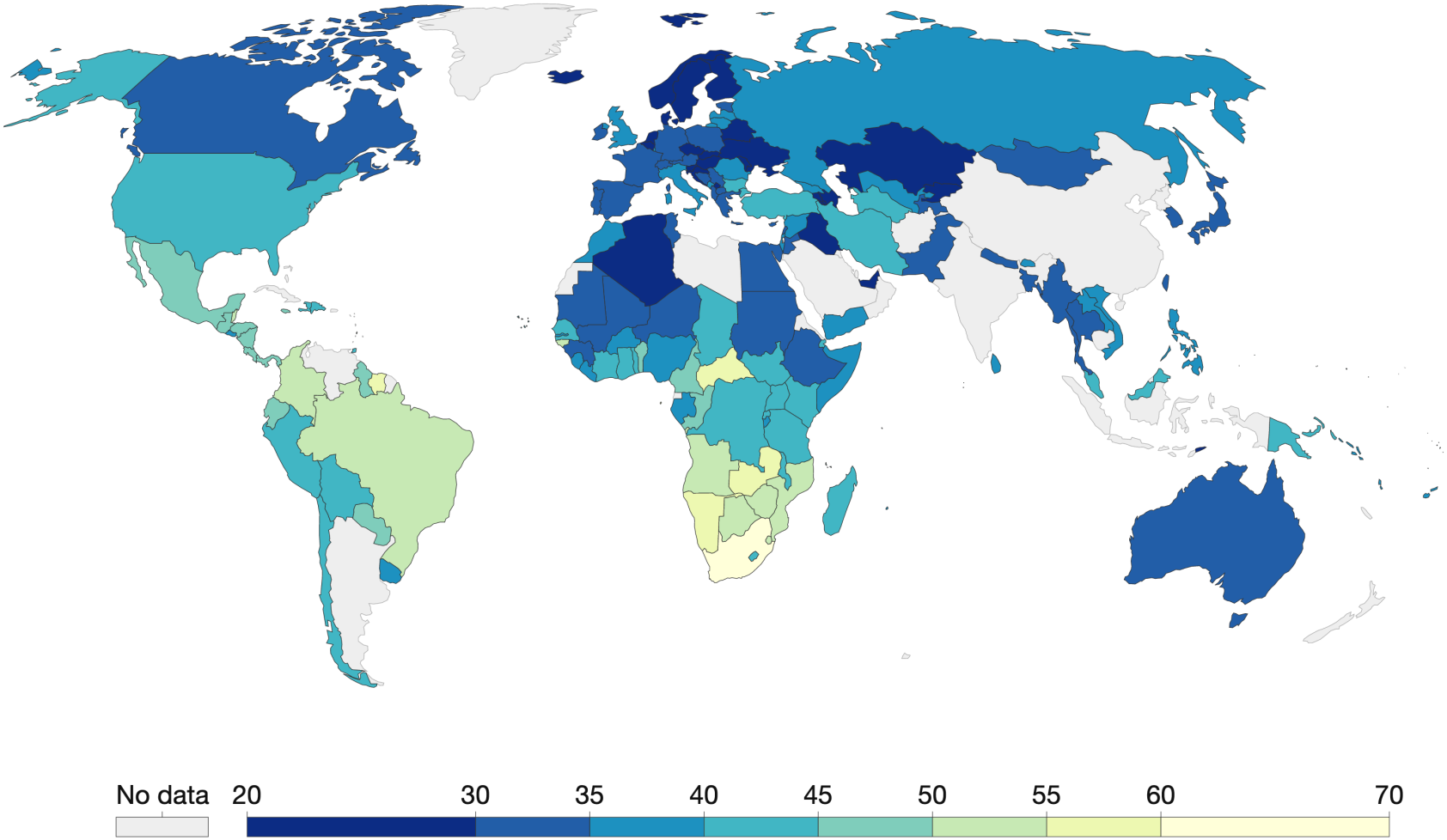
Source: Lee-Lee (2016), Barro-Lee (2018) and UNDP, HDR (2018), Transparency International (2018)

OurWorldInData.org/corruption • CC BY

Income inequality – Gini Index, 2019

A higher Gini index indicates higher inequality.

Our World in Data

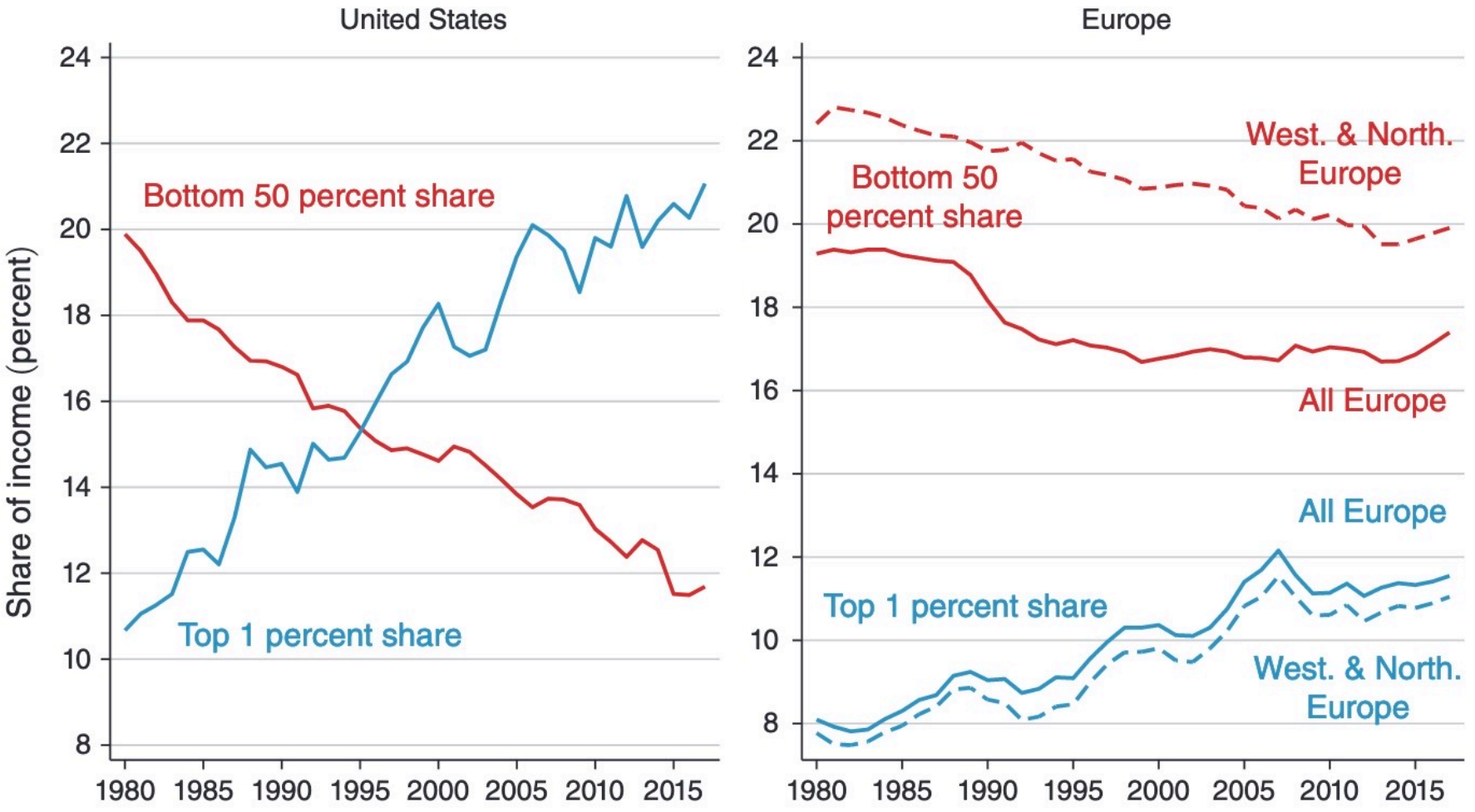


Source: PovCal (2021)

OurWorldInData.org/income-inequality/ • CC BY

Note: Shown is the World Bank (Povcal) inequality data. This data includes both income and consumption measures and comparability across countries is therefore limited.

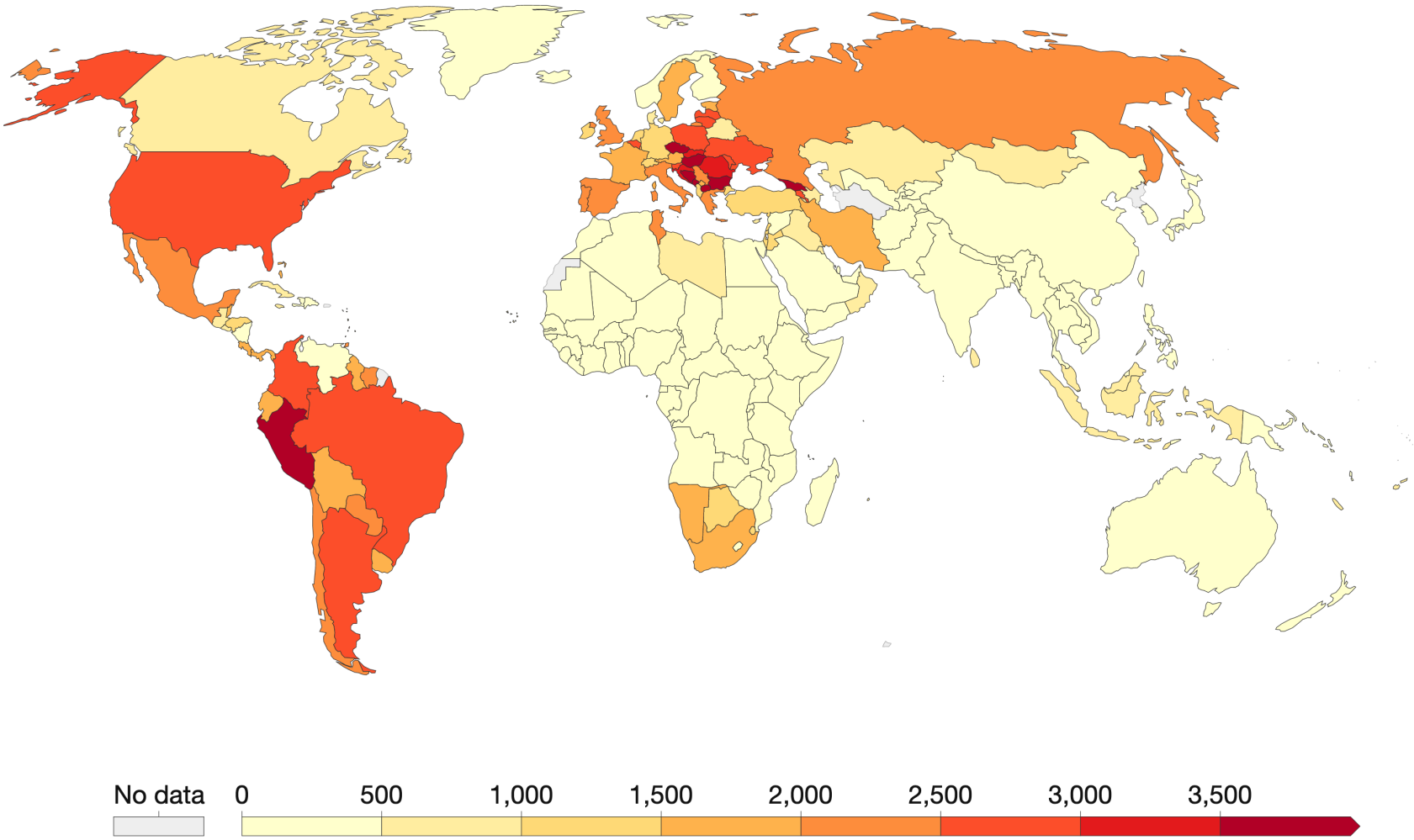
Panel A. Top 1 percent versus bottom 50 percent pretax income shares



Cumulative confirmed COVID-19 deaths per million people, Feb 9, 2022

Our World in Data

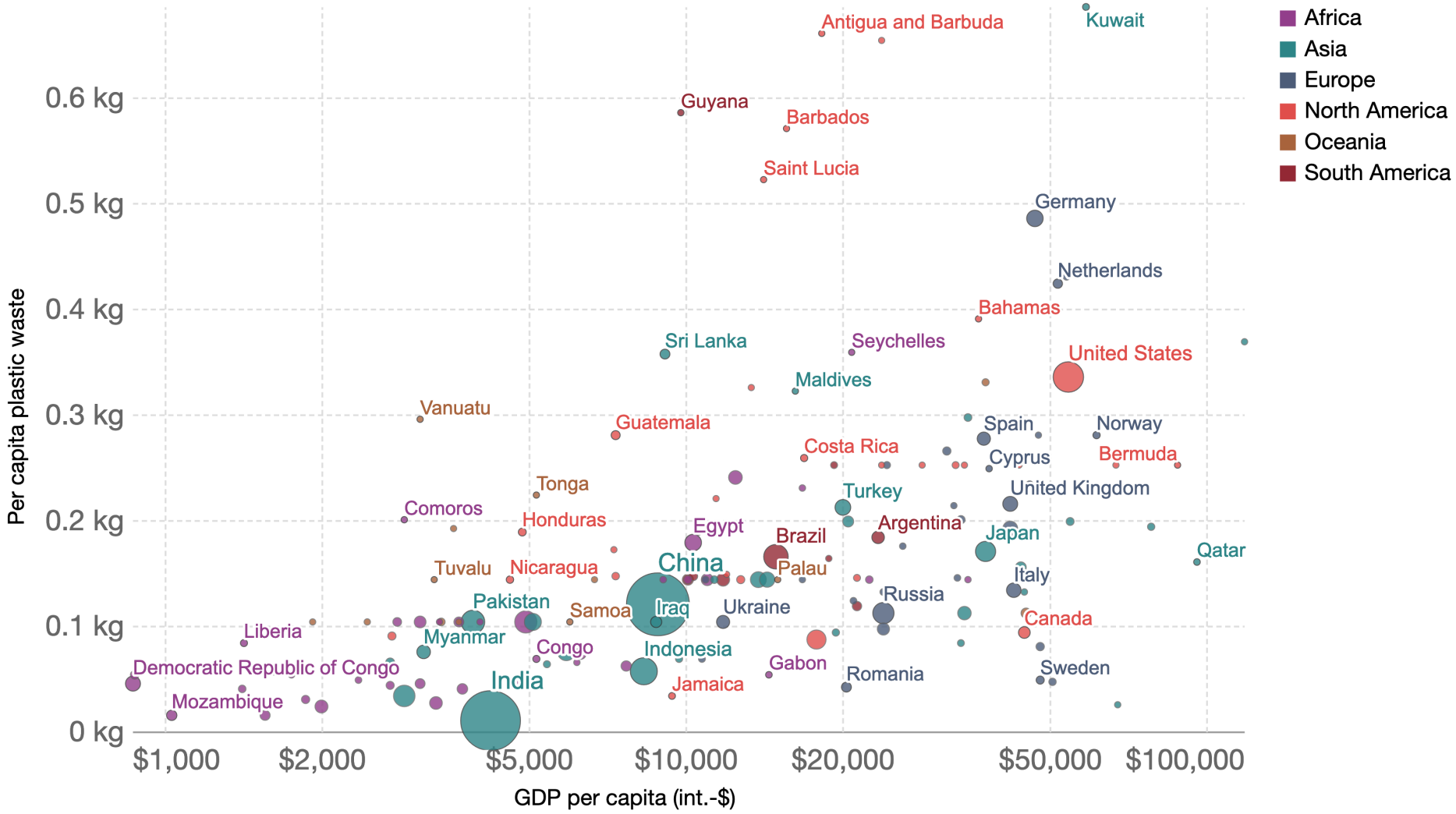
For some countries the number of confirmed deaths is much lower than the true number of deaths. This is because of limited testing and challenges in the attribution of the cause of death.



Source: Johns Hopkins University CSSE COVID-19 Data

Per capita plastic waste vs. GDP per capita, 2010

Per capita plastic waste generation rate (measured in kilograms per person per day) versus gross domestic product (GDP) per capita (measured in constant international-$).



Source: Jambeck et al. (2015), Data compiled from multiple sources by World Bank

CC BY

CONTENT

01	Introduction
02	The Basics of Supply and Demand
03	Government Policies, Efficiency and Inefficiency
04	Consumer Behavior
05	Firms in Competitive Markets
06	Monopoly
07	The Data of Macroeconomics
08	The Real Economy
09	Money and Prices

01

INTRODUCTION

1.1 What is Economics?

1.2 The Key Principles of Economics

1.3 Thinking like an Economist

1.4 Interdependence and Gains from Trade

01 IDEA

“Economics

…is about how people choose. The choices we make influence our lives and those of others. Your future will be influenced by the choices you make with regard to education, job opportunities, savings, and investment. Furthermore, changes in technology, demographics, communication and transportation are constantly altering the attractiveness of various options and opportunities available to us. The economic way of thinking is all about how incentives alter the choices people make. It can help you make better choices and enhance your understanding of our dynamic world.”

Gwartney et al. (2015) Microeconomics

ECONOMICS

Is the study of choices when there is scarcity.

- How society manages its scarce resources
- How people make decisions

Resources are scarce

Scarcity

- The limited nature of society's resources
- Society has limited resources and therefore cannot produce all the goods and services people wish to have
- Example: A city has a limited amount of land. If the city uses an acre of land for a park, it has one less acre for housing, retailers, or industry

OIKONOMOS

Oikonomos (Greek) -> economy, "one who manages a household"

Economists study:

- How people make decisions
  - Households and economies have much in common
  - Households face many decisions: allocate scarce resources; ability, effort, and desire
  - Society faces many decisions: allocate resources and output
- How people interact with one another
- Analyze forces and trends that affect the economy as a whole
  - Growth in average income
  - Fraction of the population that cannot find work
  - Rate at which prices are rising

MICRO- VS. MACROECONOMICS #1

Microeconomics

- The study of how households and firms make decisions and how they interact in markets

Macroeconomics

- The study of economy-wide phenomena, including inflation, unemployment, and economic growth

MICRO- VS. MACROECONOMICS #2

Microeconomics

- Micro is Greek for small
- Is partial equilibrium analysis
- Provides a foundation for macroeconomics

Macroeconomics

- Macro is Greek for large
- Is general equilibrium analysis
- Explains variables taken as given in microeconomics

1.2 THE KEY PRINCIPLES OF ECONOMICS

IS FACEBOOK FREE?

#1

PRINCIPLE 1:
PEOPLE FACE TRADE-OFFS

HOW PEOPLE MAKE DECISIONS

- "There is no such thing as a free lunch"
- To get something that we like, we usually have to give up something else that we also like
- Making decisions implies a trade off one goal against another
- Examples:
  - Students: time, parents: income
  - Society: National defense vs. consumer goods (guns vs. butter); clean environment vs. high level of income
    - Efficiency (Society getting the maximum benefits from its scarce resources; size of the pie) vs. equality (Distributing economic prosperity among the members of society, how the pie is divided into individual slices)

WHAT ARE THE TRADE-OFFS AN INDIVIDUAL FACES IN THIS SITUATION?

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

HOW PEOPLE MAKE DECISIONS

- People face trade-offs while making decisions
- Compare cost with benefits of alternatives

OPPORTUNITY COST:

whatever must be given up to obtain some item

PRINCIPLE 3: RATIONAL PEOPLE THINK AT THE MARGIN

HOW PEOPLE MAKE DECISIONS

- Rational people: Systematically and purposefully do the best they can to achieve their objectives
- Marginal changes: Small incremental adjustments to a plan of action
- Rational decision maker: Make decisions by comparing marginal benefits and marginal costs
- Take action only if: Marginal benefits > Marginal costs

PRINCIPLE 4:
PEOPLE RESPOND TO INCENTIVES
THE INCENTIVE EFFECTS OF GASOLINE PRICES

2005 to 2008, price of oil in world oil markets skyrocketed

- Limited supplies
- Surging demand from robust world growth
- Price of gasoline in the US rose from about $2 to about $4 a gallon

Increased incentive to conserve gas

- Smaller cars, scooters, bicycles, mass transit
- Camels (India)
- New, more fuel-efficient aircraft
- Airbus A320 and Boeing 737
- Moving near an Amtrak station
- Online courses
- Sean “Diddy” Combs - flying on commercial airlines

CASE STUDY

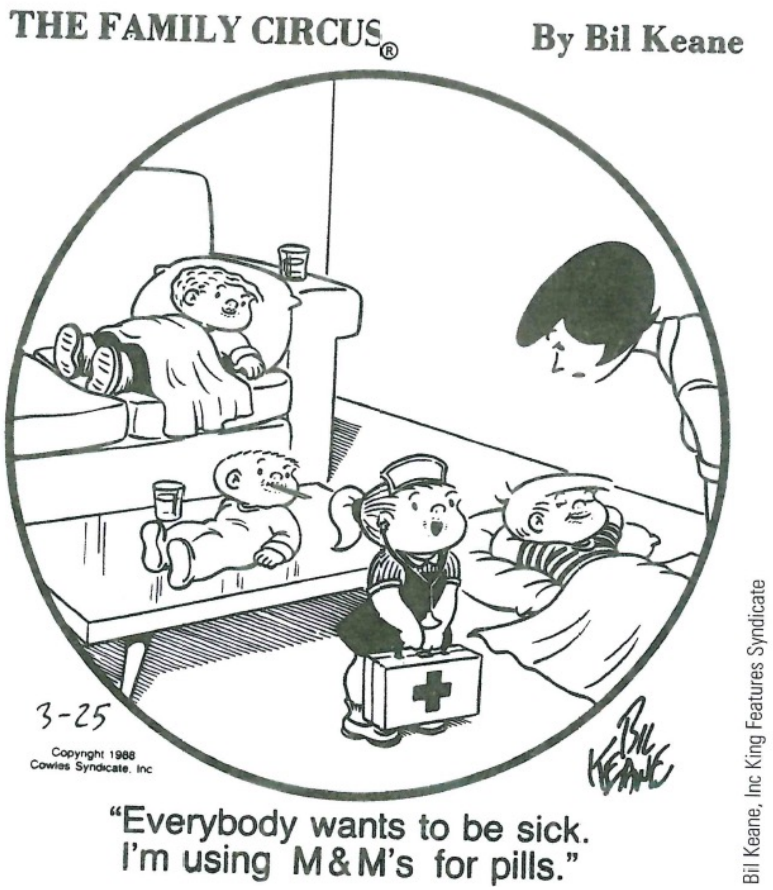
PRINCIPLE 4:
PEOPLE RESPOND TO INCENTIVES

HOW PEOPLE MAKE DECISIONS

#7

Incentive:

- Something that induces a person to act
- Higher price: buyers - consume less; sellers - produce more
- Public policy: change costs or benefits; change people's behavior



PRINCIPLE 4:
PEOPLE RESPOND TO INCENTIVES
UNEMPLOYMENT BENEFITS

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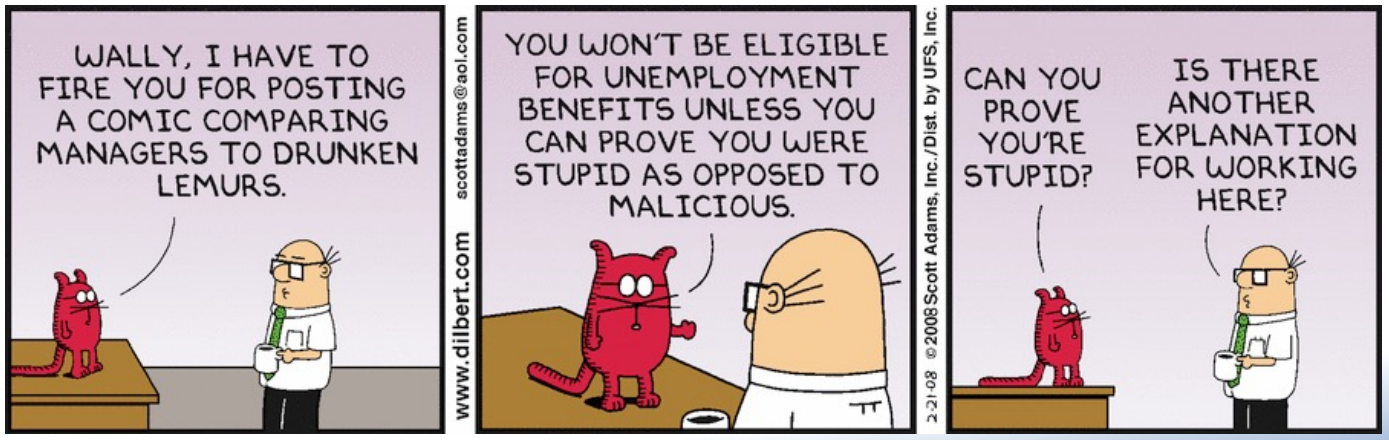
#8

EU countries are trying to cut spending but find themselves having to spend more on unemployment benefits

- What sort of incentives might governments put in place to encourage workers off welfare and into work?
- What might be unintended consequences of the incentives you identify?



CASE STUDY

PRINCIPLE 5: TRADE CAN MAKE EVERYONE BETTER OFF

HOW PEOPLE INTERACT

#1

Trade

- Allows each person to specialize in the activities he or she does best
- Enjoy a greater variety of goods and services at lower cost

"For $5 a week you can watch baseball without being nagged to cut the grass!"

From The Wall Street Journal - Permission, Cartoon Features Syndicate

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

HOW PEOPLE INTERACT

Market economy: allocation of resources

- Through decentralized decisions of many firms and households
- As they interact in markets for goods and services
- Guided by prices and self-interest

Adam Smith's **INVISIBLE HAND**

- Households and firms interacting in markets act as if they are guided by an "invisible hand"
- An efficient outcome is achieved through individuals' seeking to maximize their self-interest

- Corollary: Government intervention
  - Prevents the invisible hand's ability to coordinate the decisions of the households and firms that make up the economy

PRINCIPLE 7: GOVERNMENTS CAN SOMETIMES IMPROVE MARKET OUTCOMES

HOW PEOPLE INTERACT

We need the government

- Enforce rules and maintain institutions that are key to a market economy
- Enforce property rights: ability of an individual to own & exercise control over scarce resources
- Promote efficiency, avoid market failure: situation in which the market left on its own fails to allocate resources efficiently, e.g. due to externalities, market power
- Promote equality, avoid disparities in economic wellbeing

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

HOW THE ECONOMY AS A WHOLE WORKS

#1

- Large differences in living standards among countries/over time
- Average annual income, 2019ppp

  $66,080 (U.S.); $19,990 (Mexico); $16,700 (China); $5,190 (Nigeria)
- Explanation: differences in **PRODUCTIVITY**
  - Quantity of goods and services produced from each unit of labor input
  - Higher productivity: higher standard of living
  - Growth rate of nation's productivity: determines growth rate of its average income

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

HOW THE ECONOMY AS A WHOLE WORKS

#2

- **INFLATION**: an increase in the overall level of prices in the economy
- Causes for large or persistent inflation:
  - Growth in quantity of money
  - Value of money falls

"Well it may have been 68 cents when you got in line, but it's 74 cents now!"

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

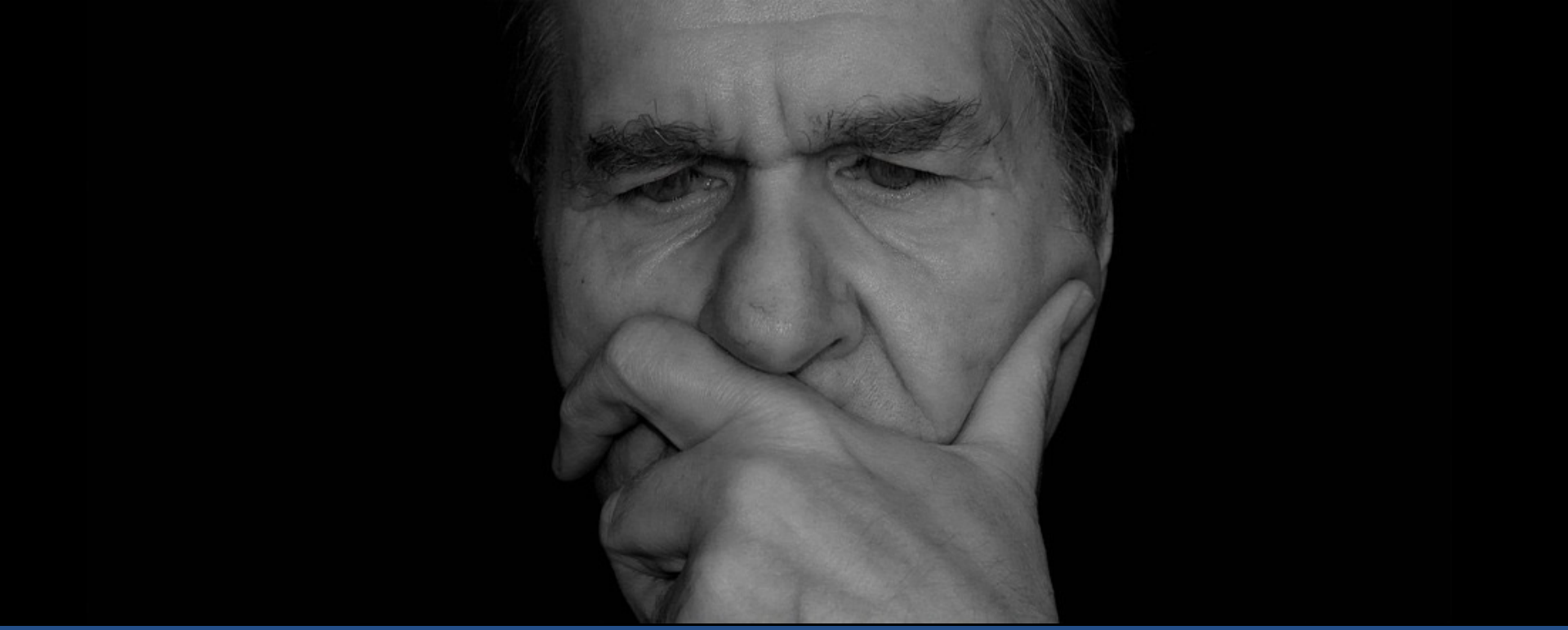
HOW THE ECONOMY AS A WHOLE WORKS

#3

- Short-run effects of monetary injections:
  - Stimulates the overall level of spending; higher demand for goods and services
  - Firms: raise prices; hire more workers; produce more goods and services
  - Lower unemployment
- Short-run trade-off between unemployment and inflation: analysis of business cycle
- Business cycle: fluctuations in economic activity: employment, production

10 PRINCIPLES OF ECONOMICS

- How People Make Decisions
  - 1: People Face Trade-offs
  - 2: The Cost of Something Is What You Give Up to Get It
  - 3: Rational People Think at the Margin
  - 4: People Respond to Incentives
- How People Interact
  - 5: Trade Can Make Everyone Better Off
  - 6: Markets Are Usually a Good Way to Organize Economic Activity
  - 7: Governments Can Sometimes Improve Market Outcomes
- How the Economy as a Whole Works
  - 8: A Country's Standard of Living Depends on Its Ability to Produce Goods and Services
  - 9: Prices Rise When the Government Prints Too Much Money
  - 10: Society Faces a Short-Run Trade-off between Inflation and Unemployment



1.3 THINKING LIKE AN ECONOMIST

THE ECONOMIST AS A SCIENTIST

Scientific Method

- Dispassionate development and testing of theories about how the world works
- Observation, theory, more observation, collect & analyze data, verify or refute their theories
- Conducting experiments in economics is not always practical
- Economists pay close attention to the natural experiments offered by history; classroom experiments

THE ECONOMIST AS A SCIENTIST

The Role of Assumptions

Assumptions

- Can simplify the complex world
- Make it easier to understand
- The art in scientific thinking: deciding which assumptions to make

Different assumptions

- To answer different questions
- To study short-run or long-run effects

THE ECONOMIST AS A SCIENTIST

THE CETERIS PARIBUS (C.P.) ASSUMPTION

- Other things being equal
- Is used in order to isolate the factors which are the most significant ones
- Enables to look at how changes in one variable affect outcomes assuming other variables that might have an effect are held constant

THE ECONOMIST AS A SCIENTIST

Economic Models

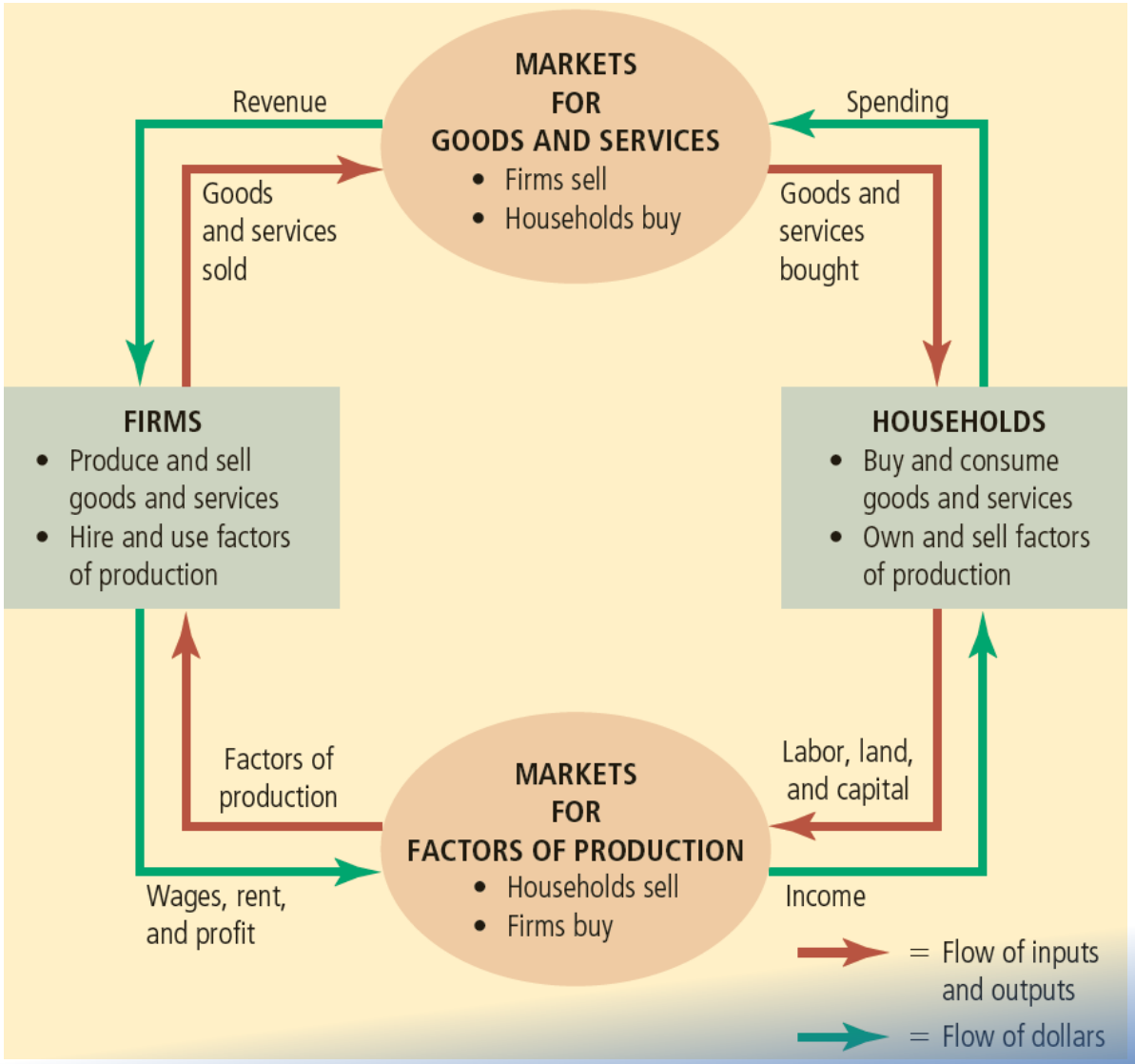
- Diagrams and equations
- Omit many details
- Allow us to see what's truly important
- Built with assumptions
- Simplify reality to improve our understanding of it

THE ECONOMIST AS A SCIENTIST

Exogenous and endogenous variables

- An **EXOGENOUS VARIABLE** is a variable whose value is NOT determined within the model
- An **ENDOGENOUS VARIABLE** is a variable whose value is determined within the model

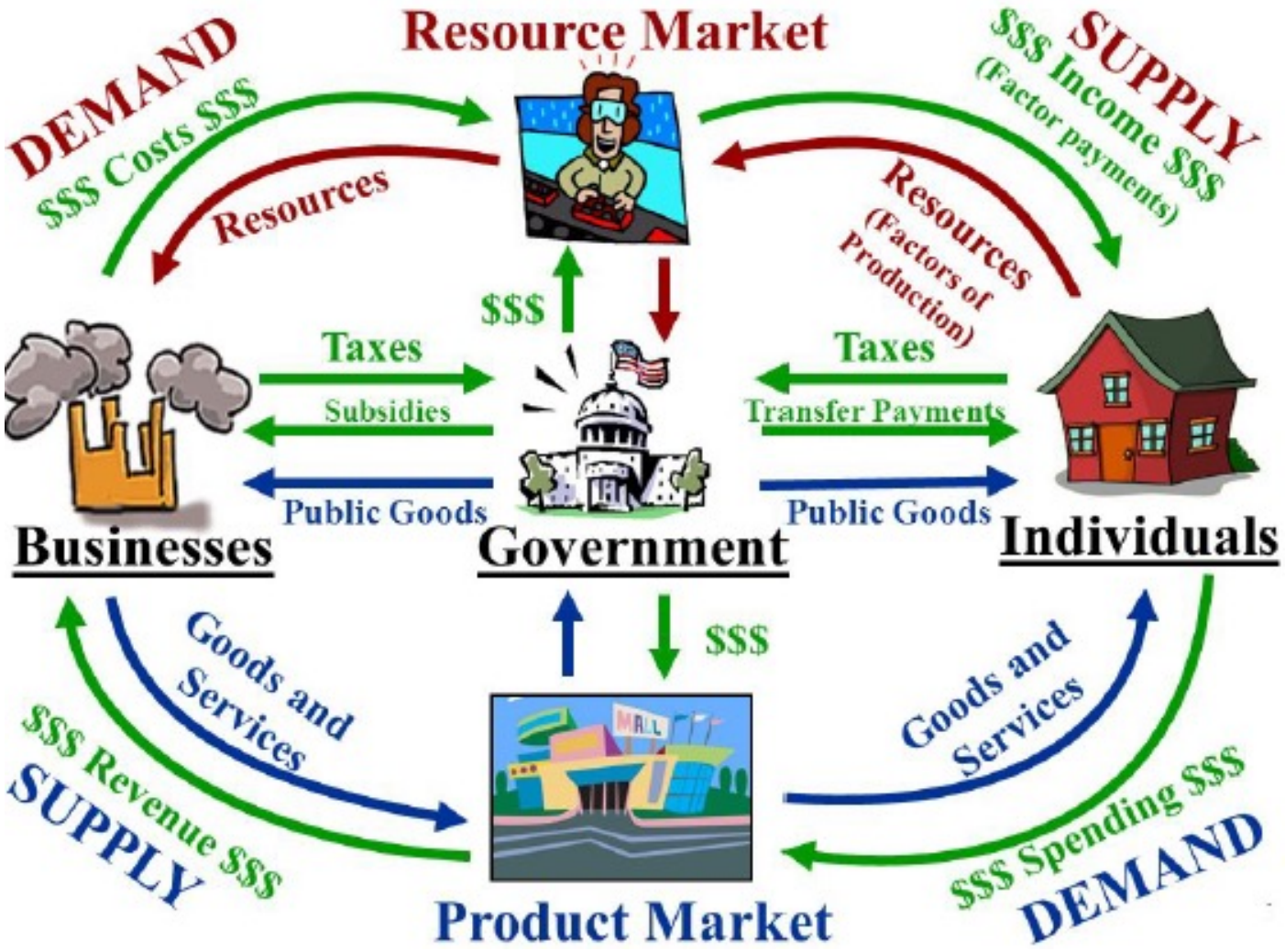
THE CIRCULAR FLOW MODEL



This diagram is a schematic representation of the organization of the economy. Decisions are made by households and firms. Households and firms interact in the markets for goods and services (where households are buyers and firms are sellers) and in the markets for the factors of production (where firms are buyers and households are sellers). The outer set of arrows shows the flow of dollars, and the inner set of arrows shows the corresponding flow of inputs and outputs.

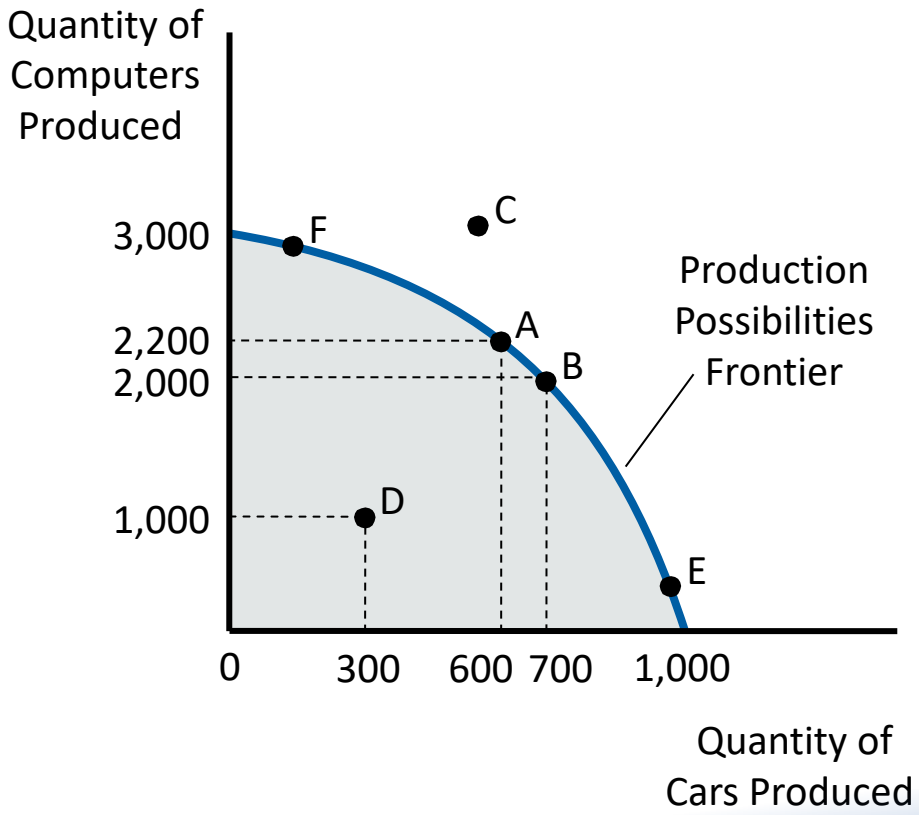
EXAMPLE

THE CIRCULAR FLOW MODEL WITH THE GOVERNMENT



THE PRODUCTION POSSIBILITIES FRONTIER #1

The **PRODUCTION POSSIBILITIES FRONTIER** shows the combinations of output—in this case, cars and computers—that the economy can possibly produce. The economy can produce any combination on or inside the frontier. Points outside the frontier are not feasible given the economy's resources. The slope of the production possibilities frontier measures the opportunity cost of a car in terms of computers. This opportunity cost varies, depending on how much of the two goods the economy is producing.



EXAMPLE

THE PRODUCTION POSSIBILITIES FRONTIER #2

Efficient levels of production

- The economy is getting all it can from the scarce resources available
- Points on the production possibilities frontier
- Trade-off: the only way to produce more of one good is to produce less of the other good

Inefficient levels of production

- Points inside production possibilities frontier

Opportunity cost of producing one good

- Give up producing the other good
- Slope of the production possibilities frontier

EXAMPLE

THE PRODUCTION POSSIBILITIES FRONTIER #3

Bowed outward production possibilities frontier

- Opportunity cost of a car is highest: when the economy is producing many cars and fewer computers
- Opportunity cost of a car is lower: when the economy is producing fewer cars and many computers
- Resource specialization

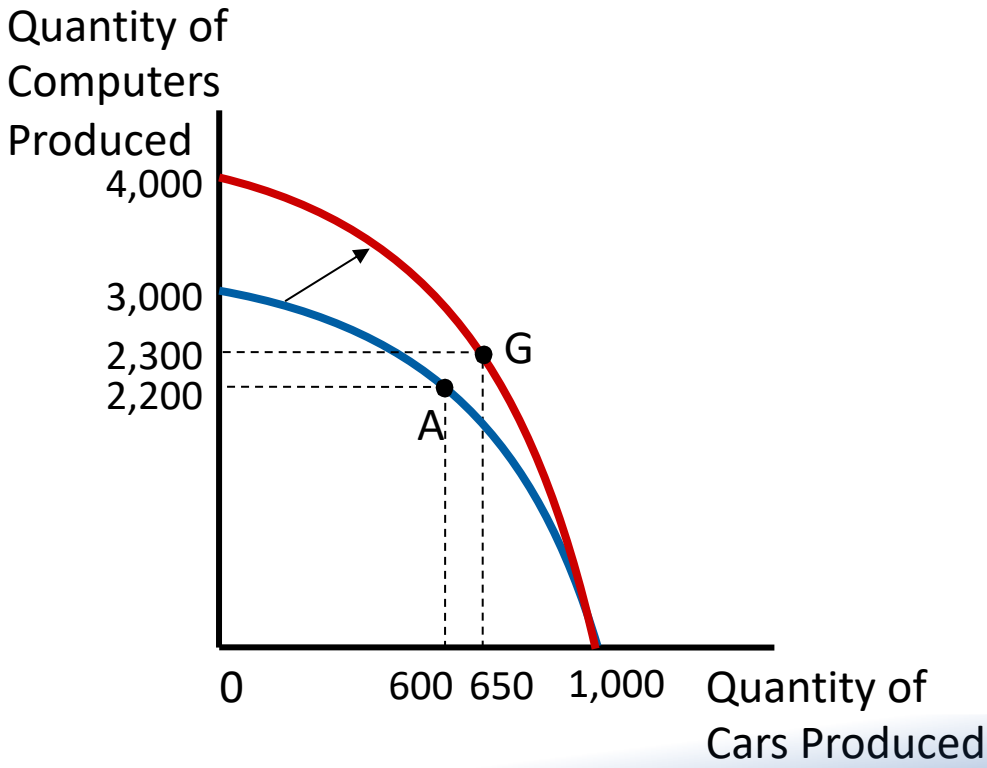
Technological advance

- Outward shift of the production possibilities frontier
- Economic growth
- Produce more of both goods

EXAMPLE

THE PRODUCTION POSSIBILITIES FRONTIER #4

A technological advance in the computer industry enables the economy to produce more computers for any given number of cars. As a result, the production possibilities frontier shifts outward. If the economy moves from point A to point G, then the production of both cars and computers increases.



EXAMPLE

THE ECONOMIST AS A SCIENTIST – POSITIVE VERSUS NORMATIVE ANALYSIS

POSITIVE ANALYSIS

- Attempt to describe the world as it is
- Descriptive
- Confirm or refute by examining evidence
- Answers the question “What is?” or “What will be?”

NORMATIVE ANALYSIS:

- Attempt to prescribe how the world should be
- Prescriptive
- Answers the question “What ought to be?”

THE ECONOMIST AS A SCIENTIST – POSITIVE VERSUS NORMATIVE ANALYSIS

Positive Questions	Normative Questions
• If the government increases the minimum wage, how many workers will lose their jobs? • If two office-supply firms merge, will the price of office supplies increase? • How does a college education affect a person's productivity and earnings? • How do consumers respond to a cut in income taxes? • If a nation restricts shoe imports, who benefits and who bears the cost?	• Should the government increase the minimum wage? • Should the government block the merger of two office-supply firms? • Should the government subsidize a college education? • Should the government cut taxes to stimulate the economy? • Should the government restrict imports?

WHY ECONOMISTS DISAGREE

- Economists may have different views

  Different normative views about what policy should try to accomplish

- Differences in scientific judgments
  - Different hunches about
  - Validity of alternative theories
  - Size of important parameters
  - Measure how economic variables are related

Hans-Werner Sinn/Clemens Fuest vs. Martin Hellwig

- Economists may disagree

  Validity of alternative positive theories about how the world works

WHY ECONOMISTS DISAGREE

Differences in values

- Peter and Paula - take the same amount of water from the town well
- The town imposes a tax to maintain the well: property/income/per capita?
- Peter's property/income (he's single)= $100,000 / $10,000
- Paula's property/income = $ 0 / $50,000

Perception vs. Reality

- Rent control
- Adversely affects availability and quality of housing
- Costly way of helping the neediest members of society
- Many cities use rent control
- Trade barriers (tariffs and import quotas)

PROPOSITIONS ABOUT WHICH MOST ECONOMISTS AGREE (1/2)

(AND % OF ECONOMISTS WHO AGREE)

1. A ceiling on rents reduces the quantity+quality of housing available. (93%)
2. Tariffs and import quotas usually reduce general economic welfare. (93%)
3. Flexible and floating exchange rates offer an effective international monetary arrangement. (90%)
4. Fiscal policy (e.g., tax cut and/or government expenditure increase) has a significant stimulative impact on a less than fully employed economy. (90%)
5. The United States should not restrict employers from outsourcing work to foreign countries. (90%)
6. Economic growth in developed countries leads to greater levels of well-being. (88%)
7. The United States should eliminate agricultural subsidies. (85%)
8. An appropriately designed fiscal policy can increase the long-run rate of capital formation. (85%)
9. Local and state governments should eliminate subsidies to professional sports franchises. (85%)
10. If the federal budget is to be balanced, it should be done over the business cycle rather than yearly. (85%)

PROPOSITIONS ABOUT WHICH MOST ECONOMISTS AGREE (2/2)

(AND % OF ECONOMISTS WHO AGREE)

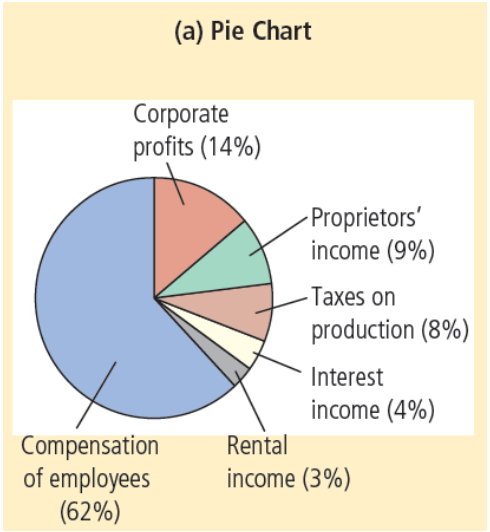
11. The gap between Social Security funds and expenditures will become unsustainably large within the next 50 years if current policies remain unchanged. (85%)
12. Cash payments increase the welfare of recipients to a greater degree than do transfers-in-kind of equal cash value. (84%)
13. A large federal budget deficit has an adverse effect on the economy. (83%)
14. The redistribution of income in the United States is a legitimate role for the government. (83%)
15. Inflation is caused primarily by too much growth in the money supply. (83%)
16. The United States should not ban genetically modified crops. (82%)
17. A minimum wage increases unemployment among young and unskilled workers. (79%)
18. The government should restructure the welfare system along the lines of a “negative income tax.” (79%)
19. Effluent taxes and marketable pollution permits represent a better approach to pollution control than the imposition of pollution ceilings. (78%)
20. Government subsidies on ethanol in the US should be reduced or eliminated. (78%)

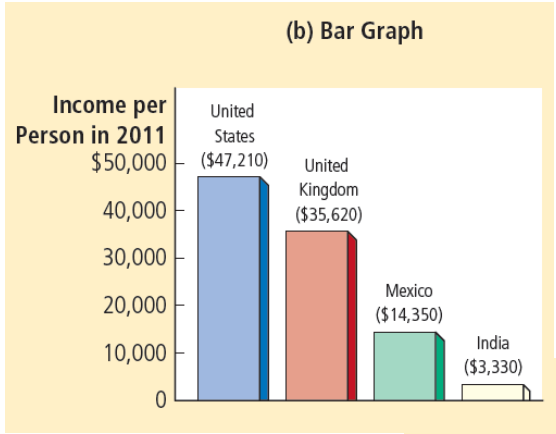
GRAPHING: A BRIEF REVIEW
GRAPHS OF A SINGLE VARIABLE

Graphs' purposes

- Visually express ideas that might be less clear if described with equations or words
- Powerful way of finding and interpreting patterns

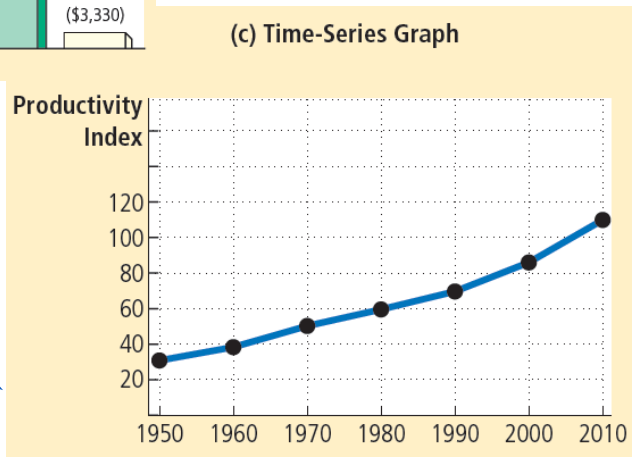
Sources of the U.S. national income in 2011





Average incomes in 2011

Productivity of labor in U.S. businesses



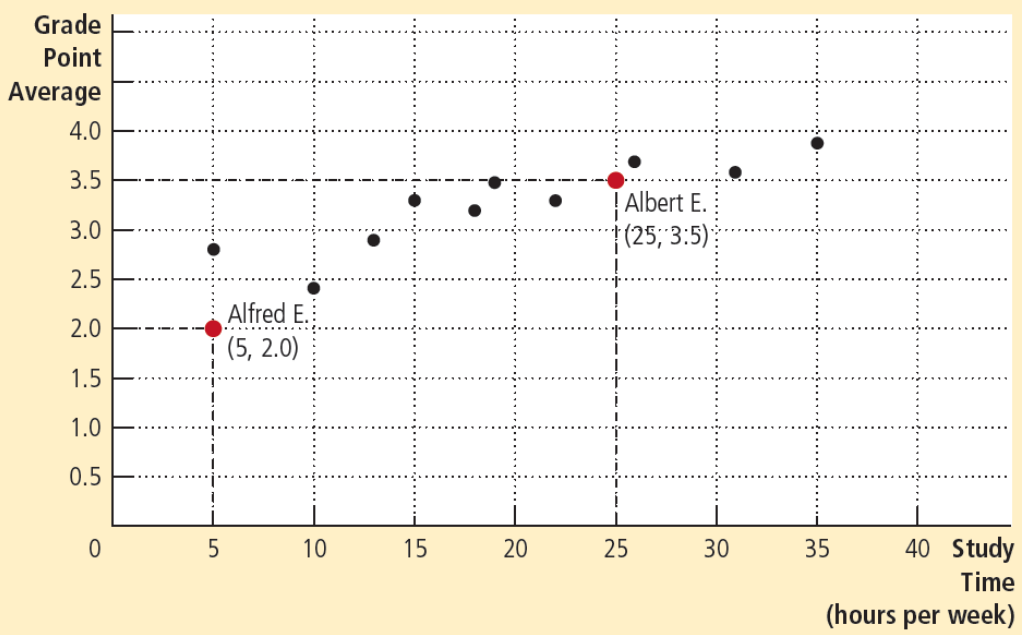
GRAPHING: A BRIEF REVIEW
GRAPHS OF TWO VARIABLES

: The coordinate system: display two variables on a single graph

- Scatterplot
- Ordered pairs of points
  - x-coordinate: horizontal location
  - y-coordinate: vertical location

- Example: Students who study more tend to get higher grades

Albert E., Alfred E., and their classmates are represented by various points



GRAPHING: A BRIEF REVIEW
AN EXAMPLE: NOVELS PURCHASED BY EMMA

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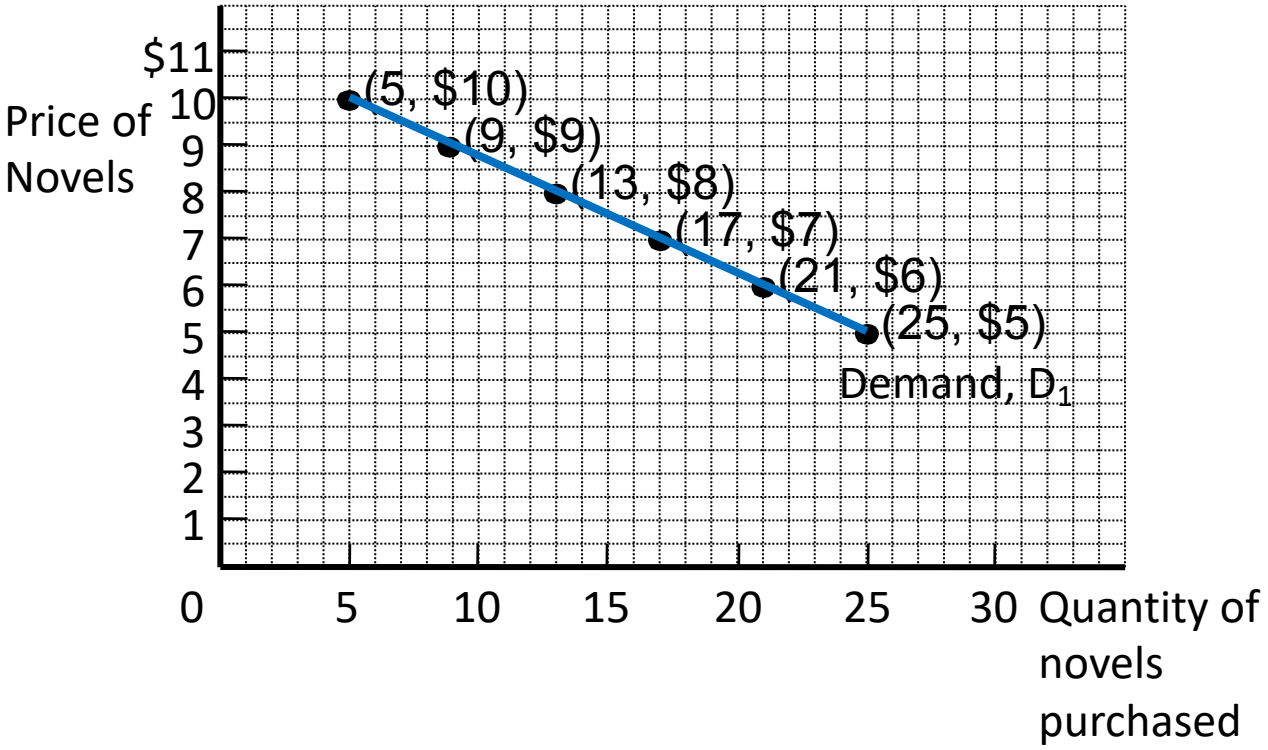
Data

- Number of novels purchased
- Price of novels
- Income

Price	For $20,000 Income:	For $30,000 Income:	For $40,000 Income:
$10	2 novels	5 novels	8 novels
9	6	9	12
8	10	13	16
7	14	17	20
6	18	21	24
5	22	25	28
	Demand curve, D_3	Demand curve, D_1	Demand curve, D_2

EXAMPLE

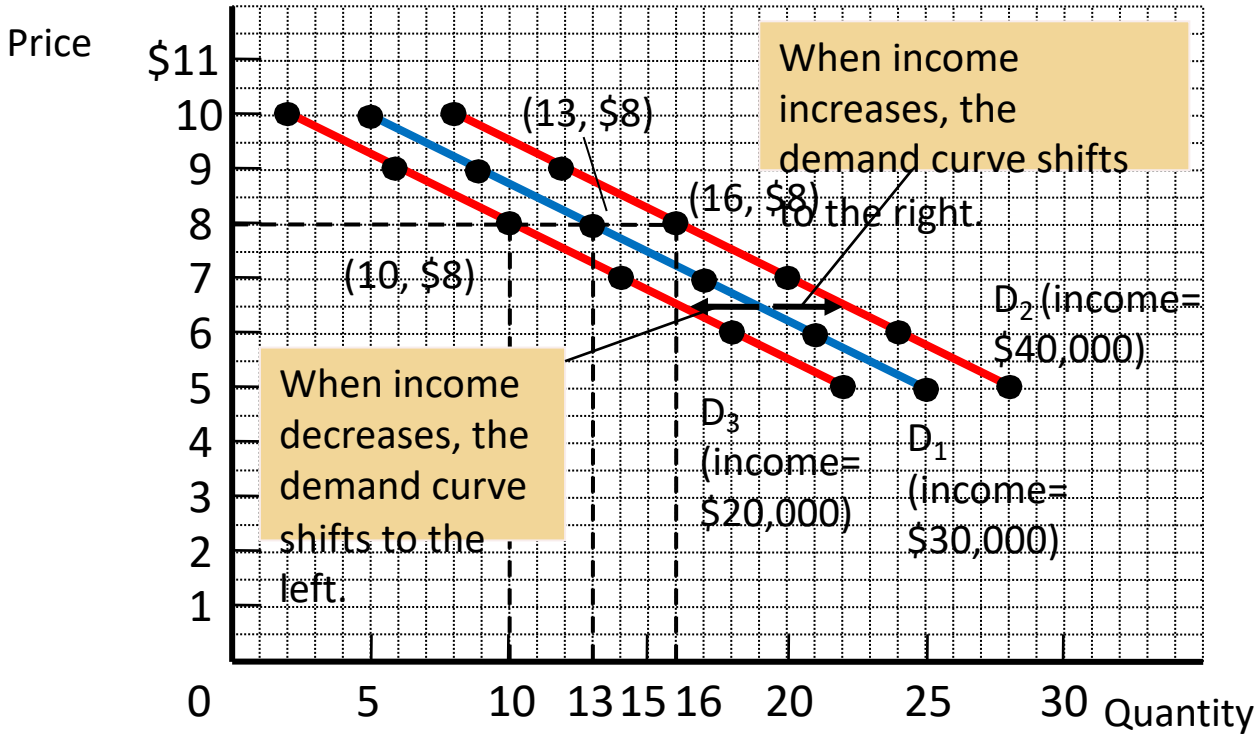
GRAPHING: A BRIEF REVIEW
AN EXAMPLE: NOVELS PURCHASED BY EMMA



The line D_1 shows how Emma's purchases of novels depend on the price of novels when her income is held constant. Because the price and the quantity demanded are negatively related, the demand curve slopes downward.

EXAMPLE

GRAPHING: A BRIEF REVIEW
AN EXAMPLE: NOVELS PURCHASED BY EMMA



The location of Emma's demand curve for novels depends on how much income she earns. The more she earns, the more novels she will purchase at any given price, and the farther to the right her demand curve will lie.

EXAMPLE

GRAPHING: A BRIEF REVIEW

Properties of Graphs of Two Variables

- Negatively related variables
  - The two variables move in opposite direction
  - Downward sloping curve
- Positively related variables
  - The two variables move in the same direction
  - Upward sloping curve
- Movement along a curve
- Shifts in a curve

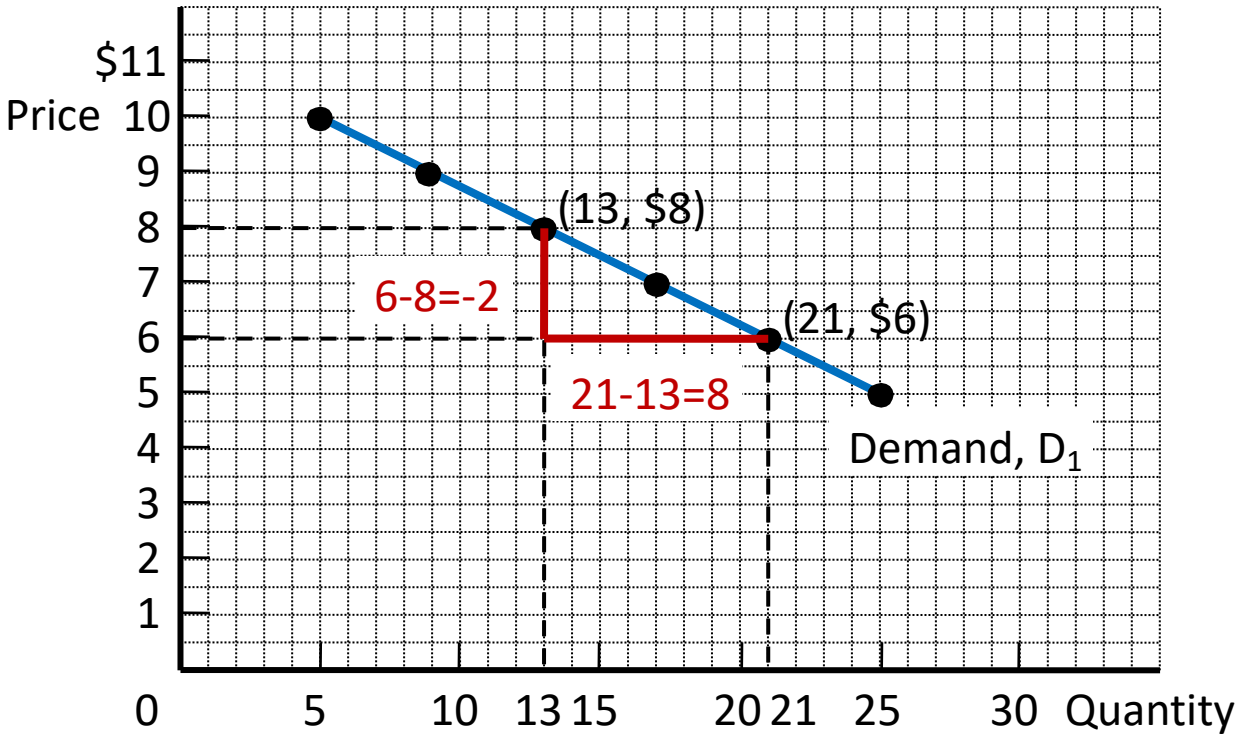
GRAPHING: A BRIEF REVIEW

The Slope of a Curve

- Ratio of the vertical distance covered to the horizontal distance covered as we move along the line
- The "rise" (change in y) divided by the "run" (change in x)
- $Slope = \frac{\Delta y}{\Delta x}$ with Δ (delta) = change in a variable
  - Fairly flat upward-sloping line: slope is a small positive number
  - Steep upward-sloping line: slope is a large positive number
  - Downward sloping line: slope is a negative number
  - Horizontal line: slope is zero
  - Vertical line: infinite slope

GRAPHING: A BRIEF REVIEW

Calculating the Slope



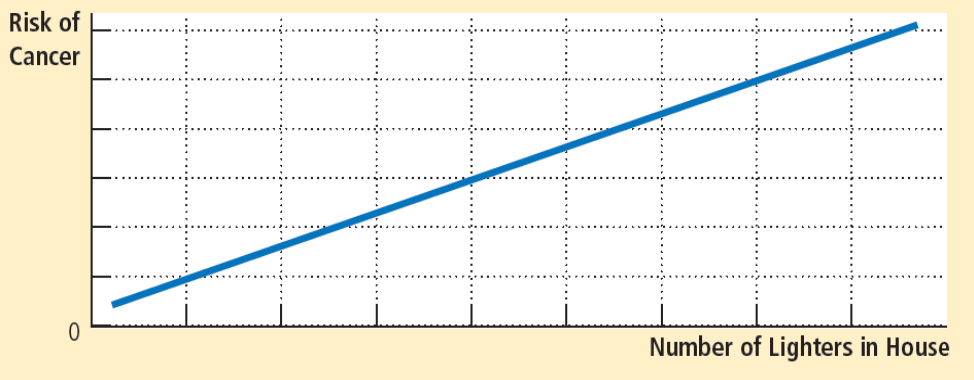
To calculate the slope of the demand curve, we can look at the changes in the x- and y-coordinates as we move from the point (21 novels, $6) to the point (13 novels, $8). The slope of the line is the ratio of the change in the y-coordinate (–2) to the change in the x-coordinate (+8), which equals –1⁄4.

GRAPHING: A BRIEF REVIEW

Cause and Effect

- One set of events: causes another set of events
- Omitted variables: lead to a deceptive graph

The upward-sloping curve shows that members of households with more cigarette lighters are more likely to develop cancer. Yet we should not conclude that ownership of lighters causes cancer because the graph does not take into account the number of cigarettes smoked.



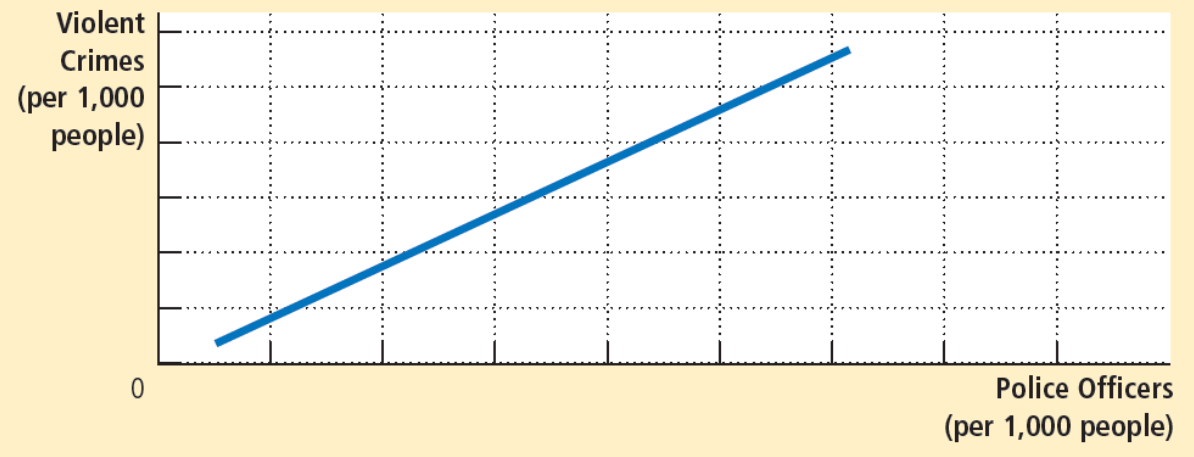
GRAPHING: A BRIEF REVIEW

Cause and Effect

- Reverse causality
  - Decide that event A causes event B
  - Facts: event B causes event A

GRAPHING: A BRIEF REVIEW

Graph Suggesting Reverse Causality



The upward-sloping curve shows that cities with a higher concentration of police are more dangerous. Yet the graph does not tell us whether police cause crime or crime-plagued cities hire more police.

1.4 INTERDEPENDENCE AND THE GAINS FROM TRADE

FRANK & ROSE (1/4)

- Only two goods: meat and potatoes
- Only two people
  - A cattle rancher named Rose
  - A potato farmer named Frank
  - Both would like to eat both meat and potatoes
- Do both gain from specialization and trade?

FRANK & ROSE (2/4)

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(a) Production Opportunities

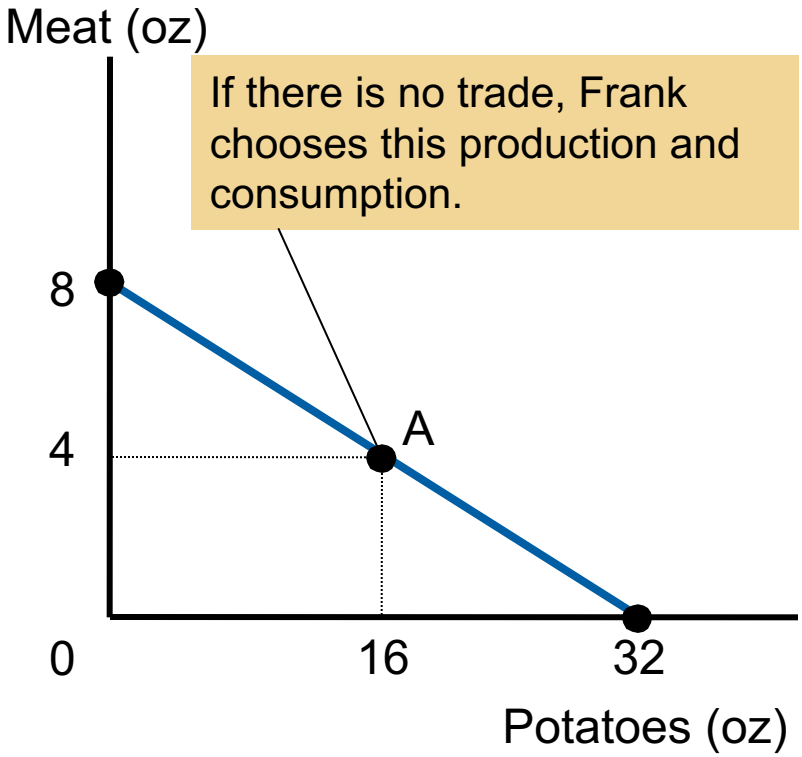
	Minutes Needed to Make 1 Ounce of:		Amount Produced in 8 Hours	
	Meat	**Potatoes**	**Meat**	**Potatoes**
Frank the farmer	60 min/oz	15 min/oz	8 oz	32 oz
Rose the rancher	20 min/oz	10 min/oz	24 oz	48 oz

Panel (a) shows the production opportunities available to Frank the farmer and Rose the rancher.

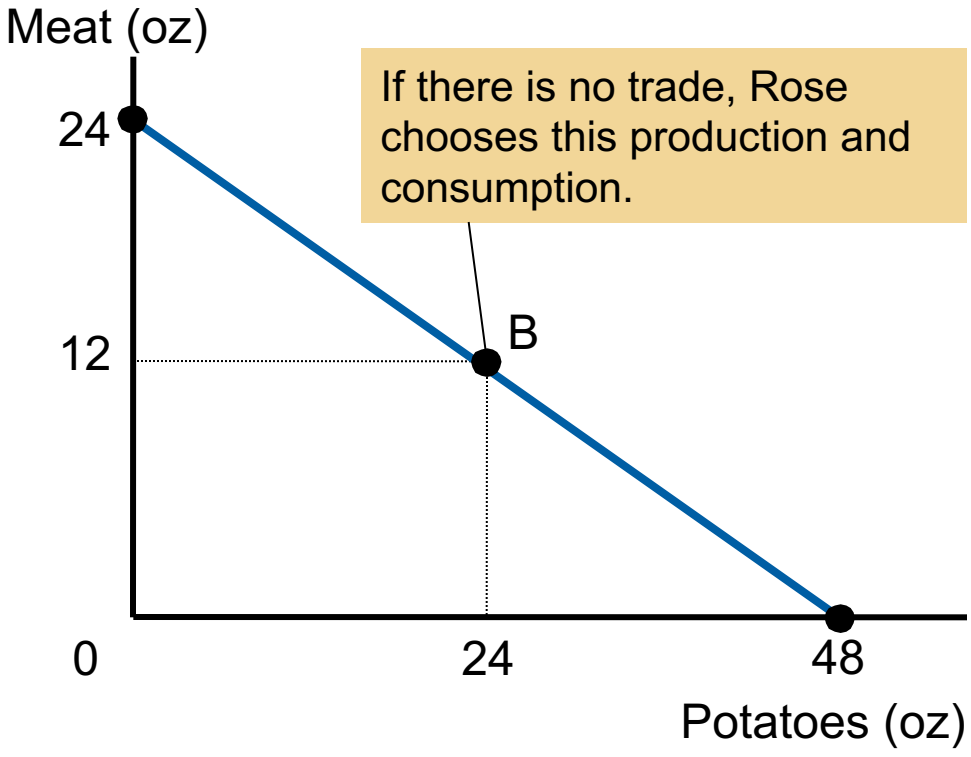
Production possibilities frontier: various mixes of output that an economy can produce

FRANK & ROSE (3/4)

(b) Frank's production possibilities frontier



(c) Rose's production possibilities frontier

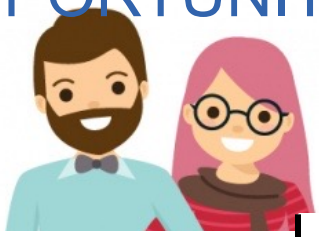


Panel b/c shows the combinations of meat and potatoes that Frank/Rose can produce. Both production possibilities frontiers are derived assuming that Frank and Rose each work 8 hours per day. If there is no trade, each person's production possibilities frontier is also his or her consumption possibilities frontier.

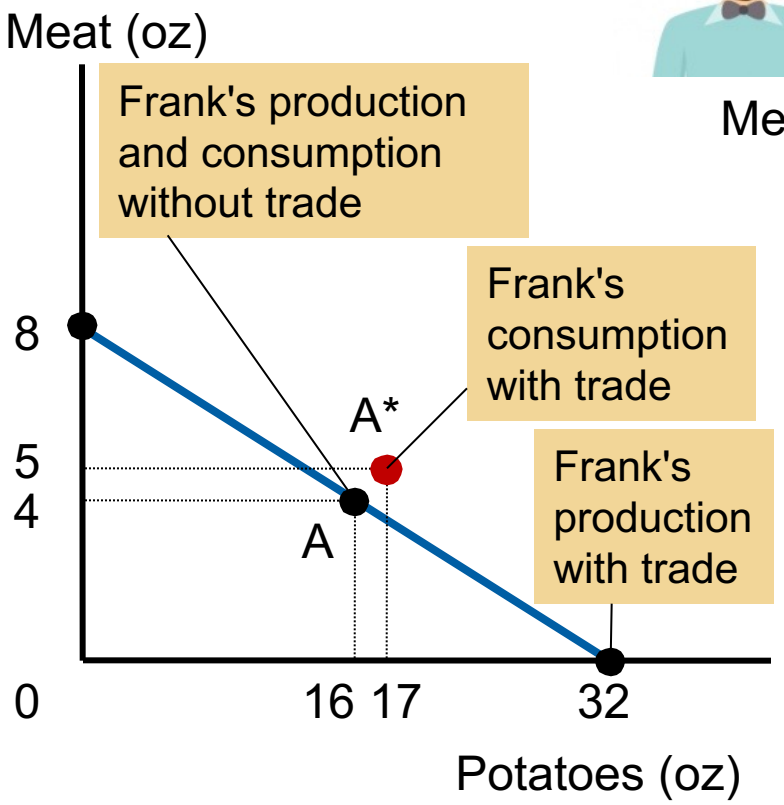
FRANK & ROSE (4/4)

- Specialization and trade
  - Farmer Frank specializes in growing potatoes
    - More time growing potatoes
    - Less time raising cattle
  - Rancher Rose specializes in raising cattle
    - More time raising cattle
    - Less time growing potatoes
  - Trade: 5 oz of meat for 15 oz of potatoes

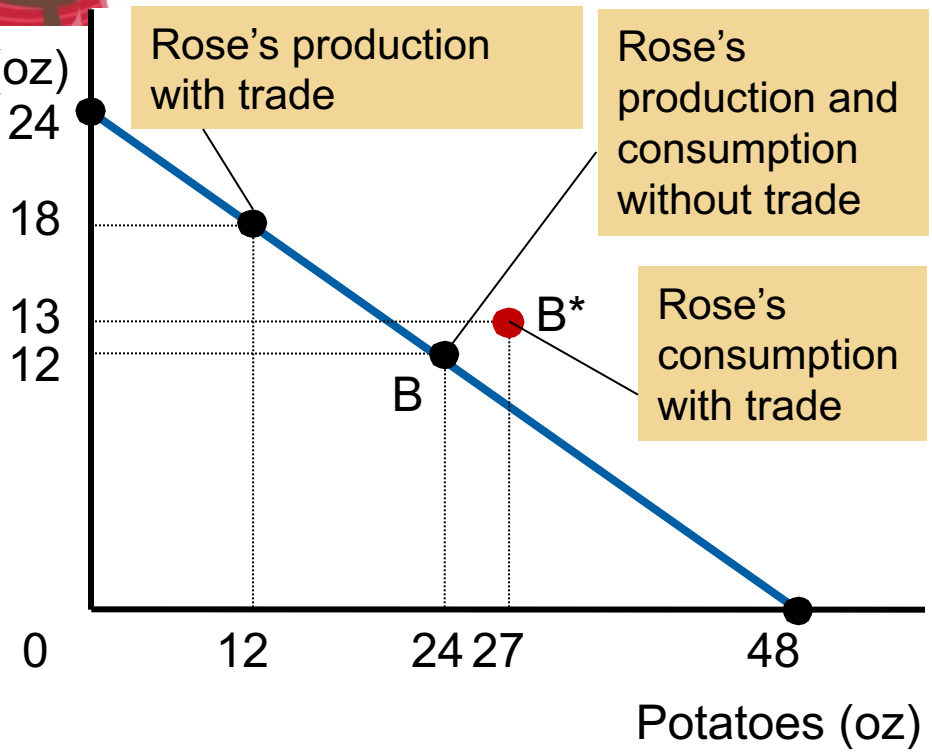
HOW TRADE EXPANDS THE SET OF CONSUMPTION OPPORTUNITIES (a, b)



(a) Frank's production and consumption



(b) Rose's production and consumption



The proposed trade between Frank the farmer and Rose the rancher offers each of them a combination of meat and potatoes that would be impossible in the absence of trade. In panel (a), Frank gets to consume at point A* rather than point A. In panel (b), Rose gets to consume at point B* rather than point B. Trade allows each to consume more meat and more potatoes.

HOW TRADE EXPANDS THE SET OF CONSUMPTION OPPORTUNITIES (c)

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(c) The Gains from Trade: A Summary

	Frank		Rose	
	Meat	**Potatoes**	**Meat**	**Potatoes**
Without Trade:				
Production and Consumption	4 oz	16 oz	12 oz	24 oz
With Trade:				
Production	0 oz	32 oz	18 oz	12 oz
Trade	Gets 5 oz	Gives 15 oz	Gives 5 oz	Gets 15 oz
Consumption	5 oz	17 oz	13 oz	27 oz
GAINS FROM TRADE:				
Increase in Consumption	+1 oz	+1 oz	+1 oz	+3 oz

The proposed trade between Frank the farmer and Rose the rancher offers each of them a combination of meat and potatoes that would be impossible in the absence of trade. In panel (a), Frank gets to consume at point A* rather than point A. In panel (b), Rose gets to consume at point B* rather than point B. Trade allows each to consume more meat and more potatoes.

ABSOLUTE AND COMPARATIVE ADVANTAGE (1/5)

ABSOLUTE ADVANTAGE: The ability to produce a good using fewer inputs than another producer

- In producing meat: Rose
  - Rose needs 20 min. to produce 1 oz. of meat
  - Frank needs 60 minutes
- In producing potatoes: Rose
  - Rose needs 10 min. to produce 1 oz. of potatoes
  - Frank needs 15 minutes

ABSOLUTE AND COMPARATIVE ADVANTAGE (2/5)

Opportunity cost

- Whatever must be given up to obtain some item
- Measures the trade-off between the two goods that each producer faces
- Opportunity cost of one good: inverse of the opportunity cost of the other

	Opportunity Cost of:	
	1 oz of Meat	1 oz of Potatoes
Frank the farmer	4 oz potatoes	¼ oz meat
Rose the rancher	2 oz potatoes	½ oz meat

ABSOLUTE AND COMPARATIVE ADVANTAGE (3/5)

COMPARATIVE ADVANTAGE: The ability to produce a good at a lower opportunity cost than another producer

- Reflects the relative opportunity cost
- Each good should be produced by the individual that has the smaller opportunity cost of producing that good
- Specialize according to comparative advantage

ABSOLUTE AND COMPARATIVE ADVANTAGE (4/5)

- One person
  - Can have absolute advantage in both goods
  - Cannot have comparative advantage in both goods
- For different opportunity costs
  - One person has comparative advantage in one good
  - The other person has comparative advantage in the other good
- Gains from specialization and trade
  - Based on comparative advantage
  - Total production in economy rises
    - Increase in the size of the economic pie
    - Everyone is better off

ABSOLUTE AND COMPARATIVE ADVANTAGE (5/5)

- Trade can benefit everyone in society
  - Allows people to specialize
- The price of trade
  - Must lie between the two opportunity costs
- The comparative advantage explains:
  - Interdependence
  - Gains from trade

APPLICATIONS OF COMPARATIVE ADVANTAGE (1/3)

Should Leonardo Mow His Own Lawn?

- Leonardo, in 2 hours
  - Mow his lawn, or
  - Film a TV commercial, earn $20,000

- Forest Gump, in 4 hours
  - Mow Leo's lawn
  - Work at McDonald's, earn $40

APPLICATIONS OF COMPARATIVE ADVANTAGE (2/3)

APPLICATIONS OF COMPARATIVE ADVANTAGE (3/3)

Should the U.S. trade with other countries?

- Imports: Goods produced abroad and sold domestically
- Exports: Goods produced domestically and sold abroad
- U.S and Japan: each produces food and cars
  - One American worker, one month. 1 car or 2 tons of food
  - One Japanese worker, one month: 1 car or 1 ton of food
- Each good should be produced by the country with the smaller opportunity cost of producing that good
- Specialization and trade: all countries have more food and more cars

02

THE BASICS OF SUPPLY AND DEMAND

2.1 The Market Forces of Supply and Demand

2.2 Elasticity and its Application

02 IDEA

In a competitive market, demand and supply determine the price.

The market equilibrium is characterized by the equilibrium price and quantity if all buyers and suppliers act according to their incentives.

As a manager you need to understand the determinants of demand, the effects of price changes and the competitive environment.

02 LEARNING OBJECTIVES

- Describe and explain the law of demand and the law of supply
- Explain the role of price in reaching a market equilibrium
- Describe the effect of a change in demand on the equilibrium price
- Describe the effect of a change in supply on the equilibrium price
- Use information on price and quantity to determine what caused a change in price
- Explain how individual and aggregate demand/supply are related
- Discuss the adjustment process that leads to an equilibrium
- Apply the concept of elasticity
- Calculate and interpret elasticities

2.1 THE MARKET FORCES OF SUPPLY AND DEMAND

MARKETS AND COMPETITION

Supply and Demand

- The forces that make market economies work
- Refer to the behavior of people as they interact with one another in markets

Markets

- A group of buyers and sellers of a particular good or service
- Buyers as a group: determine the demand for the product
- Sellers as a group: determine the supply of the product
- Markets take many forms
  - Highly organized, e.g. markets for many agricultural commodities
  - Less organized, e.g. market for ice cream in a particular town

MARKETS AND COMPETITION

PERFECTLY COMPETITIVE MARKET

- Goods offered for sale are all exactly the same (homogenous goods)
- Buyers and sellers are so numerous that no single buyer or seller has any influence over the market price: price takers
- Free market entry (or exit): buyers can easily switch from one supplier to another, and suppliers can easily enter or exit a market.
- Perfect knowledge: No information failure or time lags

MONOPOLY

- The only seller in the market
- Sets the price

Other markets: Between perfect competition and monopoly, for example: oligoply

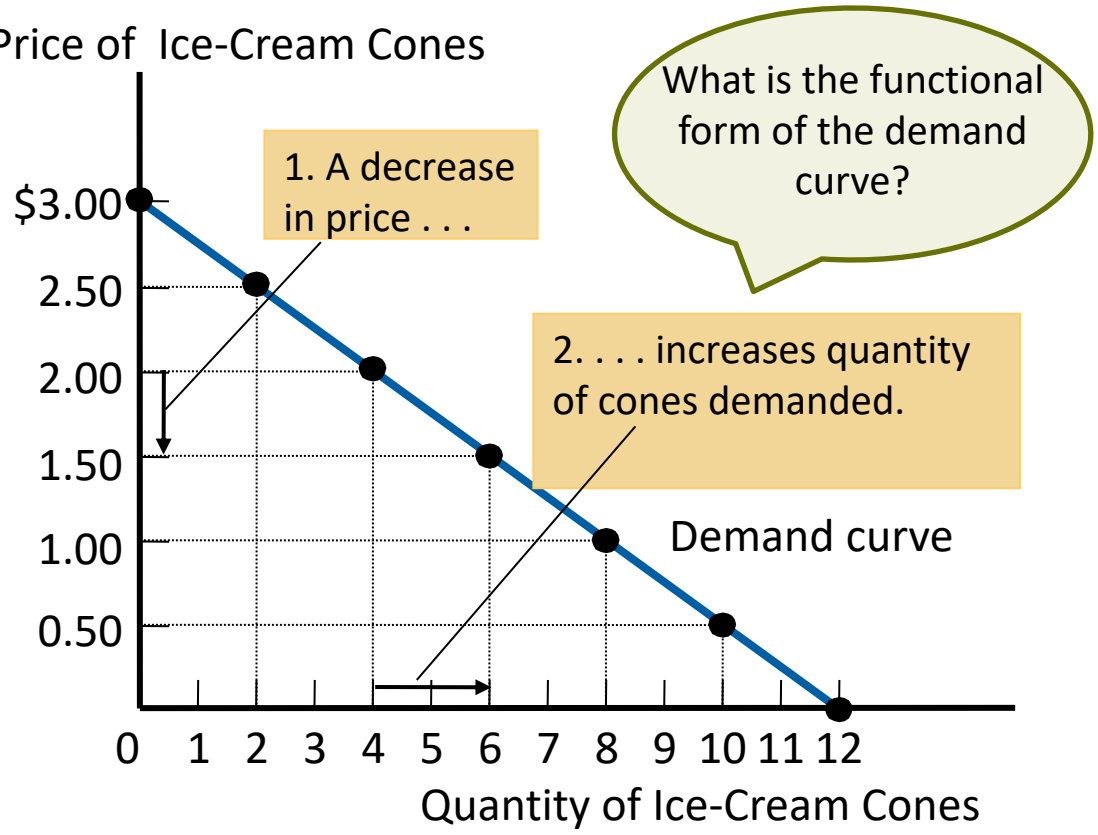
DEMAND #1

- Quantity demanded: amount of a good that buyers are willing and able to purchase
- Relationship between the price of a good and quantity demanded
- Law of demand: when the price falls, the quantity demanded rises c.p. and vice versa
- Demand curve: a graph
  - Price on the vertical axis
  - Quantity on the horizontal axis
- Individual demand: an individual's demand for a product

DEMAND #2

Catherine's Demand Schedule and Demand Curve

Price of Ice-Cream Cone	Quantity of Cones Demanded
$0.00	12 cones
0.50	10
1.00	8
1.50	6
2.00	4
2.50	2
3.00	0



DEMAND #3

Market Demand as the Sum of Individual Demands

Price of Ice-Cream Cone	Catherine		Nicholas		Market
$0.00	12	+	7	=	19 cones
0.50	10		6		16
1.00	8		5		13
1.50	6		4		10
2.00	4		3		7
2.50	2		2		4
3.00	0		1		1
3.50	0		0		0

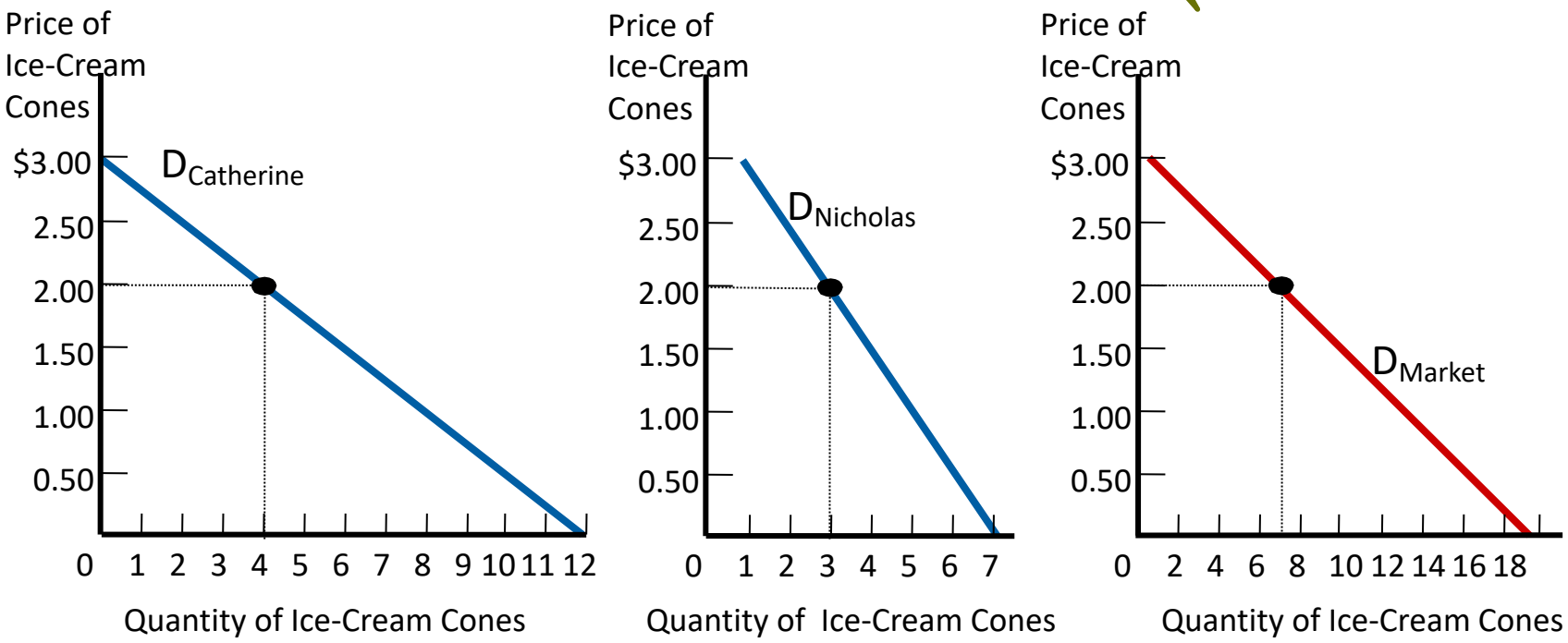
The quantity demanded in a market is the sum of the quantities demanded by all the buyers at each price. Thus, the market demand curve is found by adding horizontally the individual demand curves. At a price of $2.00, Catherine demands 4 ice-cream cones, and Nicholas demands 3 ice-cream cones. The quantity demanded in the market at this price is 7 cones.

DEMAND #4

This figure is misleading. Why?

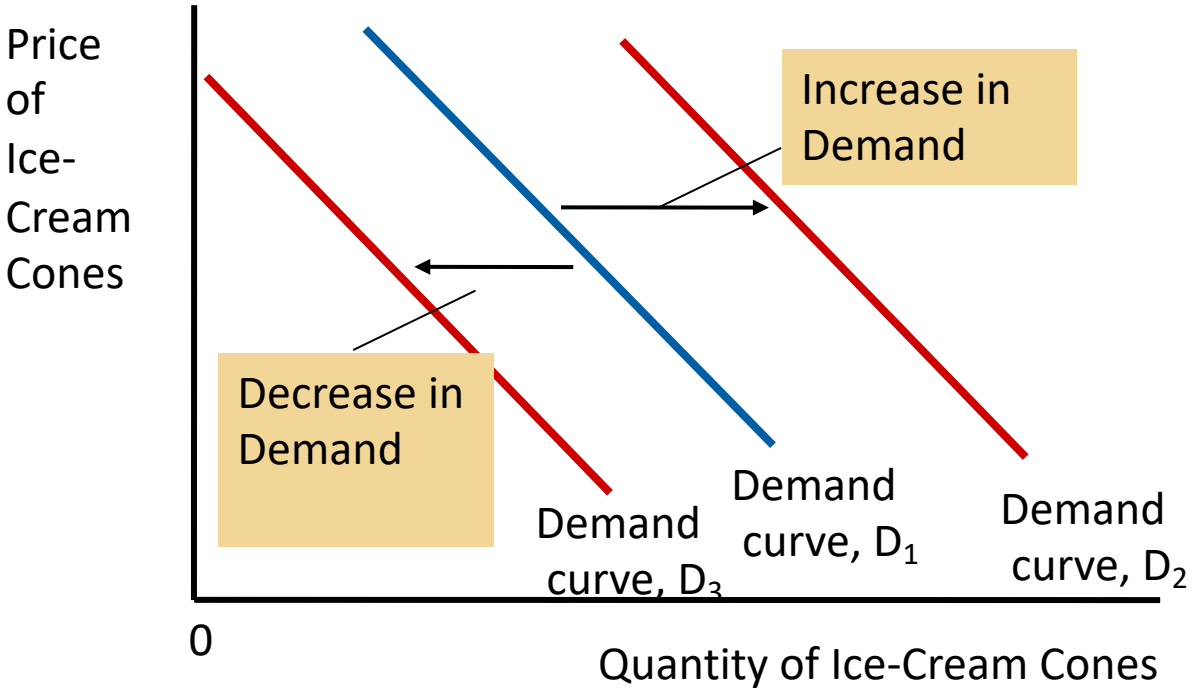
Market Demand as the Sum of Individual Demands

Catherine's demand + Nicholas's demand = Market demand



DEMAND #5

Shifts in the Demand Curve



- Any change that raises the quantity that buyers wish to purchase at any given price shifts the demand curve to the right.
- Any change that lowers the quantity that buyers wish to purchase at any given price shifts the demand curve to the left.
- Variables that can shift the demand curve: income, prices of related goods, tastes, expectations, number of buyers

DEMAND #6

The Effect of Income and Price Changes (of Related Goods)

- **NORMAL GOOD:** an increase in **income** leads to an increase in demand c.p. (and vice versa)
- **INFERIOR GOOD:** an increase in **income** leads to a decrease in demand c.p. (and vice versa)
- **SUBSTITUTES:** an increase in the **price of one** good leads to an increase in the demand for the other c.p. (and vice versa)
- **COMPLEMENTS**: an increase in the **price of one** leads to a decrease in the demand for the other c.p. (and vice versa)

The fact that goods can be complements or substitutes suggests that when studying the effects of price changes in one market, it may be important to look at the consequences in related markets.

DEMAND #7

Complete the table below by adding either

- Represents a **movement** along the demand curve or…
- **Shifts** the demand curve

Variable	A Change in This Variable …
Price of the good itself	
Income	
Prices of related goods	
Tastes	
Expectations	
Number of buyers	

EXAMPLE: SMOKING

Two ways to reduce the quantity of smoking demanded

1. Shift the demand curve for cigarettes and other tobacco products
2. Try to raise the price of cigarettes

"What is the best way to stop this?"

EXAMPLE

EXAMPLE: SMOKING

Two ways to reduce the quantity of smoking demanded

What the government can do to influence people's perception:

- Public service announcements
- Mandatory health warnings on cigarette packages
- Prohibition of cigarette advertising on television

If successful

- Shift demand curve to the left

Try to raise the price of cigarettes

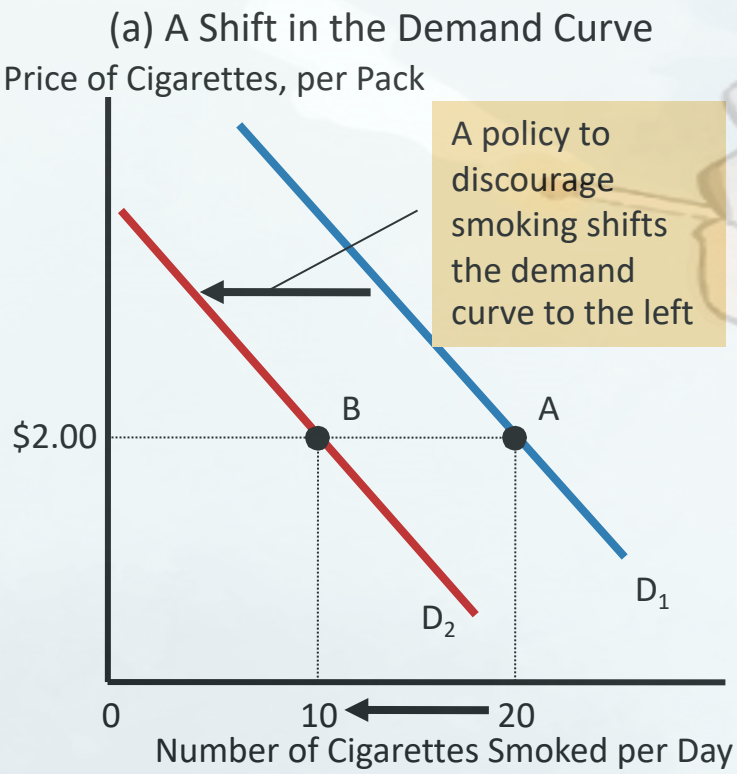
- Tax the manufacturer: higher price
- Movement along demand curve
- 10% ↑ in price → 4% ↓ in smoking
- Teenagers: 10% ↑ in price → 12% ↓ in smoking

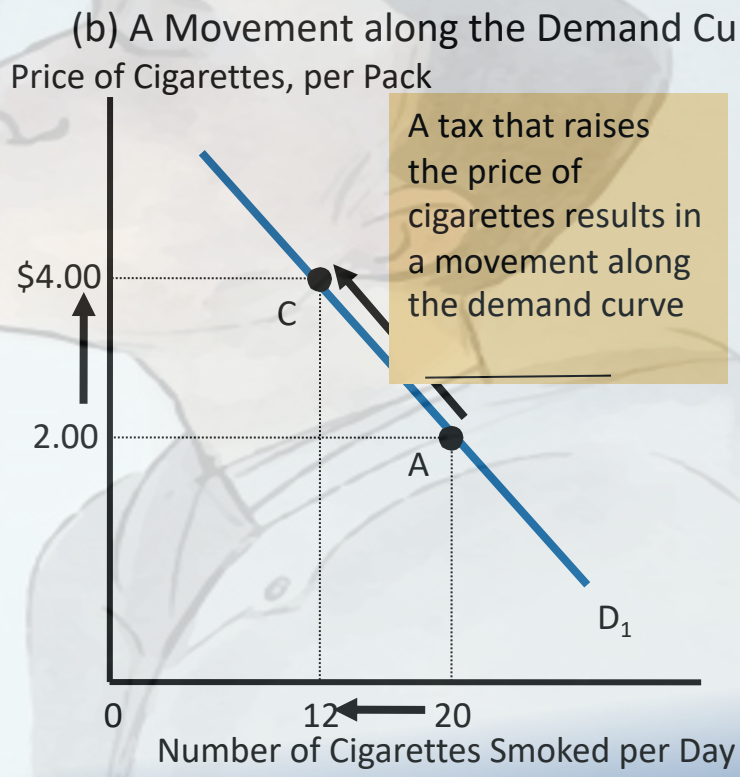
Demand for cigarettes vs. demand for marijuana: Appear to be complements

EXAMPLE

EXAMPLE: SMOKING

Two ways to reduce the quantity of smoking demanded





EXAMPLE

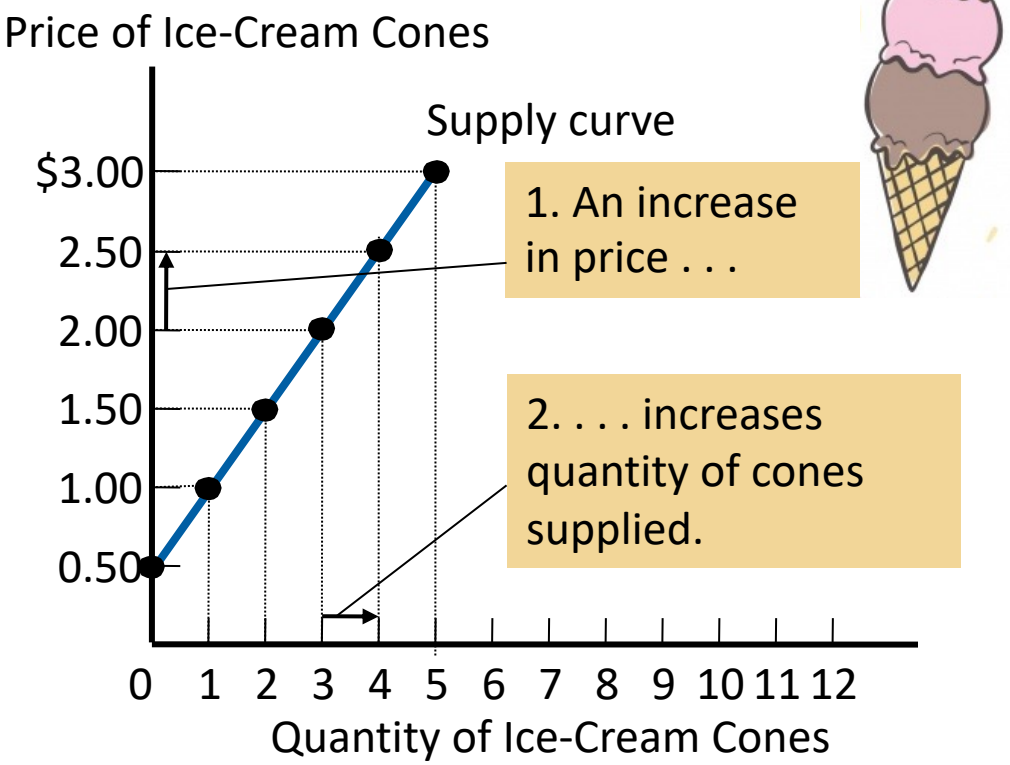
SUPPLY #1

- Quantity supplied: amount of a good sellers are willing and able to sell
- Relationship between the price of a good and the quantity supplied
- Law of supply: when the price of a good rises, the quantity supplied of the good also rises c.p. and vice versa
- Supply curve: a graph
  - Price on the vertical axis
  - Quantity on the horizontal axis
- Individual supply: a seller's individual supply

SUPPLY #2

Ben's Supply Schedule and Supply Curve

Price of Ice-cream Cone	Quantity Of Cones Supplied
$0.00	0 cones
0.50	0
1.00	1
1.50	2
2.00	3
2.50	4
3.00	5



SUPPLY #3

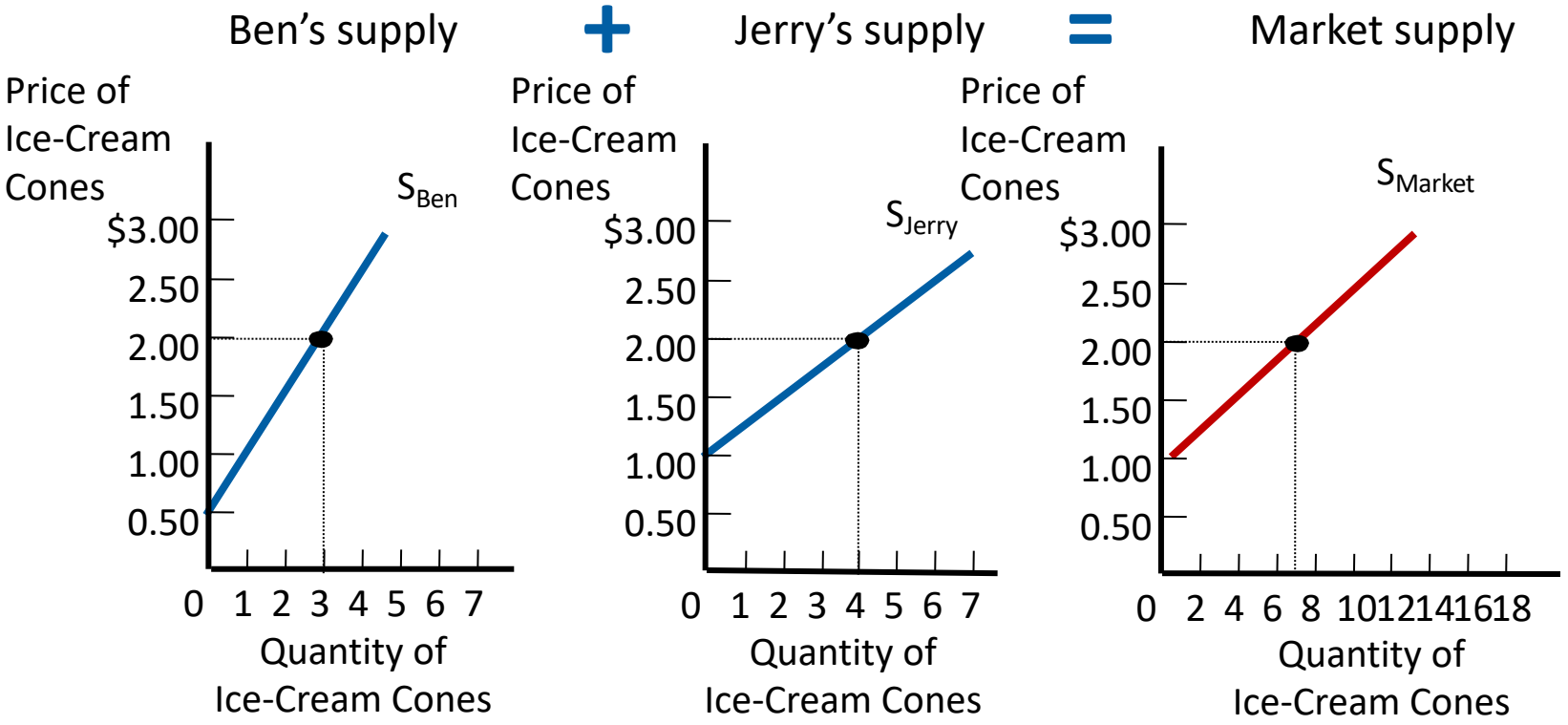
Market Supply as the Sum of Individual Supplies

Price of Ice-Cream Cone	Ben		Jerry		Market
$0.00	0	+	0	=	0 cones
0.50	0		0		0
1.00	1		0		1
1.50	2		2		4
2.00	3		4		7
2.50	4		6		10
3.00	5		8		13

The quantity supplied in a market is the sum of the quantities supplied by all the sellers at each price. Thus, the market supply curve is found by adding horizontally the individual supply curves. At a price of $2.00, Ben supplies 3 ice-cream cones, and Jerry supplies 4 ice-cream cones. The quantity supplied in the market at this price is 7 cones.

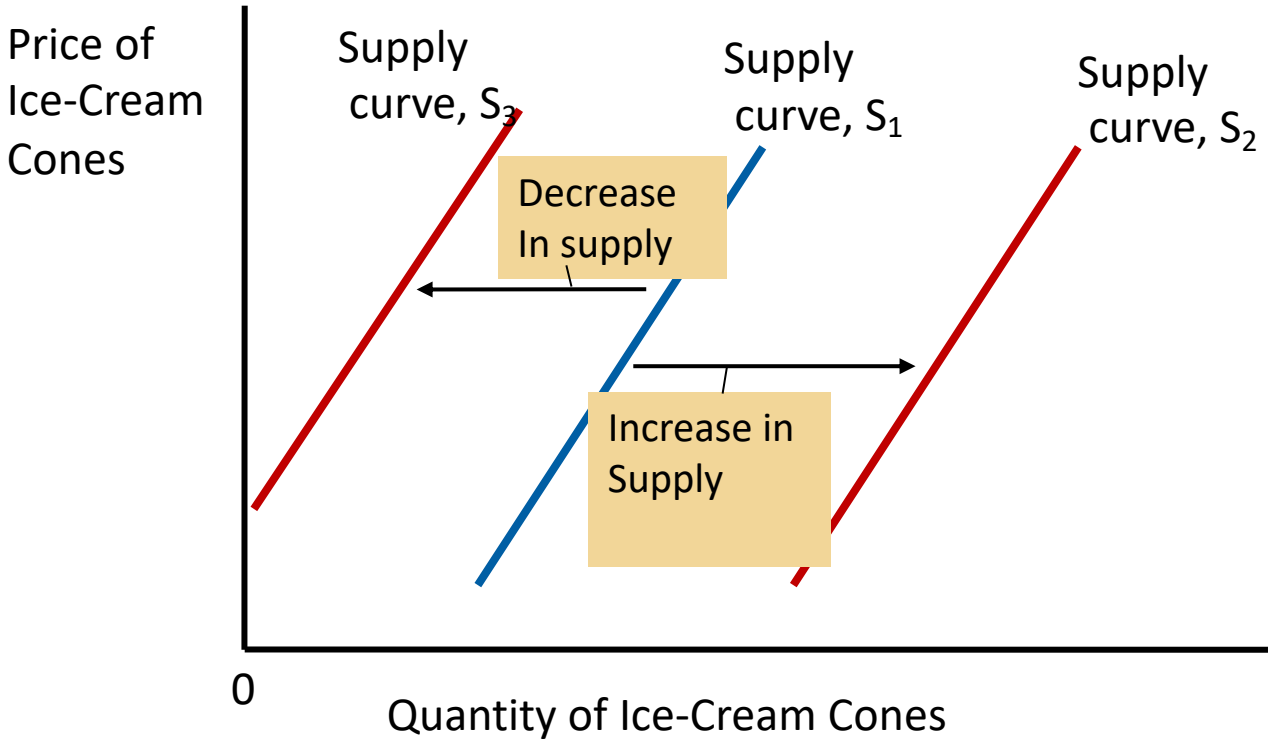
SUPPLY #4

Market Supply as the Sum of Individual Supplies



SUPPLY #5

Shifts in the supply curve



- Any change that raises the quantity that sellers wish to produce at any given price shifts the supply curve to the right.
- Any change that lowers the quantity that sellers wish to produce at any given price shifts the supply curve to the left.
- Variables that can shift the supply curve: input prices, technology, expectations about future, number of sellers

SUPPLY #6

Complete the table below by adding either

- Represents a **movement** along the supply curve or…
- **Shifts** the supply curve

Variable	A Change in This Variable …
Price of the good itself	
Input prices	
Technology	
Expectations	
Number of sellers	

SUPPLY AND DEMAND TOGETHER (1/7)

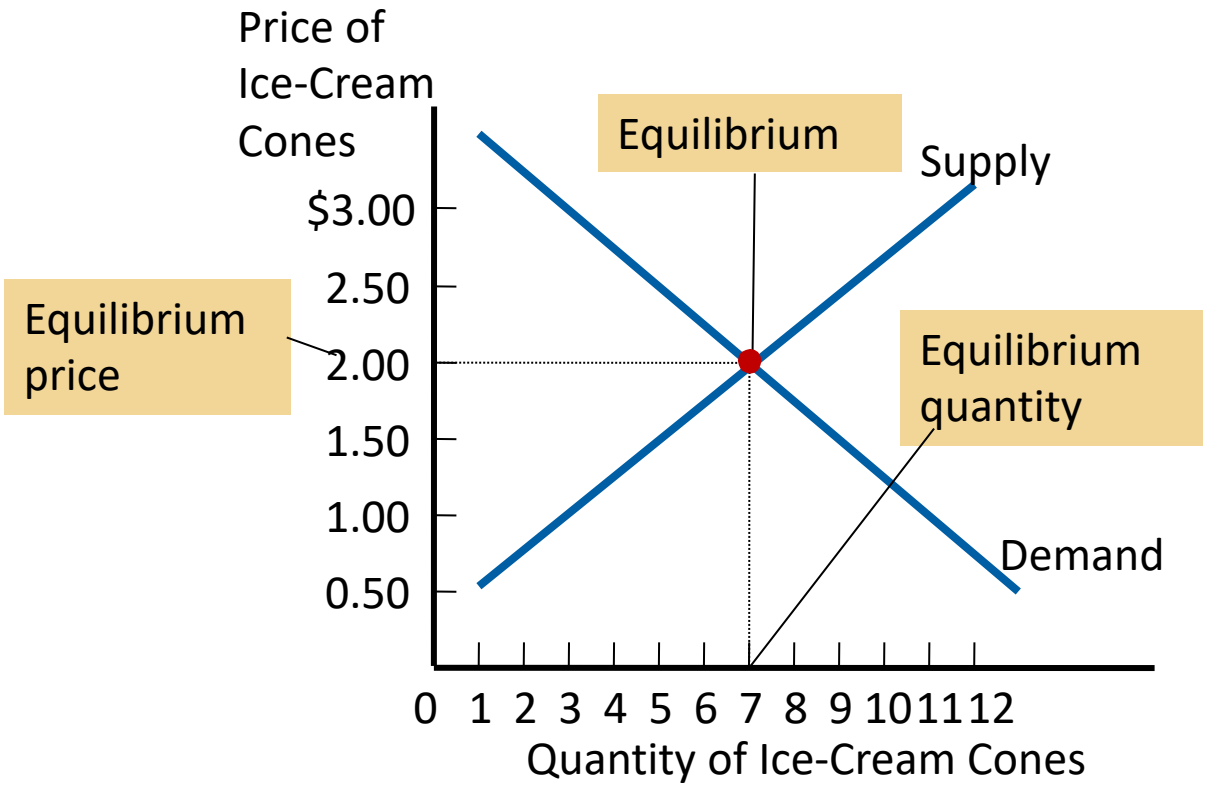
EQUILIBRIUM

- A situation in which market price has reached the level where
  - Quantity supplied = quantity demanded
  - Supply and demand curves intersect
- Equilibrium price: balances quantity supplied and quantity demanded
  Market-clearing price
- Equilibrium quantity: quantity supplied and quantity demanded at the equilibrium price

SUPPLY AND DEMAND TOGETHER (2/7)

Equilibrium

The equilibrium is found where the supply and demand curves intersect. At the equilibrium price, the quantity supplied equals the quantity demanded. Here the equilibrium price is $2.00: At this price, 7 ice-cream cones are supplied, and 7 ice-cream cones are demanded.



SUPPLY AND DEMAND TOGETHER (3/7)

Markets Not in Equilibrium

Excess supply

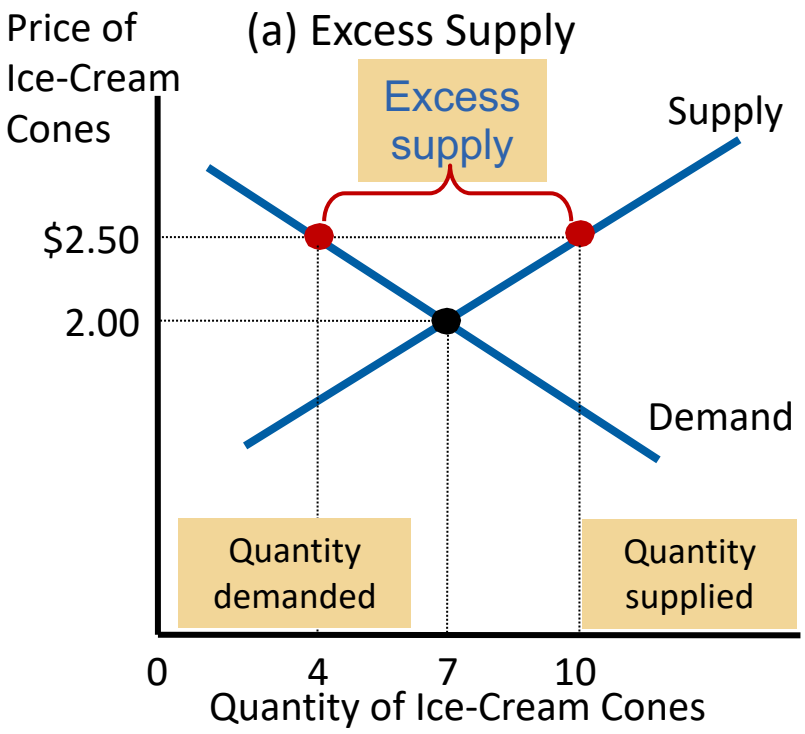
- Quantity supplied > quantity demanded
- Downward pressure on price
  - Movements along the demand and supply curves
  - Increase in quantity demanded
  - Decrease in quantity supplied

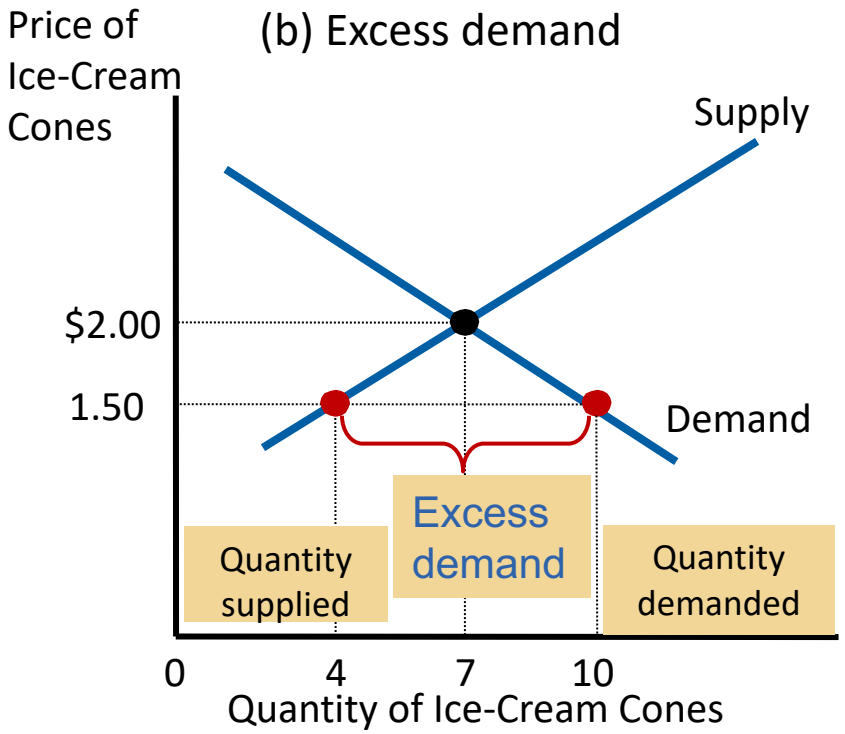
Excess demand

- Quantity demanded > quantity supplied
- Upward pressure on price
  - Movements along the demand and supply curves
  - Decrease in quantity demanded
  - Increase in quantity supplied

SUPPLY AND DEMAND TOGETHER (4/7)

Markets Not in Equilibrium





SUPPLY AND DEMAND TOGETHER (5/7)

SUPPLY AND DEMAND TOGETHER (6/7)

Law of supply and demand

- The price of any good adjusts: to bring the quantity supplied and the quantity demanded for that good into balance
- In most markets: surpluses and shortages are temporary

SUPPLY AND DEMAND TOGETHER (7/7)

Three Steps to Analyze Changes in Equilibrium

1. Decide whether the event shifts the supply curve, the demand curve, or, in some cases, both curves
2. Decide whether the curve shifts to the right or to the left
3. Use the supply-and-demand diagram
   - Compare the initial and the new equilibrium
   - Effects on equilibrium price and quantity

The Market for Ice Cream

CASE A: One summer, very hot weather increases demand

CASE B: One summer, a hurricane destroys part of the sugarcane crop, which boosts the price of sugar

CASE C: THE NEXT YEAR… A hurricane and a heat wave

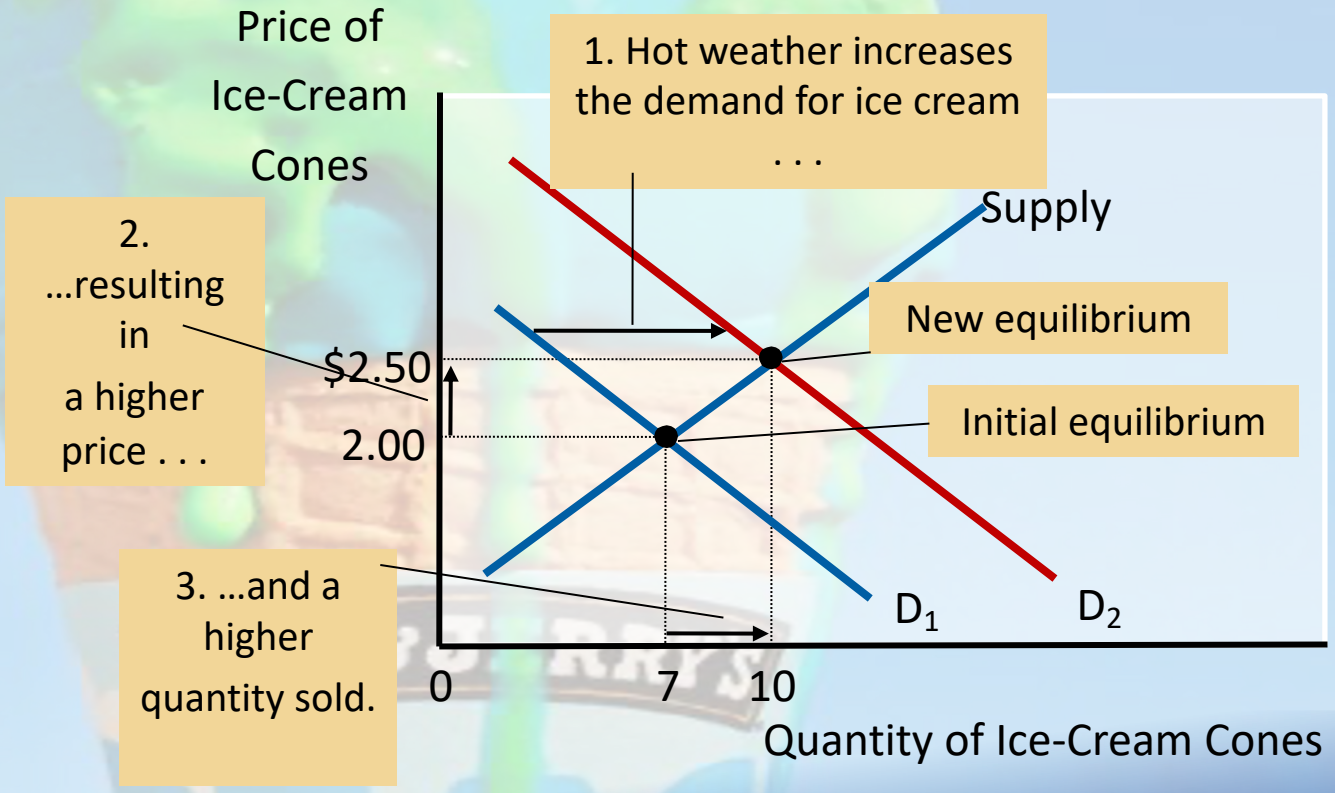
What is the effect on the market for ice cream?

Explain and show graphically!

CASE STUDY

CASE A: HOT WEATHER INCREASES DEMAND

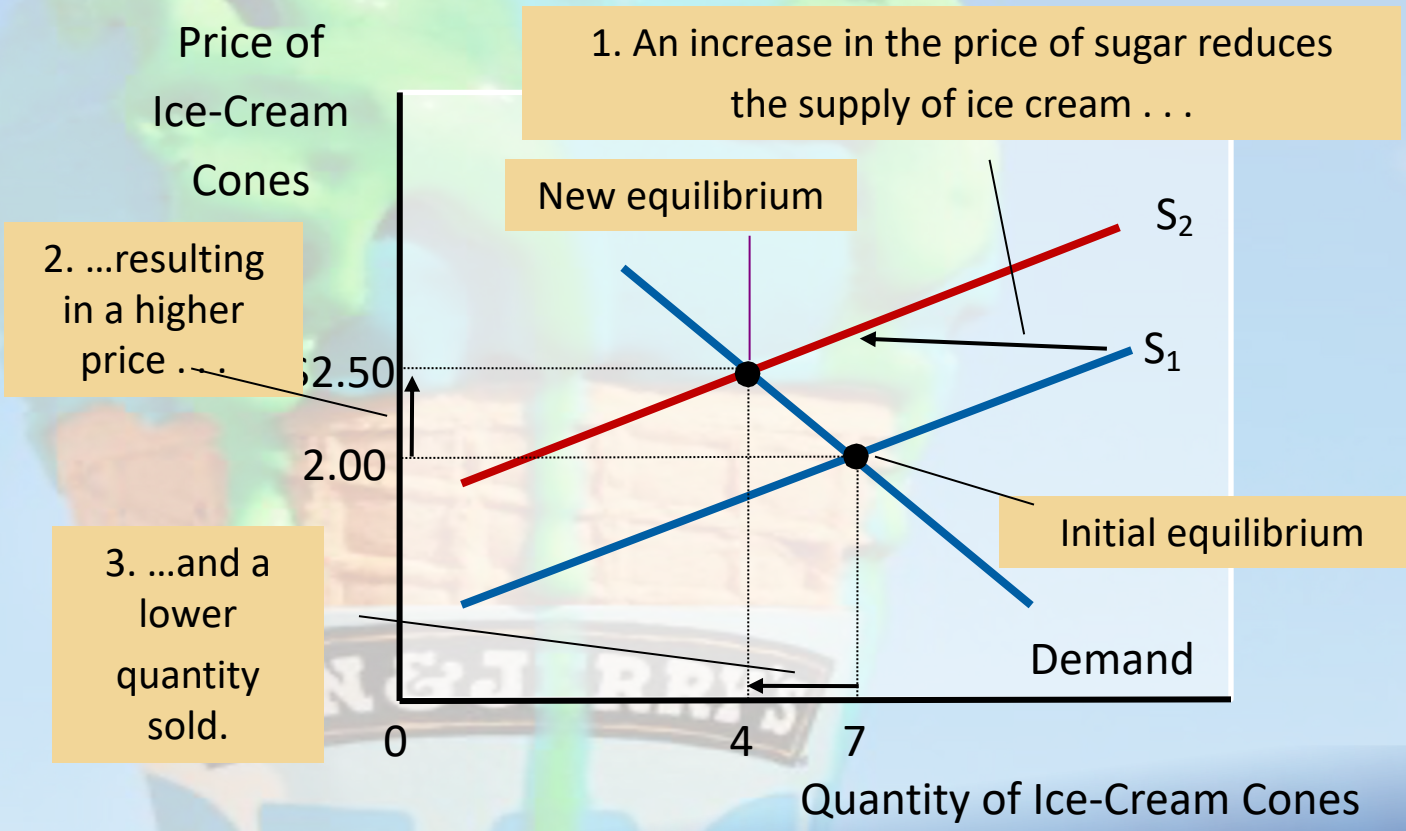
1. Hot weather: shifts the demand curve (tastes)
2. Demand curve shifts to the right
3. Higher equilibrium price; higher equilibrium quantity



CASE STUDY

CASE B: A HURRICANE BOOSTS THE PRICE OF SUGAR

1. Change in price of sugar: supply curve
2. Supply curve: shifts to the left
3. Higher equilibrium price; lower equilibrium quantity



CASE STUDY

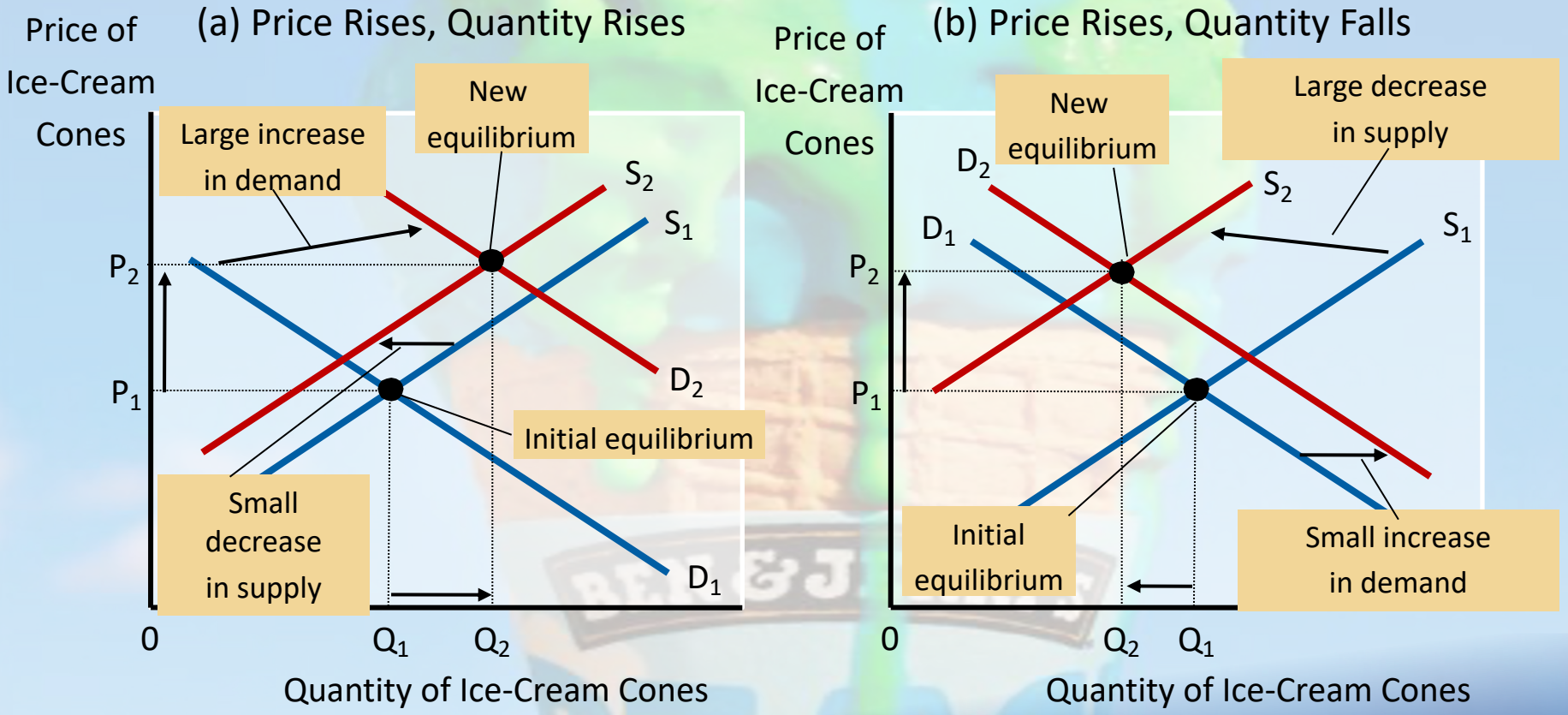
CASE C: THE NEXT YEAR… A hurricane and a heat wave

What is the effect on the market for ice cream?

1. Heat wave shifts the demand curve; hurricane shifts the supply curve
2. Demand curve shifts to the right; Supply curve shifts to the left
3. Equilibrium price raises
   - If demand increases substantially while supply falls just a little: equilibrium quantity rises
   - If supply falls substantially while demand rises just a little: equilibrium quantity falls

CASE STUDY

CASE C: THE NEXT YEAR… A HURRICANE AND HEAT A WAVE



CASE STUDY

SUPPLY AND DEMAND – SHIFTS VS. MOVEMENTS ALONG CURVES

- Shift in the supply curve
  - Change in supply
- Movement along a fixed supply curve
  - Change in the quantity supplied
- Shift in the demand curve
  - Change in demand
- Movement along a fixed demand curve
  - Change in the quantity demanded

SUPPLY AND DEMAND – SHIFTS VS. MOVEMENTS ALONG CURVES

What Happens to Price and Quantity When Supply or Demand Shifts? Complete the table below by adding for the price and quality one of the four choices: **equal, up, down, ambiguous**

	No Change in Supply	**An Increase in Supply**	**A Decrease in Supply**	
No Change in Demand	**P:** same **Q:** same	P: P: down Q:Q: up	P: Q:	P: up Q: down
An Increase in Demand	**P:** up **Q:** up	P: P: ambiguous Q:Q: up	P: Q:	P: up Q: ambiguous
A Decrease in Demand	**P:** down **Q:** down	P: P: down Q:Q: ambiguous	P: Q:	P: ambiguous Q: down

CALCULATION OF THE MARKET EQUILIBRIUM

- Demand (Q_D) and supply (Q_S) functions can be expressed as simple linear equations, for example

  $Q_D = 400-0.5p$ $Q_S = 10+1/4p$

- demand and supply function

  $Q_D(p)$ and $Q_S(p)$

- Inverse demand and supply function

  $P(Q_D)$ and $P(Q_S)$

Calculate the market equilibrium using the inverse demand and supply function.

HOW PRICES ALLOCATE RESOURCES

"Two dollars"

"—and seventy-five cents."

Prices…

- Signal that guide the allocation of resources
- Mechanism for rationing scarce resources
- Determine who produces each good and how much is produced

2.2 ELASTICITY AND ITS APPLICATION

ELASTICITY

ELASTICITY

Percentage change in one variable resulting from a 1-percent increase in another variable.

PRICE ELASTICITY OF DEMAND

- Percentage change in quantity demanded of a good resulting from a 1-percent increase in its price.

$$E_p = (\%\Delta Q)/(\%\Delta P)$$

$$E_P = \frac{\Delta Q/Q}{\Delta P/P} = \left(\frac{P}{Q}\right)\left(\frac{\Delta Q}{\Delta P}\right)$$

.

ELASTICITIES OF DEMAND #1

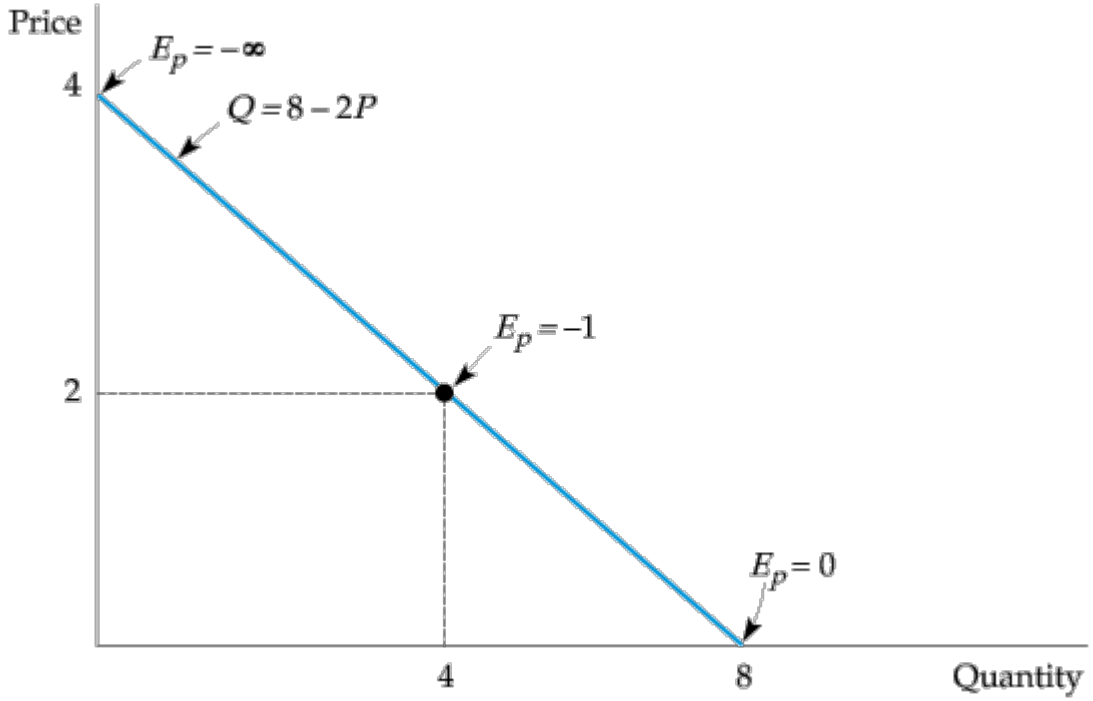
Linear Demand Curve $Q = a - bP$

The price elasticity of demand depends not only on the slope of the demand curve but also on the price and quantity.

The elasticity varies along the curve as price and quantity change. Slope is constant for this linear demand curve.

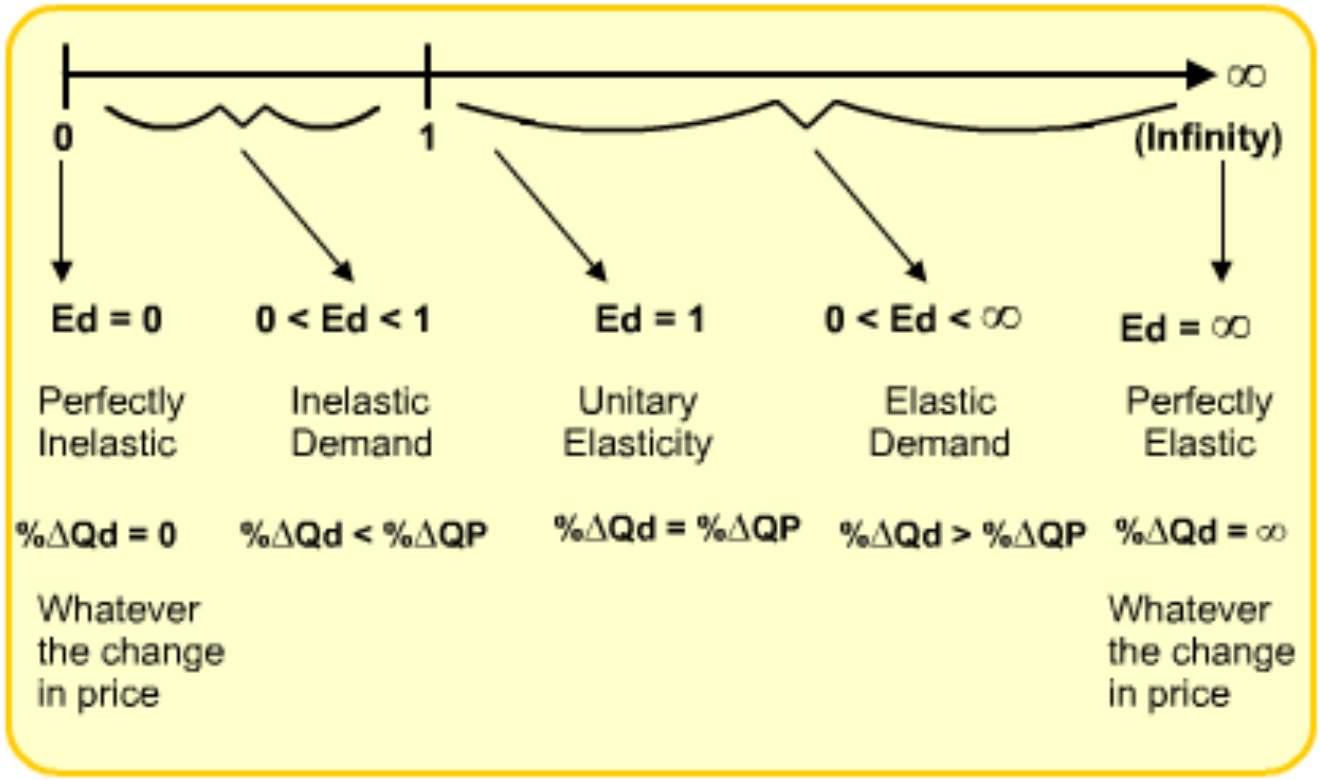
Near the top, because price is high and quantity is small, the elasticity is large in magnitude.

The elasticity becomes smaller as we move down the curve.



ELASTICITIES OF DEMAND #2

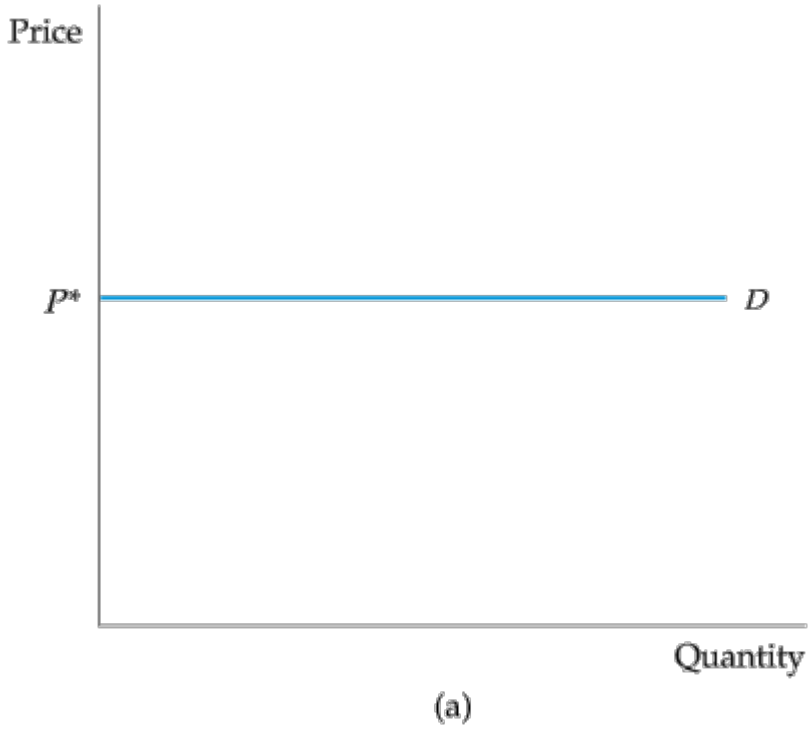
If the *absolute* value of the demand elasticity (here Ed) is….



ELASTICITIES OF DEMAND #3

Infinitely Elastic Demand

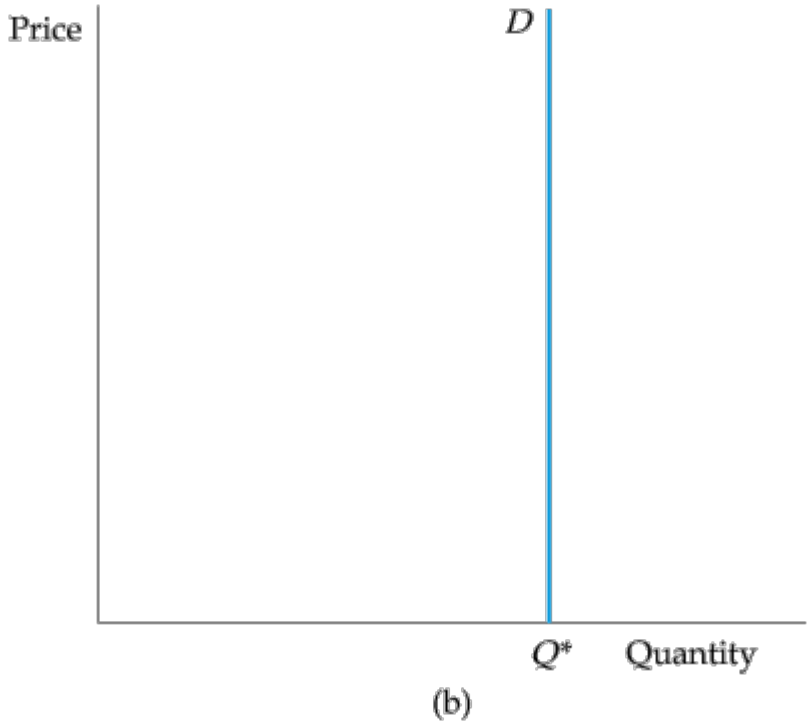
- For a horizontal demand curve, $\Delta Q/\Delta P$ is infinite. Because a tiny change in price leads to an enormous change in demand, the elasticity of demand is infinite.
- Infinitely elastic demand Principle that consumers will buy as much of a good as they can get at a single price, but for any higher price the quantity demanded drops to zero, while for any lower price the quantity demanded increases without limit.



ELASTICITIES OF DEMAND #4

Completely Inelastic Demand

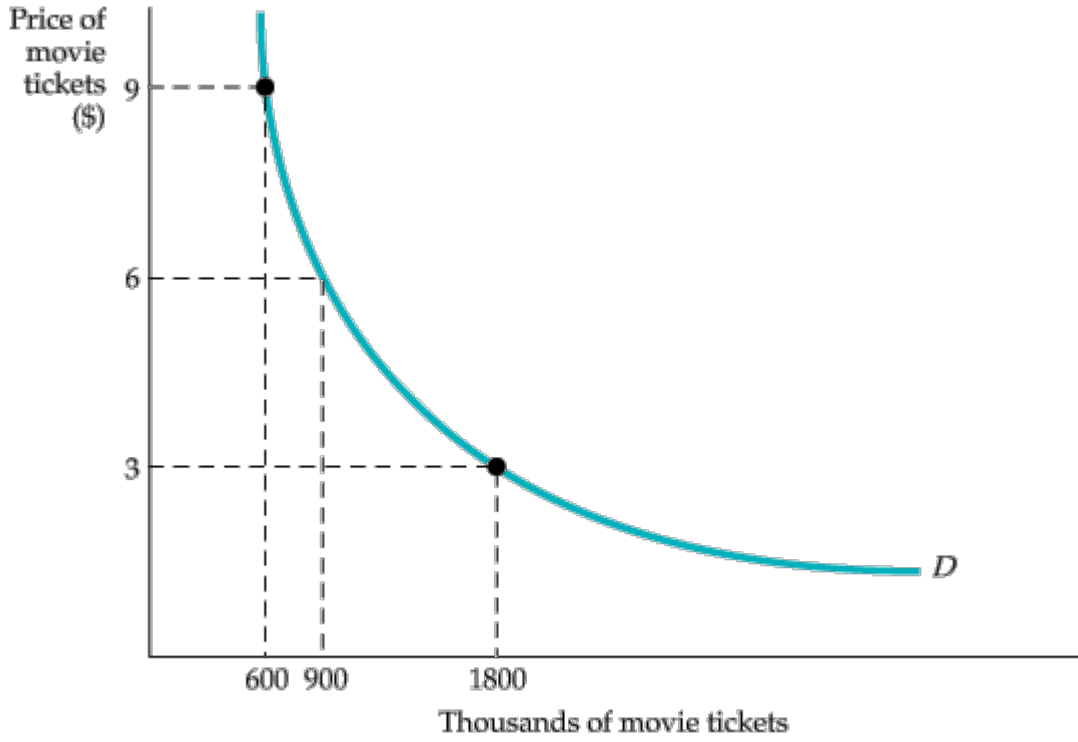
- For a vertical demand curve, $\Delta Q / \Delta P$ is zero. Because the quantity demanded is the same no matter what the price, the elasticity of demand is zero.
- Completely inelastic demand: Principle that consumers will buy a fixed quantity of a good regardless of its price.



ELASTICITIES OF DEMAND #5

Isoelastic Demand Curve

- Demand curve with a constant price elasticity.
- When the price elasticity of demand is −1.0 at every price, the total expenditure is constant along the demand curve *D*.



ELASTICITIES OF DEMAND #6

- Income elasticity of demand: %age change in the quantity demanded resulting from a 1-percent increase in income.

$$E_I = \frac{\Delta Q / Q}{\Delta I / I} = \frac{I}{Q}\frac{\Delta Q}{\Delta I}$$

- Cross-price elasticity of demand: % change in the quantity demanded of one good resulting from a 1-percent increase in the price of another.

$$E_{Q_b P_m} = \frac{\Delta Q_b / Q_b}{\Delta P_m / P_m} = \frac{P_m}{Q_b}\frac{\Delta Q_b}{\Delta P_m}$$

ELASTICITIES OF SUPPLY

Elasticities of Supply

- Price elasticity of supply: Percentage change in quantity supplied resulting from a 1-percent increase in price.
- Always positive

Go back to the slide that shows the market demand for ice cream cones. What is the price elasticity of supply, if the market price for ice cream cones is $1?

MIDPOINT METHOD

- Two points: (Q1, P1) and (Q2, P2)
- Rather than dividing by the “old value”, it divides by the average value
- Example:

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

THE DEMAND FOR HOUSING

There are significant differences in price and income elasticities of housing demand among subgroups of the population.

PRICE AND INCOME ELASTICITIES OF THE DEMAND FOR ROOMS

GROUP	PRICE ELASTICITY	INCOME ELASTICITY
Single individuals	– 0.10	0.21
Married, head of household age less than 30, 1 child	– 0.25	0.06
Married, head age 30–39, 2 or more children	– 0.15	0.12
Married, head age 50 or older, 1 child	– 0.08	0.19

In recent years, the demand for housing has been partly driven by speculative demand. Speculative demand is driven not by the direct benefits one obtains from owning a home but instead by an expectation that the price will increase.

EXAMPLE

THE MARKET FOR WHEAT

During recent decades, changes in the wheat market had major implications for both American farmers and U.S. agricultural policy.

To understand what happened, let's examine the behavior of supply and demand beginning in 1981

- Supply: $Q_S = 1800 + 240P$
- Demand: $Q_D = 3550 - 266P$

We can determine the market-clearing price and of wheat and quantity for 1981:

- $Q_S = Q_D$
- P = \$3.46 per bushel
- Q = 1800 + (240)(3.46) = 2630 million bushels

CASE STUDY

Given the demand function, $\frac{\Delta Q}{\Delta P}$ can be calculated easily. How?

THE MARKET FOR WHEAT

We use the demand curve to find the price elasticity of demand:

$$E_P^D = \frac{P}{Q}\frac{\Delta Q_D}{\Delta P} = \frac{3.46}{2630}(-266) = -0.35$$

Thus demand is inelastic

We can likewise calculate the price elasticity of supply:

$$E_P^S = \frac{P}{Q}\frac{\Delta Q_S}{\Delta P} = \frac{3.46}{2630}(240) = 0.32$$

Because these supply and demand curves are linear, the price elasticities will vary as we move along the curves.

CASE STUDY

PRICE ELASTICITY AND TOTAL REVENUE

What happens to Total Revenue if price goes up?

Total revenue= total revenue = price per unit × quantity sold

- The money a firm generates from selling its product

Price and Total Revenue with Different Elasticities of Demand		
Elastic Demand: E_d = 2.0		
Price	**Quantity Sold**	**Total Revenue**
$10	100	$1,000
11	80	880
Inelastic Demand: E_d = 0.50		
Price	**Quantity Sold**	**Total Revenue**
100	10	$1,000
120	9	1,080

If price goes up

- Good News: You get more for each unit sold
- Bad News: You sell fewer units

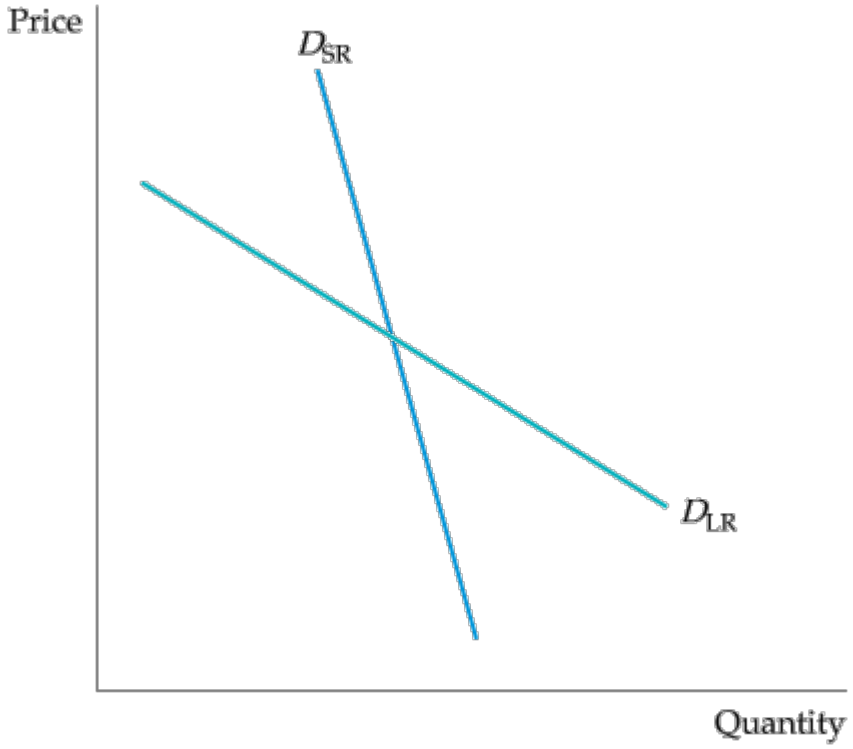
Effect on TR depends on which effect is bigger, i.e. whether the price elasticity is less than or greater than one

SHORT-RUN VERSUS LONG-RUN ELASTICITIES

Gasoline: Short-Run and Long-Run Demand Curves

In the **short run**, an increase in price has **only a small effect** on the quantity of gasoline demanded. Motorists may drive less, but they will not change the kinds of cars they are driving overnight.

In the **longer run**, however, because they will shift to smaller and more fuel-efficient cars, **the effect of the price increase will be larger**. Demand, therefore, is more elastic in the long run than in the short run.

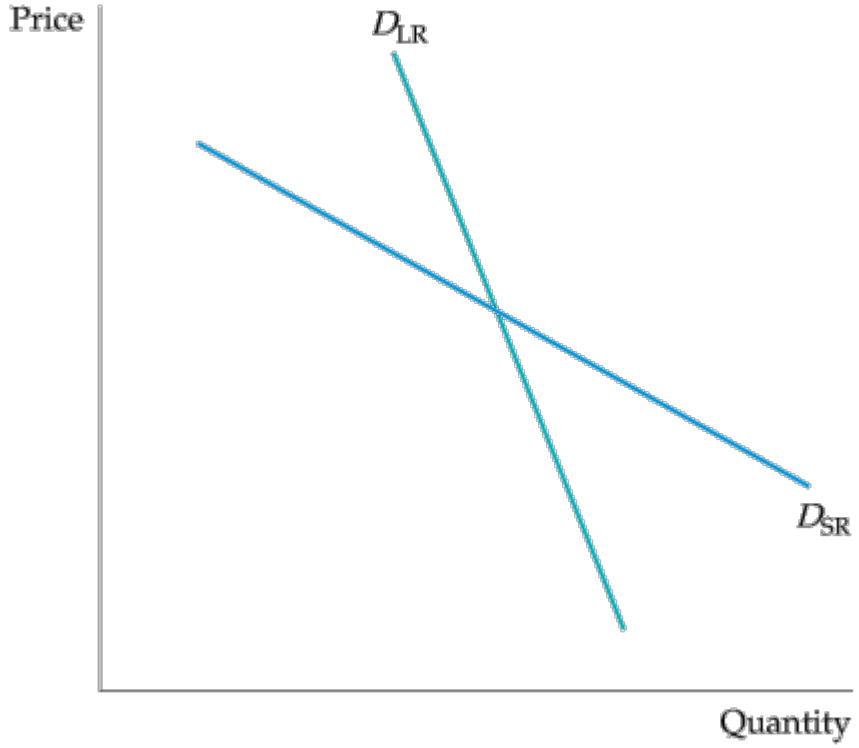


SHORT-RUN VERSUS LONG-RUN ELASTICITIES

Automobile: Short-Run and Long-Run Demand Curves

The opposite is true for automobile demand. If price increases, consumers initially defer buying new cars; thus annual **quantity demanded falls sharply in the short run.**

In the **longer run**, however, old cars wear out and must be replaced; thus annual quantity demanded picks up. Demand, therefore, is **less elastic** in the long run than in the short run.



INCOME ELASTICITIES

- Income elasticities also differ from the short run to the long run.
- For most goods and services—foods, beverages, fuel, entertainment, etc.— the income elasticity of demand is larger in the long run than in the short run.
- For a durable good, the opposite is true. The short-run income elasticity of demand will be much larger than the long-run elasticity.

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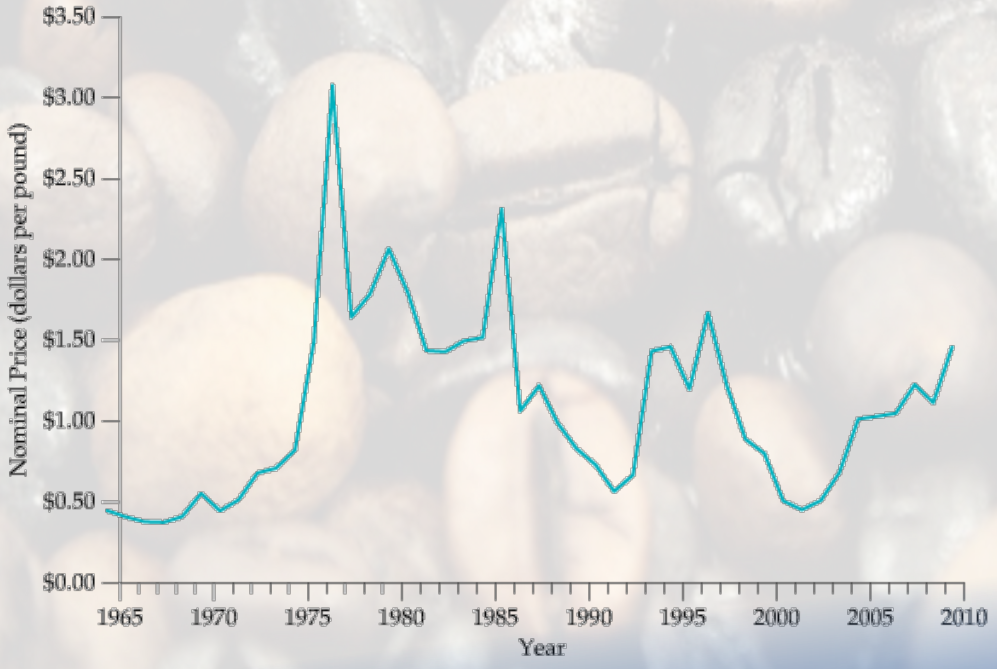
THE DEMAND FOR GASOLINE AND AUTOMOBILES

	DEMAND FOR GASOLINE				
	NUMBER OF YEARS ALLOWED TO PASS FOLLOWING A PRICE OR INCOME CHANGE				
ELASTICITY	**1**	**2**	**3**	**5**	**10**
Price	0.2	−0.3	−0.4	−0.5	−0.8
Income	0.2	0.4	0.5	0.6	1.0

	DEMAND FOR AUTOMOBILES				
	NUMBER OF YEARS ALLOWED TO PASS FOLLOWING A PRICE OR INCOME CHANGE				
ELASTICITY	**1**	**2**	**3**	**5**	**10**
Price	−1.2	−0.9	−0.8	−0.6	−0.4
Income	3.0	2.3	1.9	1.4	1.0

THE WEATHER IN BRAZIL AND THE PRICE OF COFFEE IN NEW YORK

Price of Brazilian Coffee



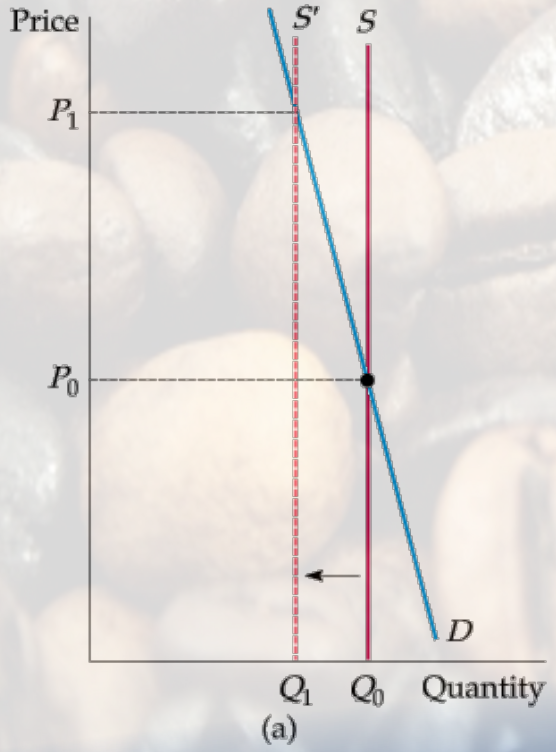
When droughts or freezes damage Brazil's coffee trees, the price of coffee can soar.

The price usually falls again after a few years, as demand and supply adjust.

CASE STUDY

THE WEATHER IN BRAZIL AND THE PRICE OF COFFEE IN NEW YORK

Supply and Demand for Coffee (a)



A freeze or drought in Brazil causes the supply curve to shift to the left.

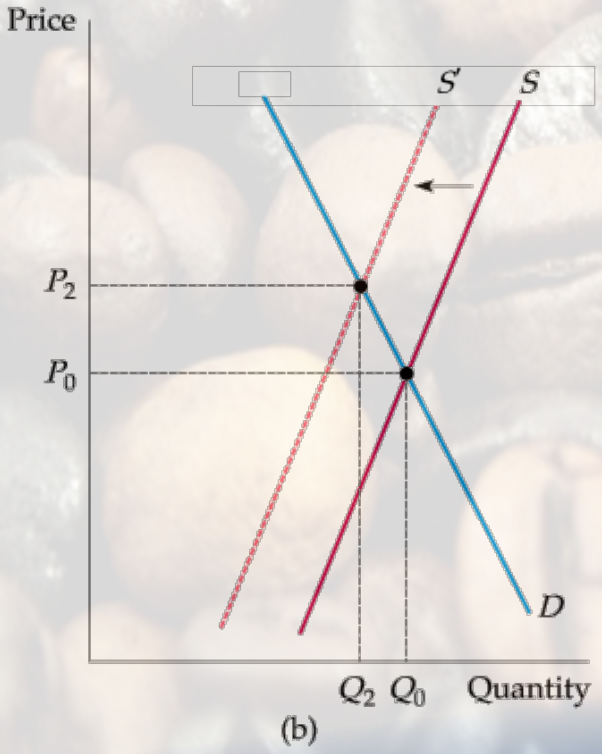
In the short run, supply is completely inelastic; only a fixed number of coffee beans can be harvested. Demand is also relatively inelastic; consumers change their habits only slowly.

As a result, the initial effect of the freeze is a sharp increase in price, from P0 to P1.

CASE STUDY

THE WEATHER IN BRAZIL AND THE PRICE OF COFFEE IN NEW YORK

Supply and Demand for Coffee (b)

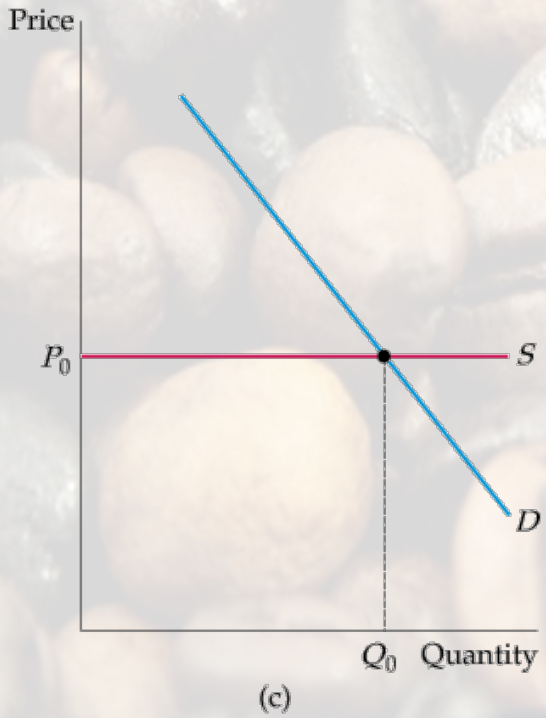


In the intermediate run, supply and demand are both more elastic; thus price falls part of the way back, to P2.

CASE STUDY

THE WEATHER IN BRAZIL AND THE PRICE OF COFFEE IN NEW YORK

Supply and Demand for Coffee (c)



In the long run, supply is extremely elastic; because new coffee trees will have had time to mature, the effect of the freeze will have disappeared. Price returns to P_0

CASE STUDY

03

GOVERNMENT POLICIES, EFFICIENCY AND INEFFICIENCY

3.1 Supply, Demand and Government Policies

3.2 Consumers, Producers, and the Efficiency of Markets

3.3 Externalities

3.4 Public Goods and Common Resources

03 IDEA

There are two primary methods of allocating scarce resources: markets (see part 02) and government. This part gives us insights about the conditions under which each will likely work well.

Managers must be able to advise your company in matters related to governmental policies. How do you respond proactively to the changing market and legal environment?

03 LEARNING OBJECTIVES

- Understand how government policies affect market outcomes
- Discuss the pros and cons of minimum wages
- Apply tax incidence analysis to taxes levied by the government
- Recall that elasticities matter for tax incidence
- Remember how welfare can be measured
- Apply the idea of consumer and producer rent to market analyses
- Interpret Adam Smith's invisible hand
- Define externalities and find appropriate examples
- Define the different kind of goods
- Understand the free-rider problem and the tragedy of the commons
- Explain the importance of property rights

3.1 SUPPLY, DEMAND AND GOVERNMENT POLICIES

GOVERNMENT MARKET INTERVENTION

Taxes

- Used to raise revenue for public purposes and to influence market outcomes

Price controls

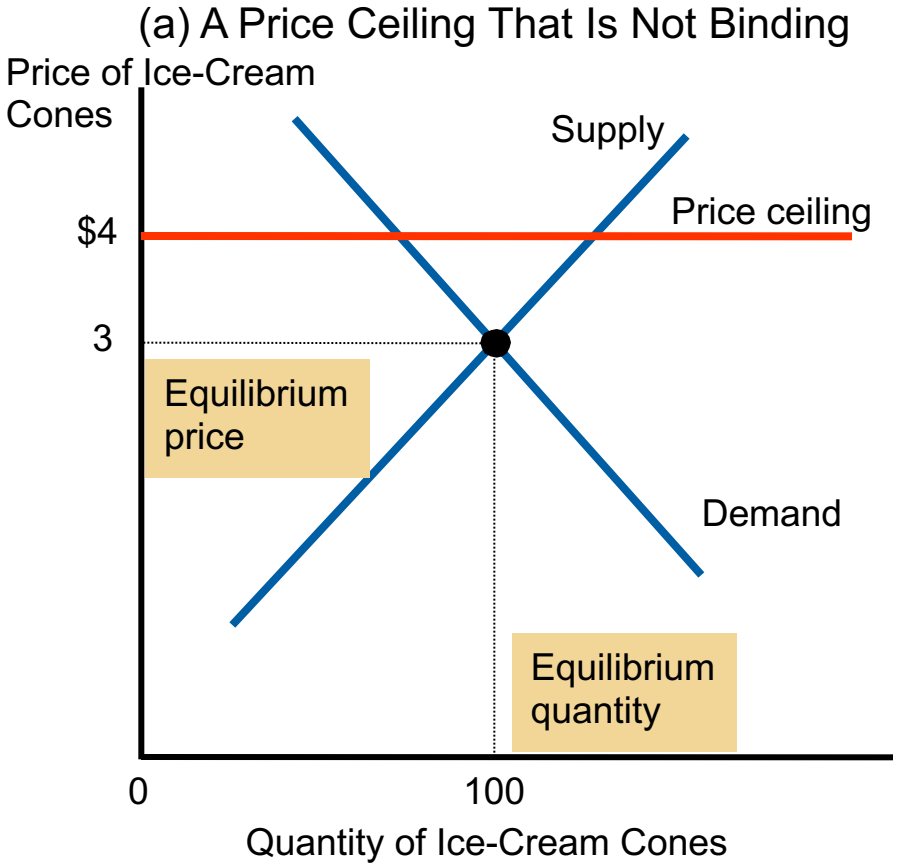
- Usually enacted when policymakers believe that the market price of a good or service is unfair to buyers or sellers
- Can generate inequities

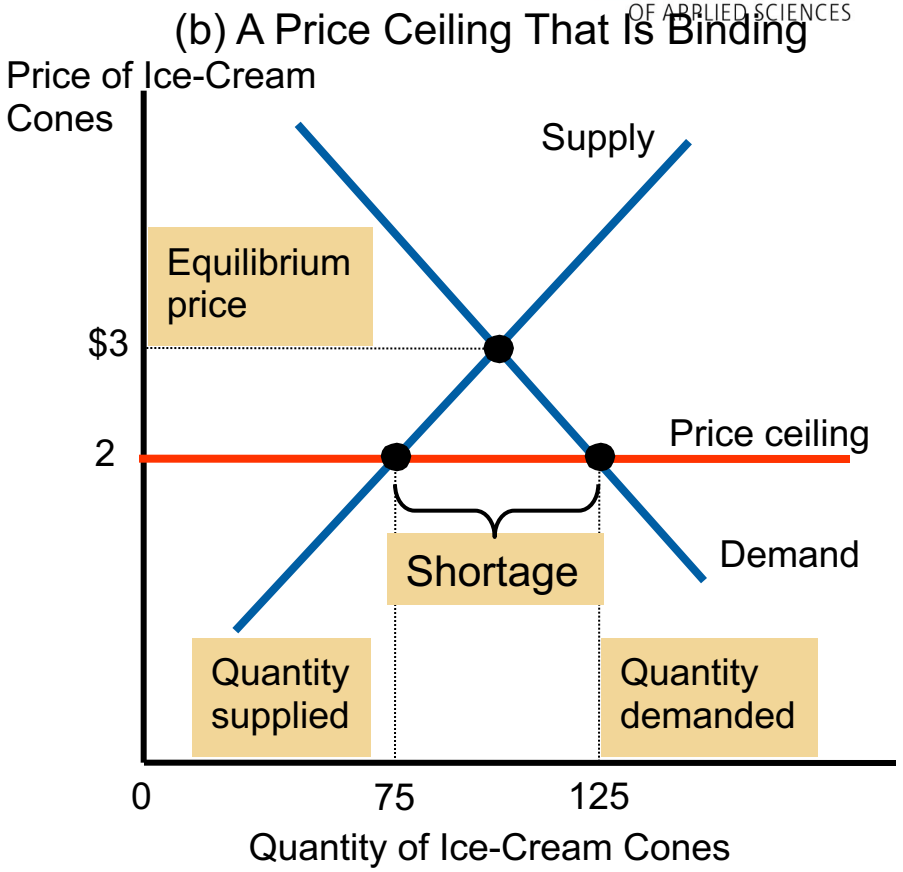
- **PRICE CEILING**
  - A legal maximum on the price at which a good can be sold
- **PRICE FLOOR**
  - A legal minimum on the price at which a good can be sold

PRICE CEILINGS

- Not binding
  - Set above the equilibrium price
  - No effect on the price or quantity sold
- Binding constraint
  - Set below the equilibrium price
  - Shortage
  - Sellers must ration the scarce goods
    - Long lines
    - Discrimination according to sellers bias

PRICE CEILINGS



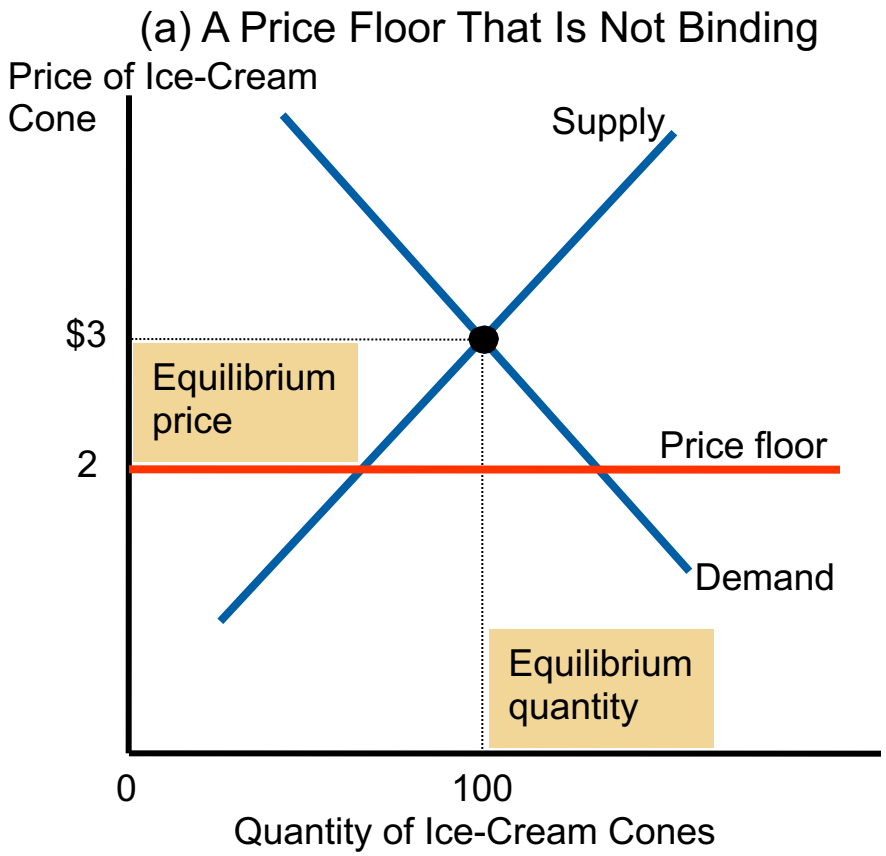


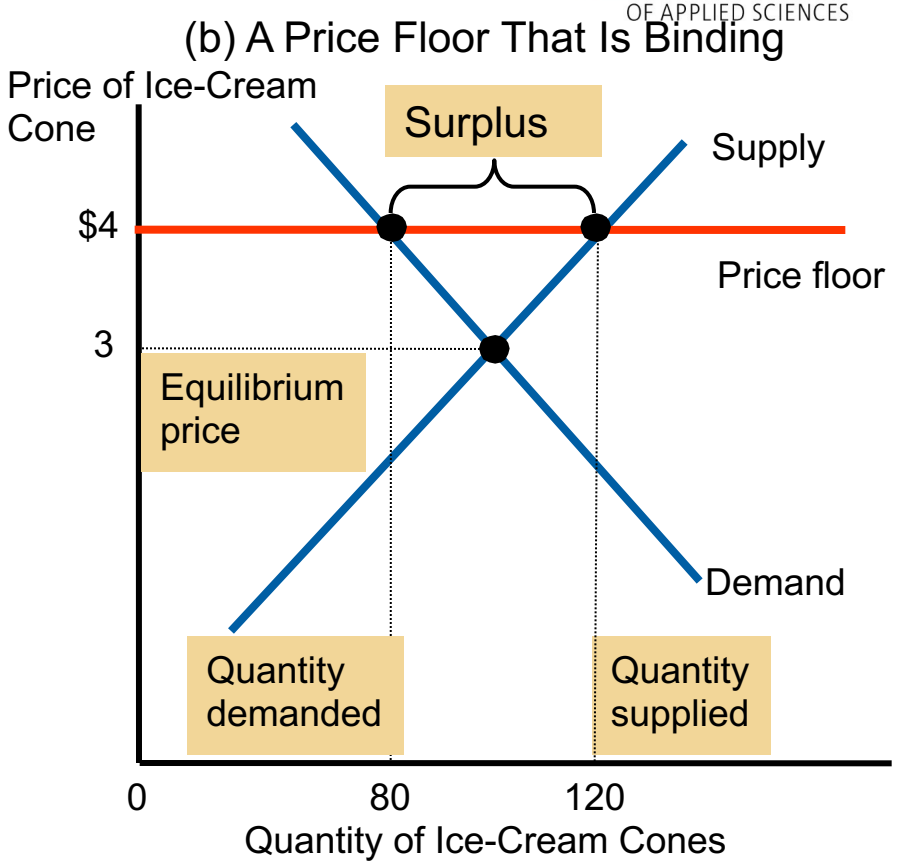
In panel (a), the government imposes a price ceiling of $4. Because the price ceiling is above the equilibrium price of $3, the price ceiling has no effect, and the market can reach the equilibrium of supply and demand. In this equilibrium, quantity supplied and quantity demanded both equal 100 cones. In panel (b), the government imposes a price ceiling of $2. Because the price ceiling is below the equilibrium price of $3, the market price equals $2. At this price, 125 cones are demanded and only 75 are supplied, so there is a shortage of 50 cones.

PRICE FLOORS

- Not binding
  - Set below the equilibrium price
  - No effect on the market
- Binding constraint
  - Set above the equilibrium price
  - Surplus
  - Some sellers are unable to sell what they want
    - The rationing mechanisms: not desirable

PRICE FLOORS





In panel (a), the government imposes a price floor of $2. Because this is below the equilibrium price of $3, the price floor has no effect. The market price adjusts to balance supply and demand. At the equilibrium, quantity supplied and quantity demanded both equal 100 cones. In panel (b), the government imposes a price floor of $4, which is above the equilibrium price of $3. Therefore, the market price equals $4. Because 120 cones are supplied at this price and only 80 are demanded, there is a surplus of 40 cones.

THE MINIMUM WAGE (1/2)

Price floor: Lowest price for labor that any employer may pay

- If minimum wage is above equilibrium
  - Unemployment
  - Higher income for workers who have jobs
- Impact of the minimum wage on highly skilled and experienced workers
  - No effect: their equilibrium wages are well above the minimum
  - Minimum wage - not binding
- US: Fair Labor Standards Act of 1938: federal minimum wage, $7.25/hour (2012)
- France. Minimum wage 9.40 euros per hour (2012)

THE MINIMUM WAGE (2/2)

Impact of the minimum wage on teenage labor

- Least skilled and least experienced
- Minimum wage – binding -> low equilibrium wages
- Willing to accept a lower wage in exchange for on-the-job training

Teenage labor market

- A 10% increase in the minimum wage depresses teenage employment between 1 and 3%
- Some teenagers who are still attending high school choose to drop out and take jobs
  - Displace other teenagers who had already dropped out of school and who now become unemployed

EVALUATING PRICE CONTROLS (1/2)

PRINCIPLE #6

Markets are usually a good way to organize economic activity

- Economists usually oppose price ceilings and price floors
- Prices are not the outcome of some haphazard process
- Prices have the crucial job of balancing supply and demand
  - Coordinating economic activity

EVALUATING PRICE CONTROLS (2/2)

PRINCIPLE #7

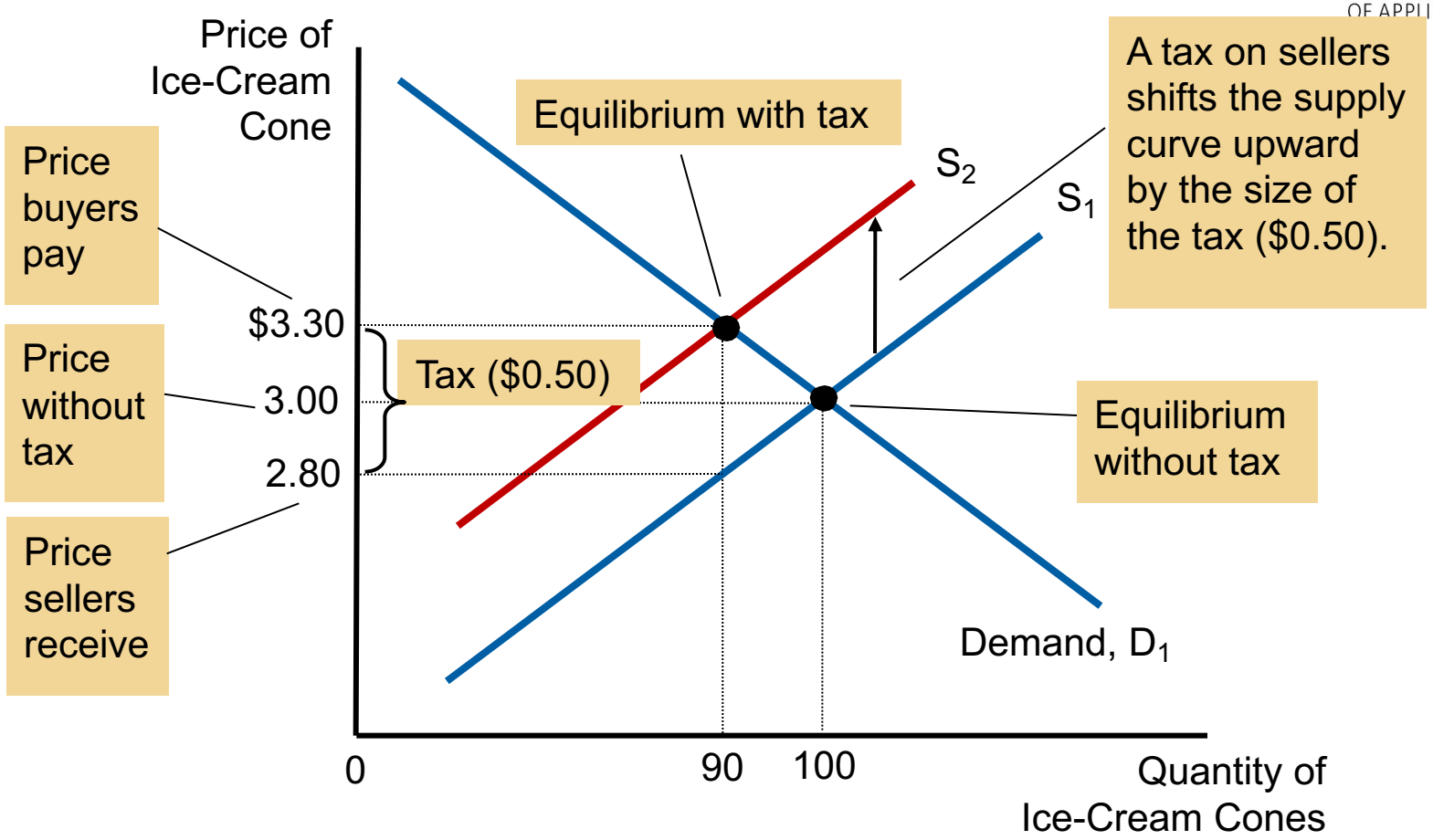
Governments can sometimes improve market outcomes

- Want to use price controls
  - Because of unfair market outcome
  - Aimed at helping the poor
- Often hurt those they are trying to help
- Other ways of helping those in need
  - Rent subsidies
  - Wage subsidies

TAXES (1/4)

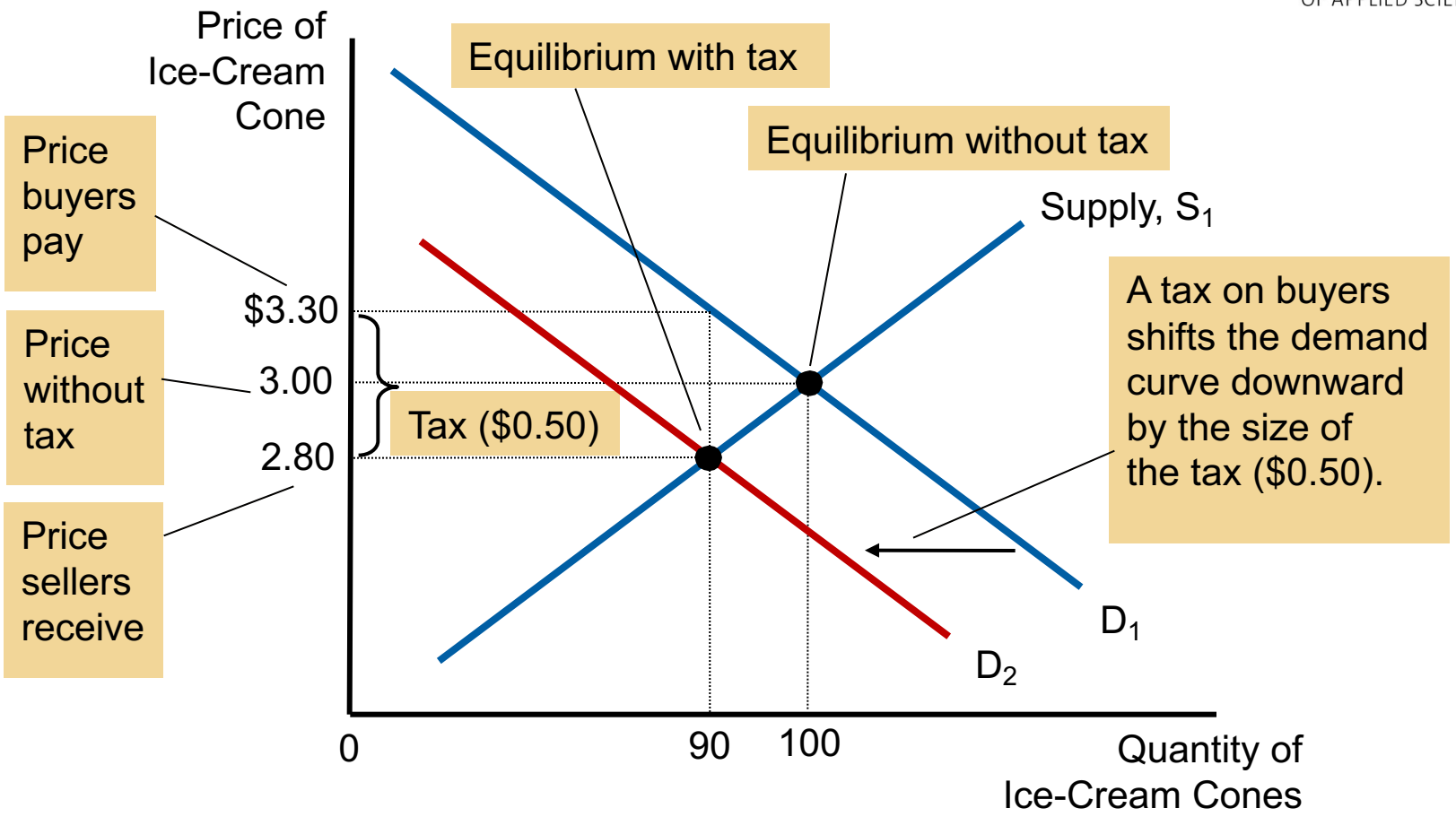
- Government use taxes: to raise revenue for public projects : roads, schools, and national defense
- **TAX INCIDENCE:** Manner in which the burden of a tax is shared among participants in a market
- How taxes on sellers affect market outcomes
  - Immediate impact on sellers: shift in supply
  - Supply curve shifts left
  - Higher equilibrium price, lower equilibrium quantity
  - The tax reduces the size of the market

A TAX ON SELLERS #1



When a tax of \$0.50 is levied on sellers, the supply curve shifts up by \$0.50 from S_1 to S_2. The equilibrium quantity falls from 100 to 90 cones. The price that buyers pay rises from \$3.00 to \$3.30. The price that sellers receive (after paying the tax) falls from \$3.00 to \$2.80. Even though the tax is levied on sellers, buyers and sellers share the burden of the tax.

A TAX ON SELLERS #2



When a tax of $0.50 is levied on buyers, the demand curve shifts down by $0.50 from D_1 to D_2. The equilibrium quantity falls from 100 to 90 cones. The price that sellers receive falls from $3.00 to $2.80. The price that buyers pay (including the tax) rises from $3.00 to $3.30. Even though the tax is levied on buyers, buyers and sellers share the burden of the tax.

TAXES (2/4)

How taxes on buyers affect market outcomes

- Buyers and sellers share the burden of tax
- Sellers get a lower price, are worse off
- Buyers pay a lower market price, are worse off
  - Gross price (with tax) rises

Taxes levied on sellers and taxes levied on buyers are equivalent

- Wedge between the price that buyers pay and the price that sellers receive: the same, regardless of whether the tax is levied on buyers or sellers
- Shifts the relative position of the supply and demand curves; buyers and sellers share the tax burden

THE BURDEN OF A PAYROLL TAX #1

Payroll taxes

- Deducted from the amount you earned

Introduce payroll tax

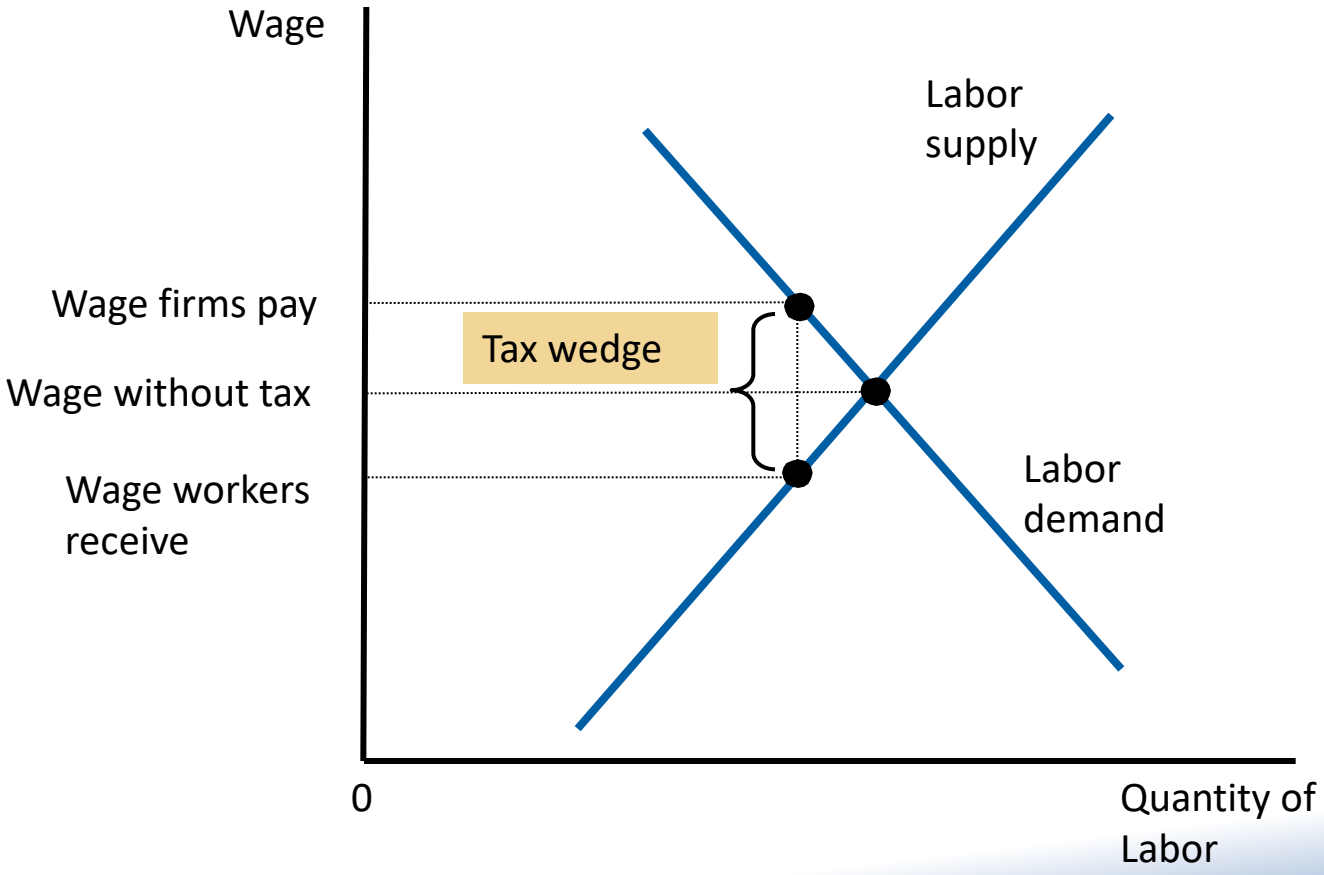
- Wage received by workers falls
- Wage paid by firms rises
- Workers and firms share the tax burden

By law, the tax burden:

- Half of the tax is paid by firms
  - Out of firm's revenue
- Half of the tax is paid by workers
  - Deducted from workers' paychecks

CASE STUDY

THE BURDEN OF A PAYROLL TAX #2



A payroll tax places a wedge between the wage that workers receive and the wage that firms pay. Comparing wages with and without the tax, you can see that workers and firms share the tax burden. This division of the tax burden between workers and firms does not depend on whether the government levies the tax on workers, levies the tax on firms, or divides the tax between the two groups (not necessarily 50-50).

CASE STUDY

TAXES (3/4)

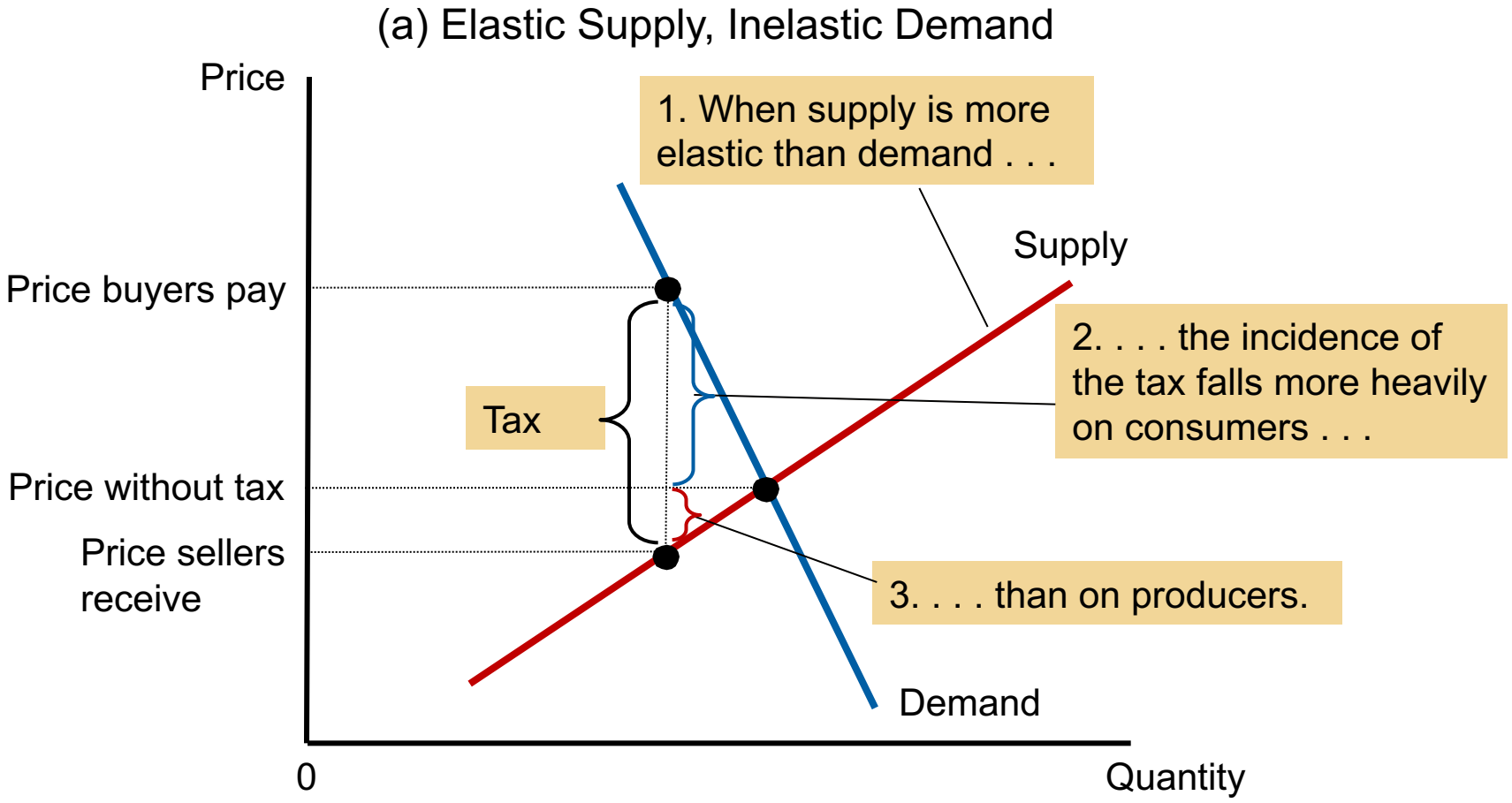
Taxes levied on sellers and taxes levied on buyers are equivalent

- Wedge between the price that buyers pay and the price that sellers receive: the same, regardless of whether the tax is levied on buyers or sellers

  $p^{gross} = p^{net} + t$ t: tax rate (per unit)

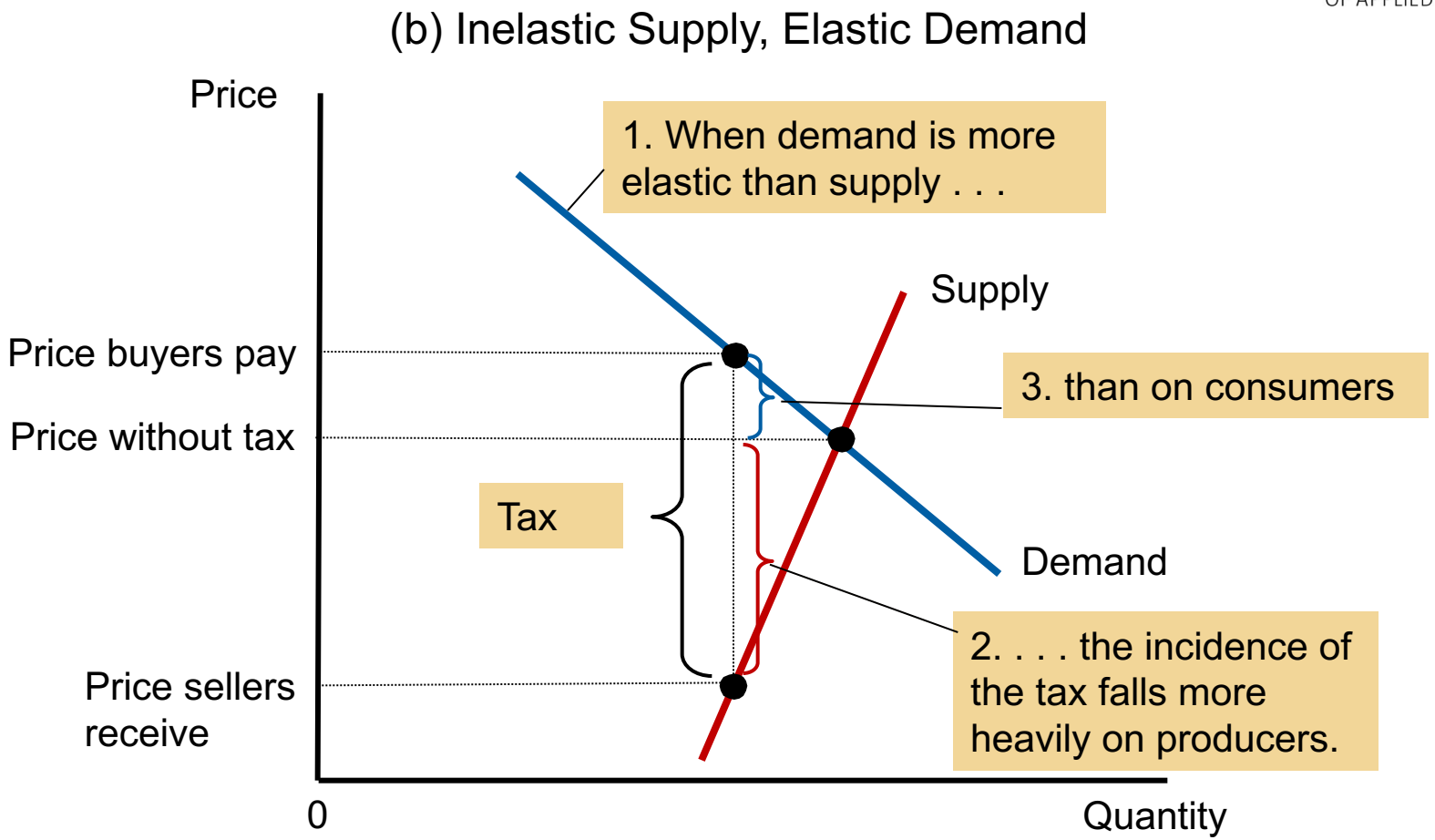
- Shifts the relative position of the supply and demand curves
- Buyers and sellers share the tax burden

HOW THE BURDEN OF A TAX IS DIVIDED (A)



In panel (a), the supply curve is elastic, and the demand curve is inelastic. In this case, the price received by sellers falls only slightly, while the price paid by buyers rises substantially. Thus, buyers bear most of the burden of the tax.

HOW THE BURDEN OF A TAX IS DIVIDED (B)



In panel (b), the supply curve is inelastic, and the demand curve is elastic. In this case, the price received by sellers falls substantially, while the price paid by buyers rises only slightly. Thus, sellers bear most of the burden of the tax.

TAXES (4/4)

Elasticity and Tax Incidence

- Tax burden
  - Falls more heavily on the side of the market that is less elastic
  - Small elasticity of demand
    - Buyers do not have good alternatives to consuming this good
  - Small elasticity of supply
    - Sellers do not have good alternatives to producing this good
- Lawmakers
  - Can decide whether a tax comes from the buyer's pocket or from the seller's
  - Cannot legislate the true burden of a tax
  - tax incidence determined by the forces of supply and demand

3.2 CONSUMERS, PRODUCERS, AND THE EFFICIENCY OF MARKETS

WELFARE

How does the allocation of resources affect the economic well-being of buyers and sellers?

WELFARE ECONOMICS

is the study of how the allocation of resources affects economic well-being

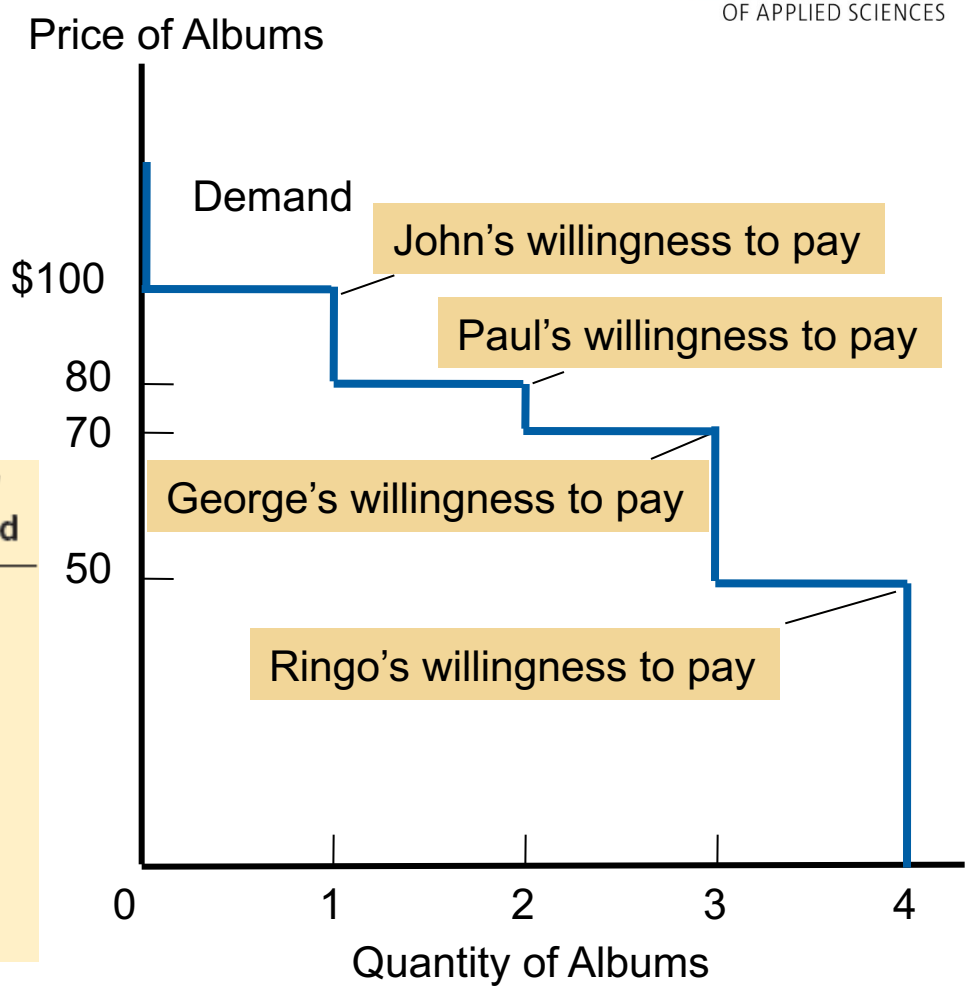
CONSUMER SURPLUS (1/6)

- Willingness to pay
  - Maximum amount that a buyer will pay for a good
  - How much that buyer values the good
- **CONSUMER SURPLUS (CS)**
  - Amount a buyer is willing to pay for a good minus amount the buyer actually pays for it
  - Willingness to pay minus price paid
  - Measures the benefit buyers receive from participating in a market
  - Closely related to the demand curve

CONSUMER SURPLUS (2/6)
AN EXAMPLE

Buyer	Willingness to Pay
John	$100
Paul	80
George	70
Ringo	50

Price	Buyers	Quantity Demanded
More than $100	None	0
$80 to $100	John	1
$70 to $80	John, Paul	2
$50 to $70	John, Paul, George	3
$50 or less	John, Paul, George, Ringo	4

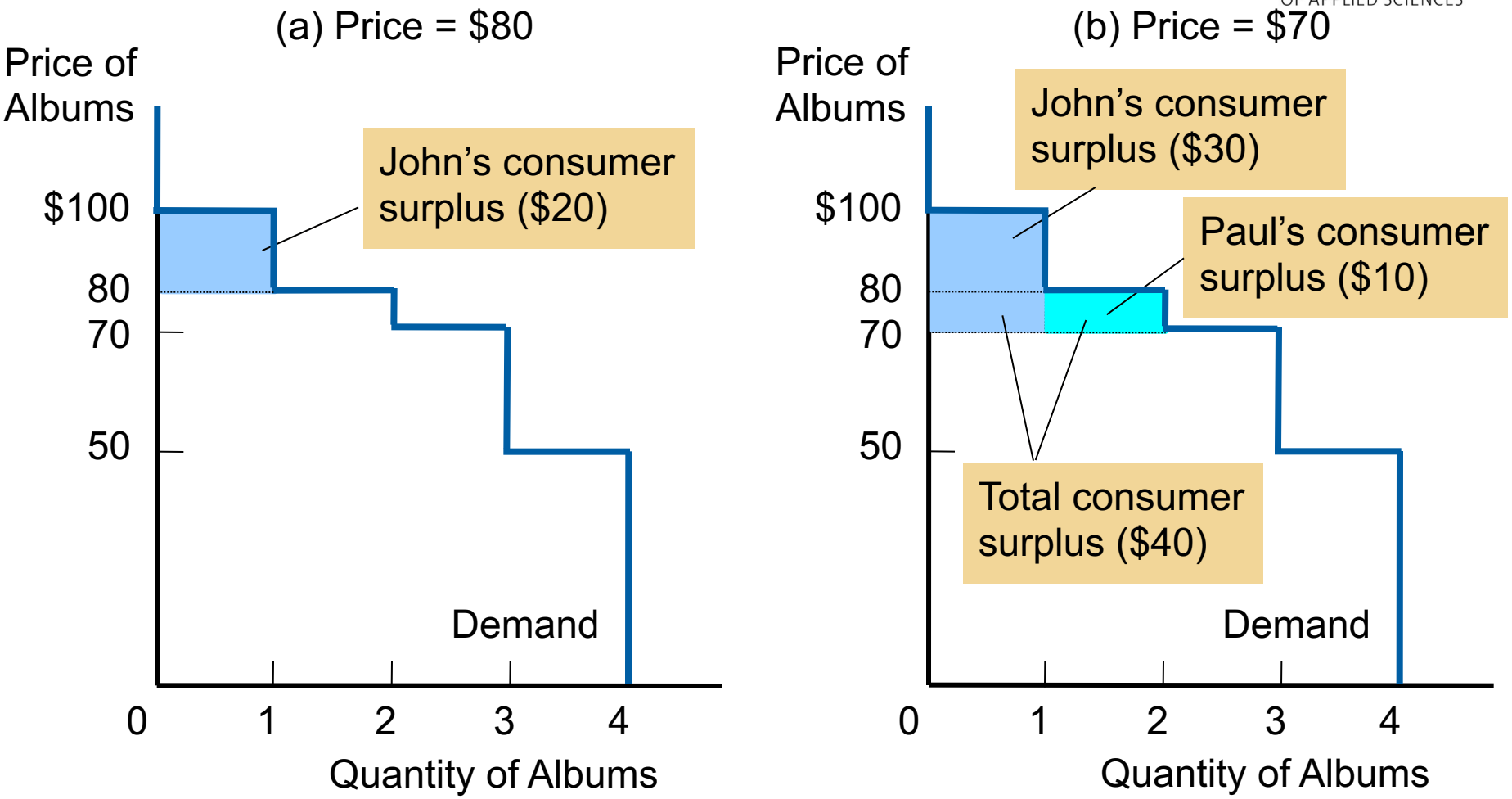


The table shows the demand schedule for the buyers of the mint-condition copy of Elvis Presley's first album. The graph shows the corresponding demand curve. Note that the height of the demand curve reflects the buyers' willingness to pay.

CONSUMER SURPLUS (3/6)

- At any quantity, the price given by the demand curve
  - Shows the willingness to pay of the *marginal buyer*
    - The buyer who would leave the market first if the price were any higher
- Consumer surplus in a market
  - Area below the demand curve and above the price
  - Benefit that buyers receive from a good
    - As the buyers themselves perceive it
  - Good measure of economic well-being

CONSUMER SURPLUS (4/6)



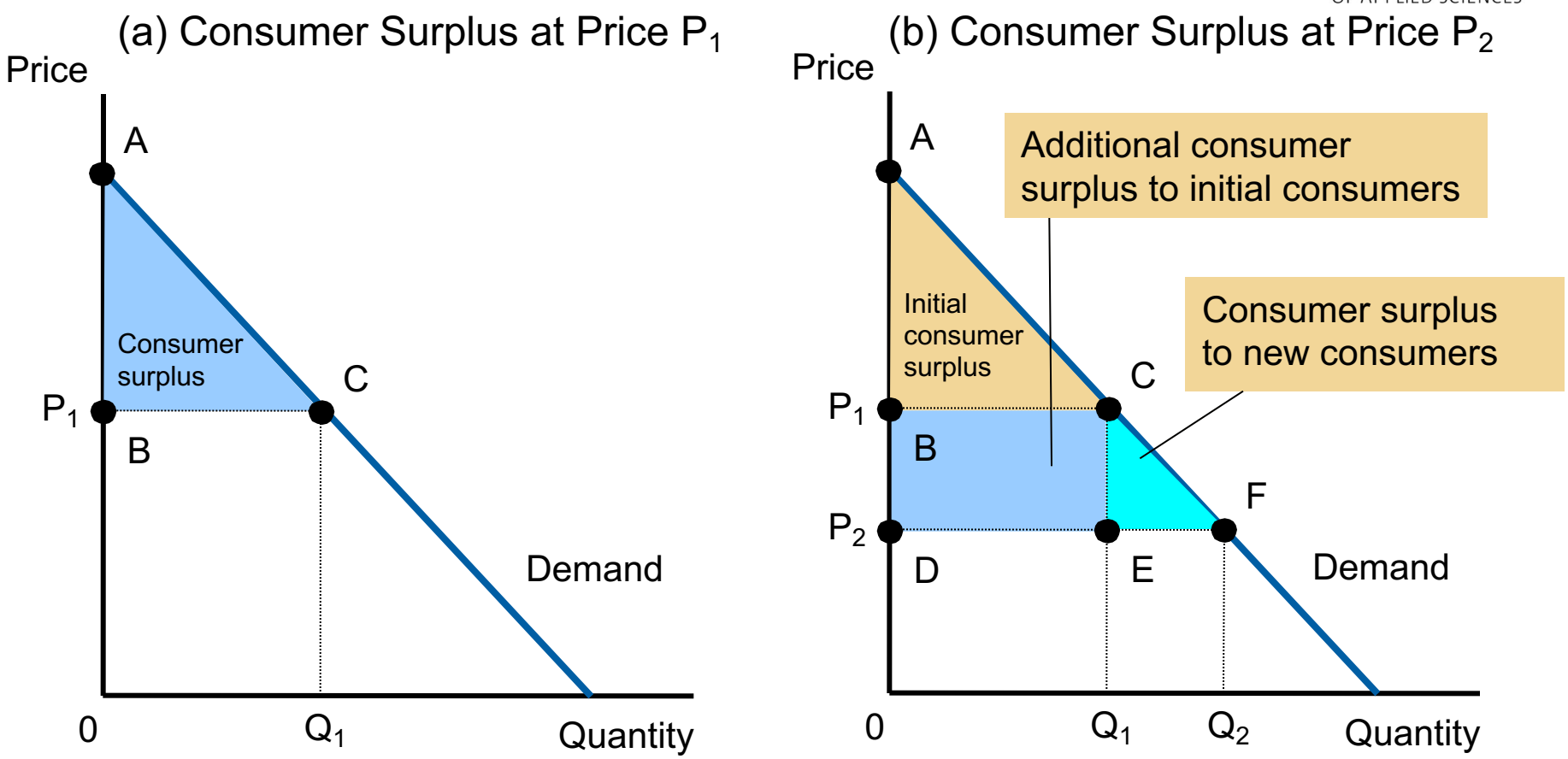
In panel (a), the price of the good is $80 and the consumer surplus is $20. In panel (b), the price of the good is $70 and the consumer surplus is $40.

CONSUMER SURPLUS (5/6)

A lower price raises consumer surplus

1. Existing buyers: increase in consumer surplus
   - Buyers who were already buying the good at the higher price are better off because they now pay less
2. New buyers enter the market: increase in consumer surplus
   - Willing to buy the good at the lower price

CONSUMER SURPLUS (6/6)
EFFECT OF A PRICE FALL



In panel (a), the price is P_1, the quantity demanded is Q_1, and consumer surplus equals the area of the triangle ABC. When the price falls from P_1 to P_2, as in panel (b), the quantity demanded rises from Q_1 to Q_2, and the consumer surplus rises to the area of the triangle ADF. The increase in consumer surplus (area BCFD) occurs in part because existing consumers now pay less (area BCED) and in part because new consumers enter the market at the lower price (area CEF).

PRODUCER SURPLUS (1/6)

Cost

- Value of everything a seller must give up to produce a good
- Measure of willingness to sell

PRODUCER SURPLUS (PS)

- Amount a seller is paid for a good minus the seller's cost of providing it
- Price received minus willingness to sell

PRODUCER SURPLUS (2/6)

Supply curve

- Reflects sellers' costs
- Used to measure producer surplus

Producer surplus

- Closely related to the supply curve
- Area below the price and above the supply curve

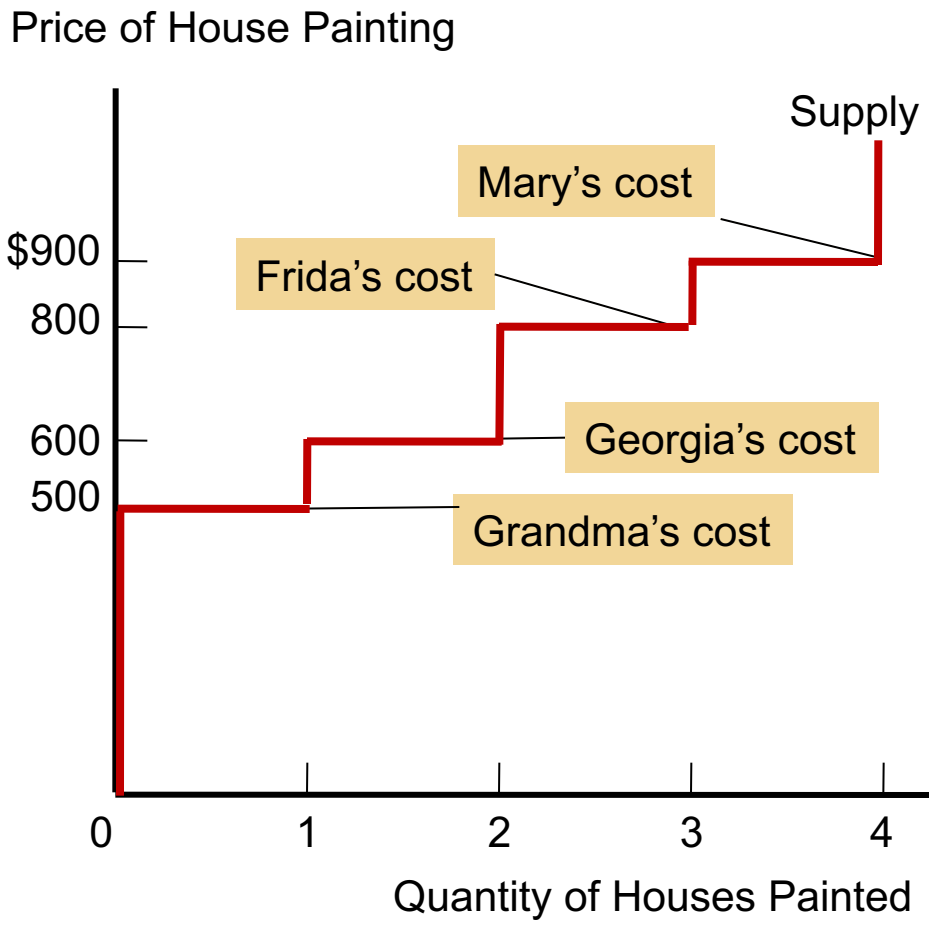
At any quantity

- Price given by the supply curve shows the cost of the marginal seller: Seller who would leave the market first if the price were any lower

PRODUCER SURPLUS (3/6)
AN EXAMPLE

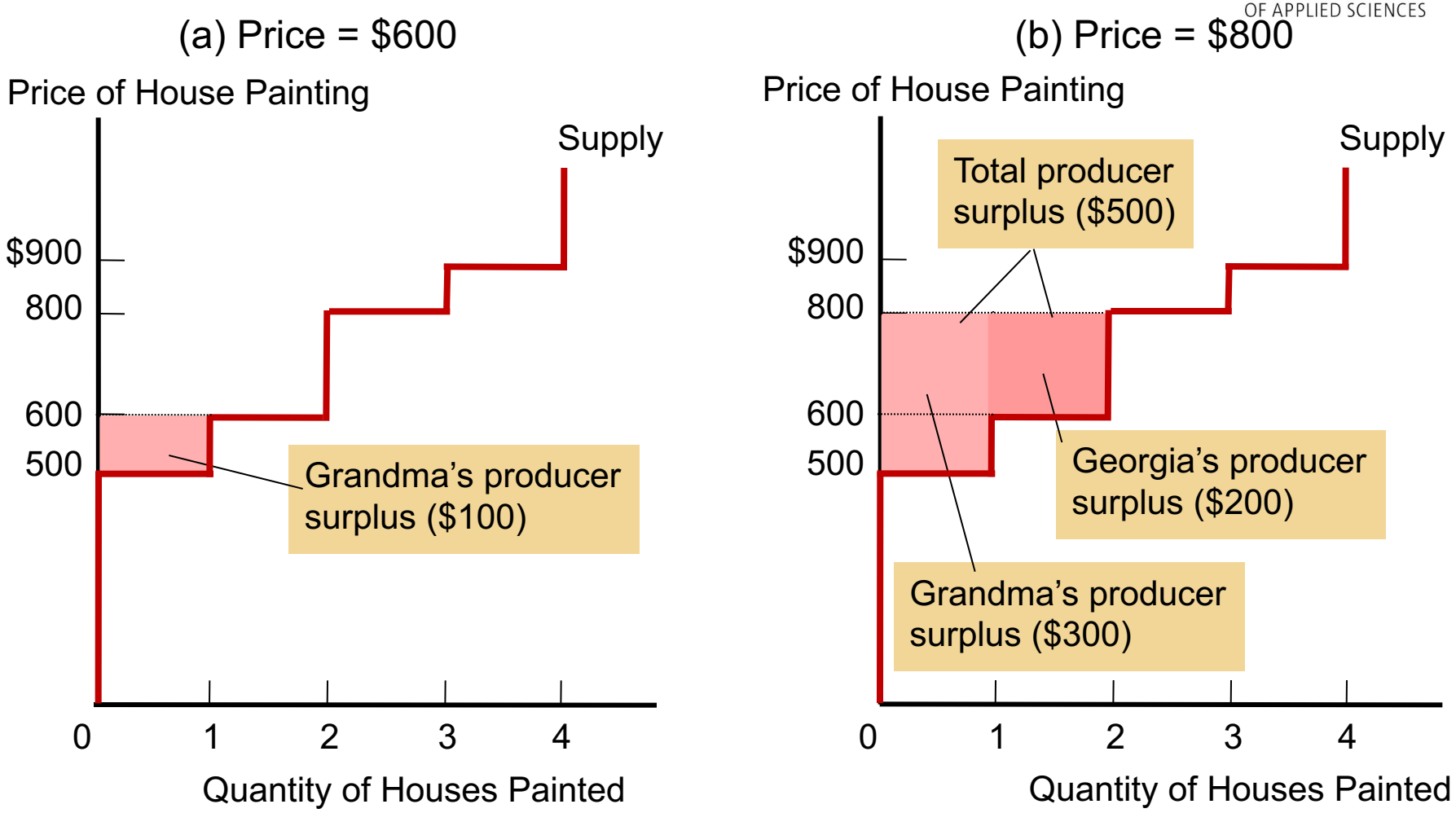
Seller	Cost
Mary	$900
Frida	800
Georgia	600
Grandma	500

Price	Sellers	Quantity Supplied
$900 or more	Mary, Frida, Georgia, Grandma	4
$800 to $900	Frida, Georgia, Grandma	3
$600 to $800	Georgia, Grandma	2
$500 to $600	Grandma	1
Less than $500	None	0



The table shows the supply schedule for the sellers. The graph shows the corresponding supply curve. Note that the height of the supply curve reflects sellers' costs.

PRODUCER SURPLUS (4/6)



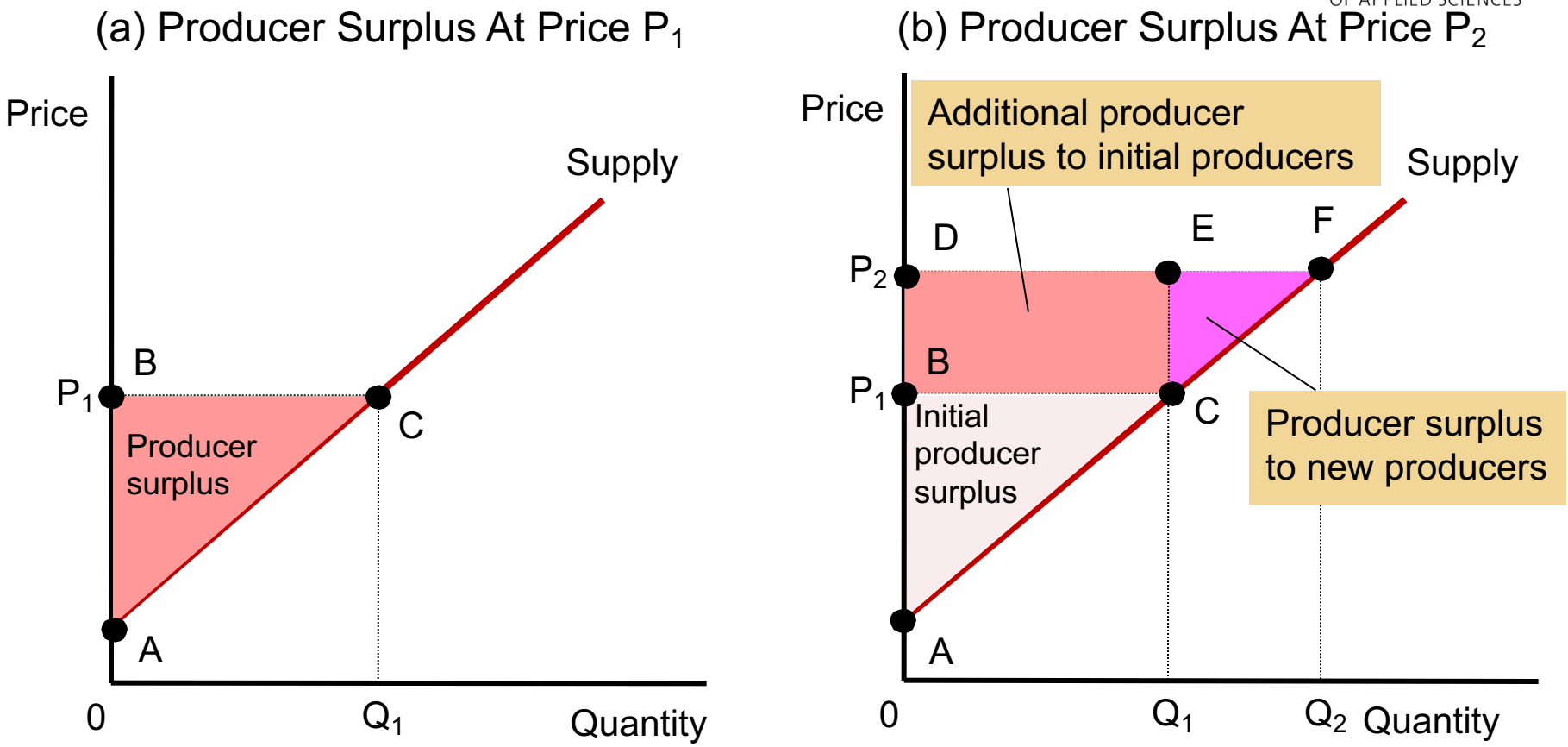
In panel (a), the price of the good is $600, and the producer surplus is $100. In panel (b), the price of the good is $800, and the producer surplus is $500

PRODUCER SURPLUS (5/6)

A higher price raises producer surplus

1. Existing sellers: increase in producer surplus
   - Sellers who were already selling the good at the lower price are better off because they now get more for what they sell
2. New sellers enter the market: increase in producer surplus
   - Willing to produce the good at the higher price

PRODUCER SURPLUS (6/6)
HOW PRICE AFFECTS PS



In panel (a), the price is P_1, the quantity supplied is Q_1, and producer surplus equals the area of the triangle ABC. When the price rises from P_1 to P_2, as in panel (b), the quantity supplied rises from Q_1 to Q_2, and the producer surplus rises to the area of the triangle ADF. The increase in producer surplus (area BCFD) occurs in part because existing producers now receive more (area BCED) and in part because new producers enter the market at the higher price (area CEF).

MARKET EFFICIENCY (1/6)

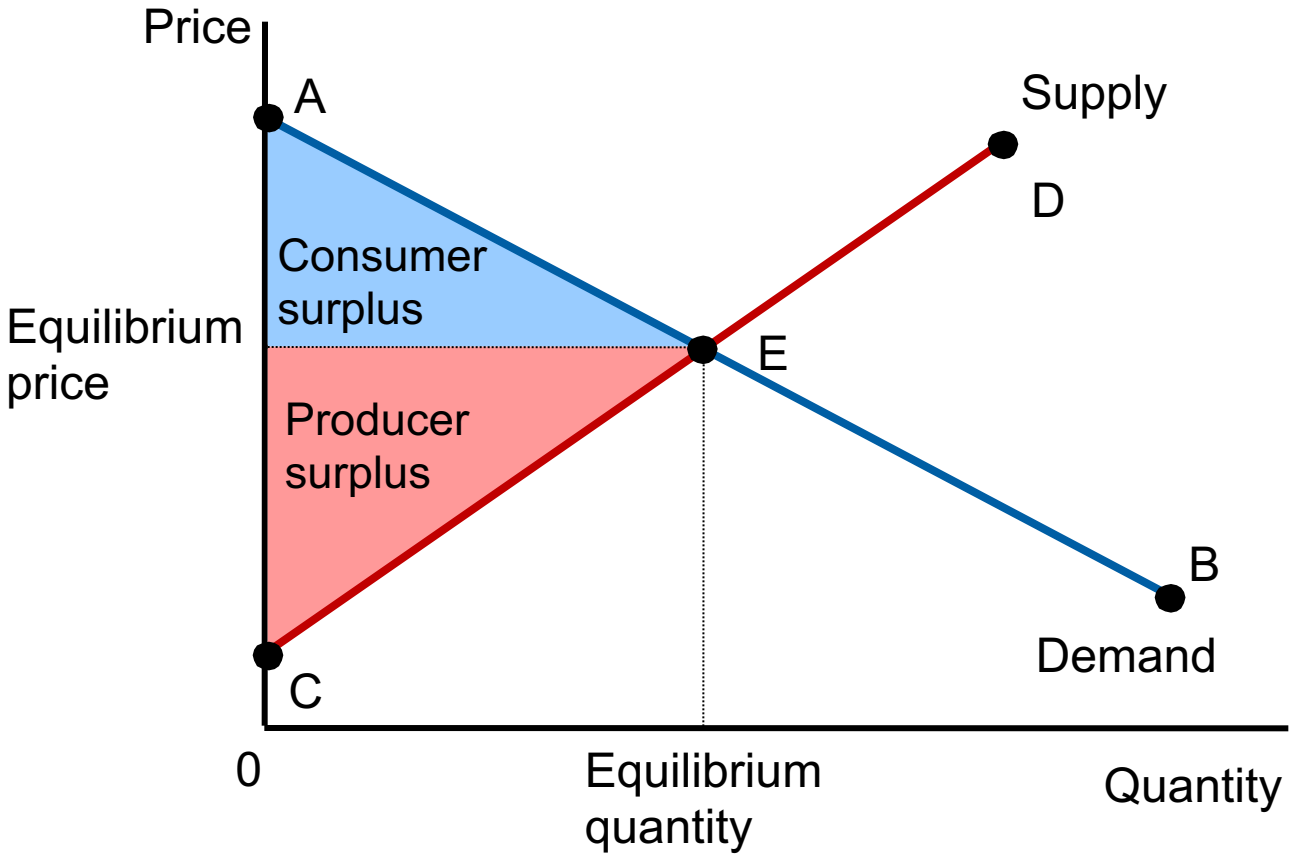
- The benevolent social planner
  - All-knowing, all-powerful, well-intentioned dictator
  - Wants to maximize the economic well-being (=total surplus) of everyone in society
- Total surplus = Consumer surplus + Producer surplus
  - Consumer surplus = Value to buyers – Amount paid by buyers
  - Producer surplus = Amount received by sellers – Cost to sellers
  - Amount paid by buyers = Amount received by sellers
  - Total surplus = Value to buyers – Cost to sellers
- If there are taxes:

  Total surplus = CS + PS + Tax revenues

MARKET EFFICIENCY (2/6)

- Efficiency
  - Property of a resource allocation
  - Maximizing the total surplus received by all members of society
- Equality
  - Property of distributing economic prosperity uniformly among the members of society
- Gains from trade in a market
  - Like a pie to be shared among the market participants
- The question of efficiency
  - Whether the pie is as big as possible
- The question of equality
  - How the pie is sliced/ distributed

MARKET EFFICIENCY (3/6)



Total surplus—the sum of consumer and producer surplus—is the area between the supply and demand curves up to the equilibrium quantity.

MARKET EFFICIENCY (4/6)

Market outcomes: Free markets…

- …produce the quantity of goods that maximizes welfare
- … allocate the supply of goods to the buyers who value them most highly measured by their willingness to pay
- … allocate the demand for goods to the sellers who can produce them at the least cost

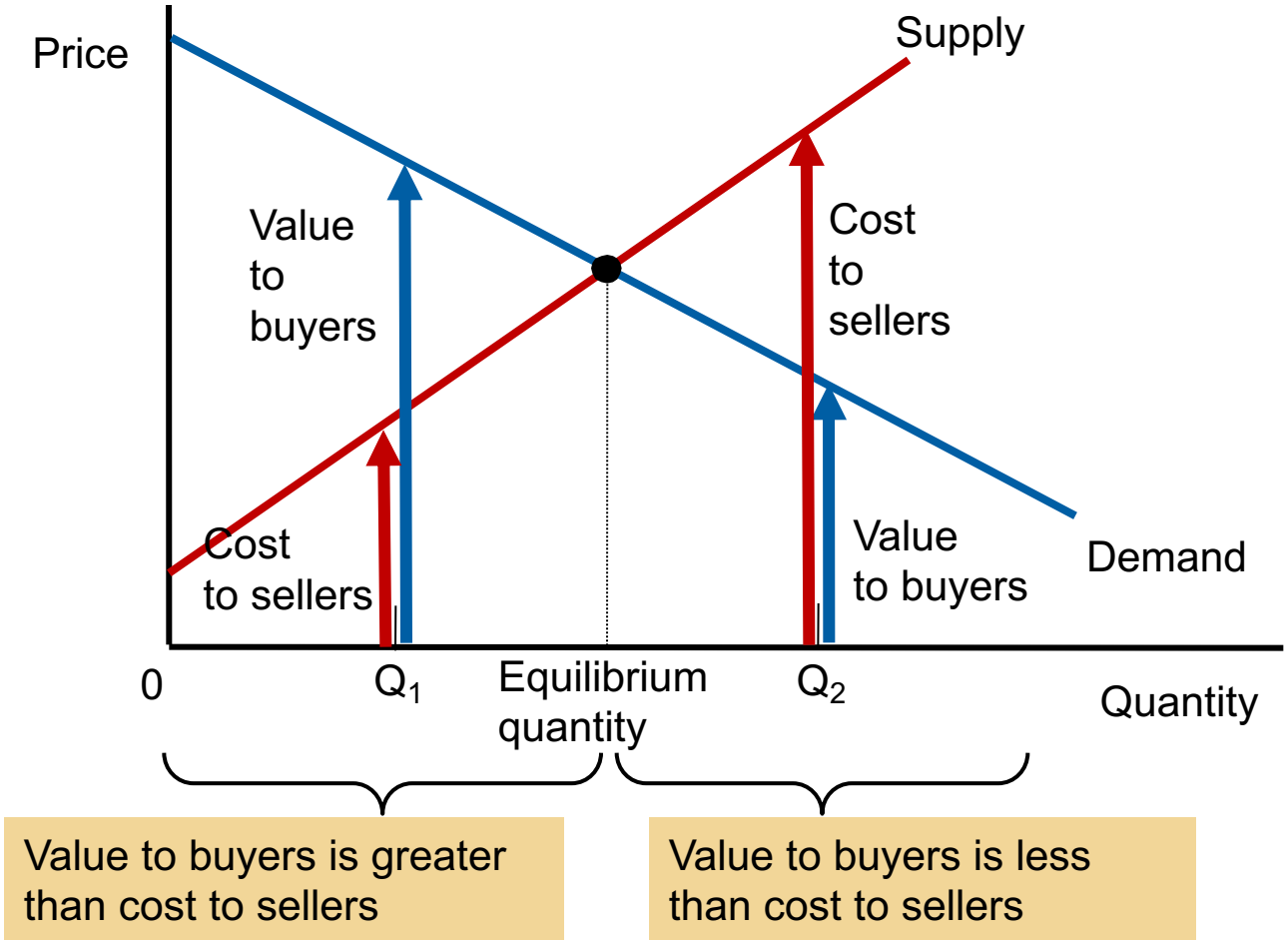
Market equilibrium

- Efficient allocation of resources

The benevolent social planner

- “Laissez faire” = “let people do as they will”

MARKET EFFICIENCY (5/6)



At quantities less than the equilibrium quantity, such as Q_1, the value to buyers exceeds the cost to sellers. At quantities greater than the equilibrium quantity, such as Q_2, the cost to sellers exceeds the value to buyers. Therefore, the market equilibrium maximizes the sum of producer and consumer surplus

MARKET EFFICIENCY (6/6)

ADAM SMITH'S INVISIBLE HAND

- Households and firms interacting in markets act as if they are guided by an "invisible hand"
- An efficient outcome is achieved through individuals' seeking to maximize their self-interest

Free markets

- Best way to organize economic activity

THE DEADWEIGHT LOSS OF TAXATION

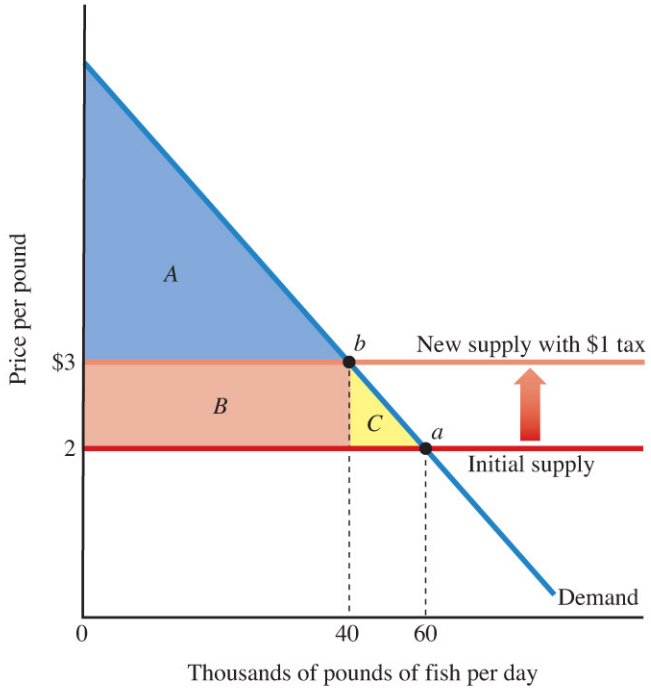
DEADWEIGHT LOSS

The decrease in the total surplus of the market (including revenue collected by the government) that results from a policy such as tax, rent control

When the supply curve is horizontal, a tax increases the equilibrium price by the tax ($1 per pound in this example).

Consumer surplus decreases by the areas *B* and *C*. Total tax revenue collected is shown by rectangle *B*, so the total burden exceeds tax revenue by triangle *C*.

Triangle *C* is sometimes known as the deadweight loss of the tax.



THE DEADWEIGHT LOSS OF PRICE CONTROLS

Rent Control

(A) In the market equilibrium, with a price of $400 and 1,000 apartments, the total surplus is the area between the demand curve and the supply curve.

(B) Rent control, with a maximum price of $300, reduces the quantity to 700 apartments and decreases the total surplus.

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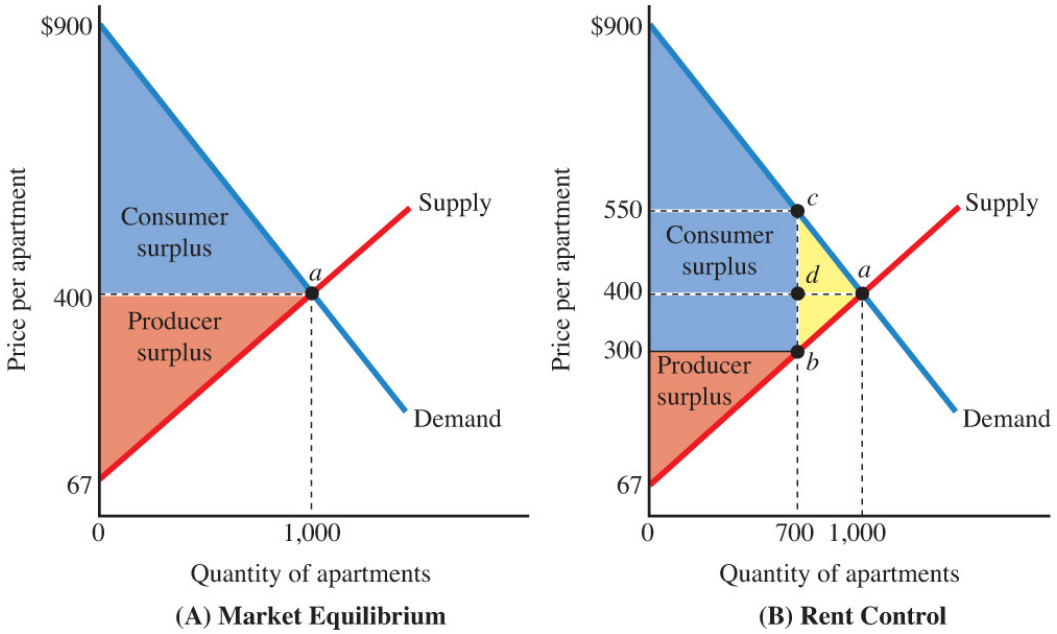


MARKET EFFICIENCY & FAILURE (1/2)

Forces of supply and demand allocate resources efficiently if

1. Markets are perfectly competitive
2. Outcome in a market matters only to the buyers and sellers in that market

In the world, competition is far from perfect

- Market power
  - A single buyer or seller (small group)
  - Control market prices
  - Markets are inefficient

When these assumptions do not hold

- "Market equilibrium is efficient" may no longer be true

MARKET EFFICIENCY & FAILURE (2/2)

In the world: Decisions of buyers and sellers affect people who are not participants in the market at all

- Externalities - cause welfare in a market to depend on more than just the value to the buyers and the cost to the sellers
- Inefficient equilibrium - from the standpoint of society as a whole

Market failure

- E.g.: market power and externalities
- The inability of some unregulated markets to allocate resources efficiently
- Public policy: Can potentially remedy the problem and increase economic efficiency

3.3 EXTERNALITIES

A CLASSROOM EXPERIMENT ON EDUCATION

Based on the standard public goods game, see e.g. Fischbacher, U., S. Gächter (2010) AER

Each of you is endowed with 10 coins

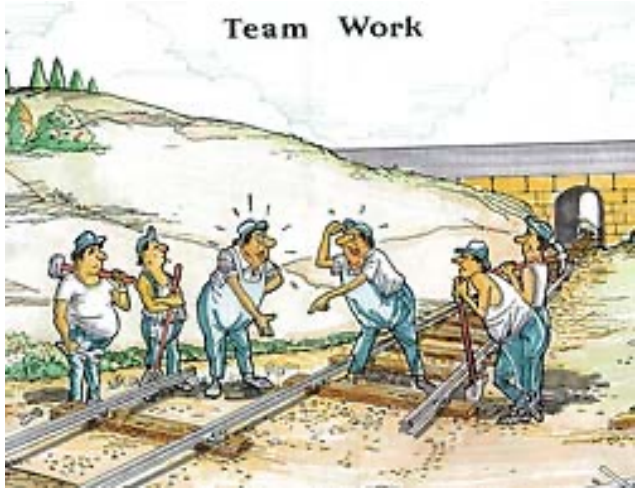
- All coins have to be spent for textbooks
  - Either for yourself and/or for the class library (books are available to all classmates)
  - Constant marginal utility of books
  - No other goods, no savings
  - 1 textbook costs 1 coin
  - For each coin contributed to the class library, the instructor adds 1 coin
- No communication allowed
- Fill in your choice (0, 1 ,2 ,.. or 10) of how much coins you spend for the class library

I donate ____ coins to support the class library.

EXTERNALITIES: EXAMPLES

Workplace externalities

When a well-educated person joins a work team, the productivity of everyone on the team may increase, higher profits and salaries are likely



Crime externalities

Educated people earn higher incomes and commit less crime

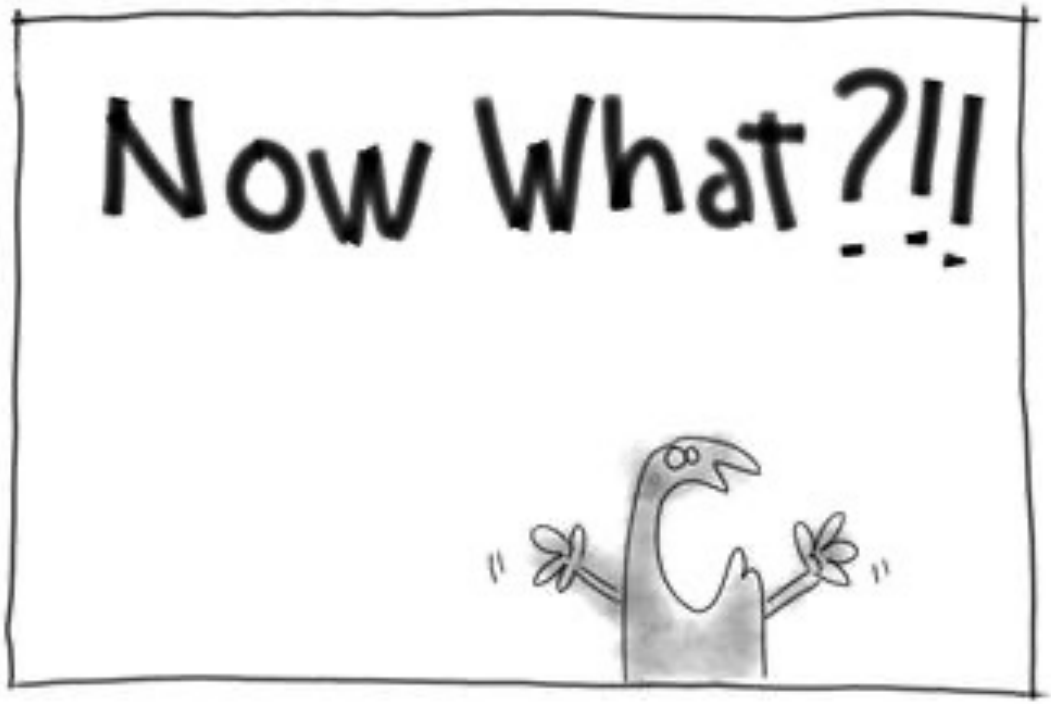
For every high-school student who graduates* rather than dropping out (one year prior to graduation), the “cost of crime**” decreases by about $1,600 per year for the rest of the graduate’s working life

Lochner, Moretti (2004) AER

* cost of last year high school: $6,000

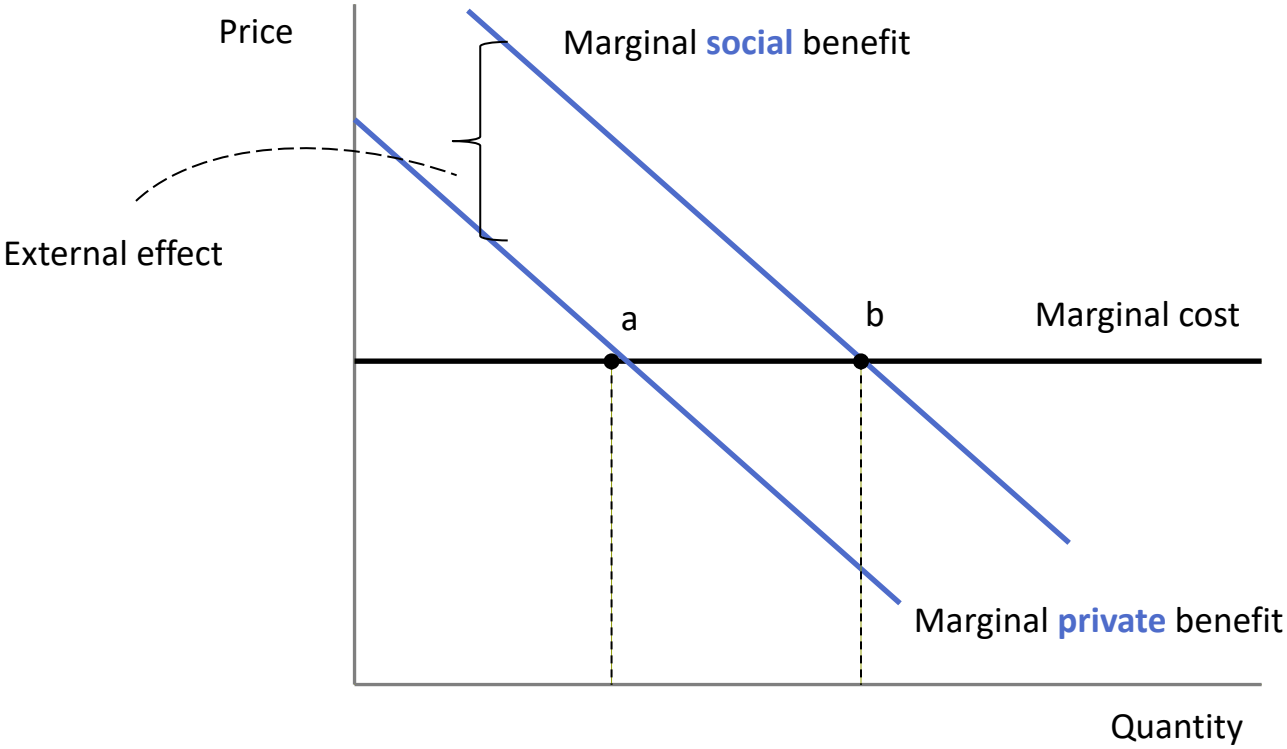
** such as incarceration costs and victim costs

ANALYZING THE SITUATION



Why should we care about *external* benefits?

DIFFERENCE BETWEEN PRIVATE AND SOCIAL BENEFITS



If external benefits are present, the marginal social benefit exceeds the marginal private benefit: an individual picks point *a*, but point *b* is the socially efficient point

INEFFICIENT MARKET OUTCOMES

- When a good provides external benefits, markets will produce too little of the good
- This is a market failure as the market does not generate the most efficient outcome

> Externalities are a source of market failure

- As a market with external benefits is inefficient, there is an opportunity for the government to improve efficiency

EXTERNAL BENEFITS

EXTERNAL BENEFIT: a benefit from a good experienced by someone other than the person who buys the good

- Examples: R&D spillovers, trees in residential neighborhoods, clock towers, smoke alarms, vaccinations

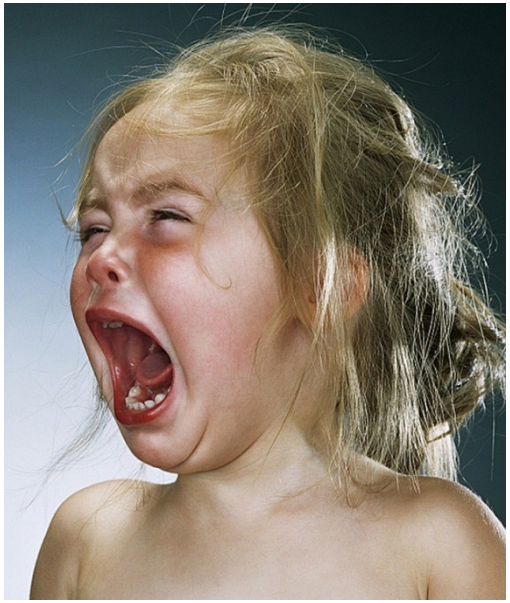
A special kind of external benefit:

- Network effects: the value of a product to a consumer increases with the number of other consumers who use it – Katz/Shaprio (1985) AER

EXTERNAL COSTS

EXTERNAL COSTS: When an action is harmful to others

- Examples: barking dogs, crying children, air pollution, disease transmission, traffic



Exercise: draw the graph in case of external costs

OVERCOMING THE PROBLEM (1/2)

Price regulation

- **Taxes**
  - **PIGOU TAX**: per-unit tax equal to the marginal external cost
  - Example: taxation of alcoholic drinks in Germany: Schaumwein-, Getränke-, Schankerlaubnis-, Bier-, Branntwein-, Alkopopsteuer

- **Subsidies**

  (e.g. education system)

- **Property rights or quantity regulation** such as tradeable permits, patents

OVERCOMING THE PROBLEM (2/2)

Private solutions: Moral codes, social sanctions, contracting between parties

COASE THEOREM:

Externality problems will be solved efficiently through private transactions if certain conditions hold

”**INTERNALIZING**” external effects improves economic efficiency

3.4 PUBLIC GOODS AND COMMON RESOURCES

FOUR TYPES OF GOODS

Excludable? \ Rival in consumption?	Yes	No
Yes	**Private Goods** • Ice-cream cones • Clothing • Congested toll roads	**Club Goods** • Fire protection • Cable TV • Uncongested toll roads
No	**Common Resources** • Fish in the ocean • The environment • Congested nontoll roads	**Public Goods** • Tornado siren • National defense • Uncongested nontoll roads

Goods can be grouped into four categories according to two characteristics: (1) A good is excludable if people can be prevented from using it. (2) A good is rival in consumption if one person's use of the good diminishes other people's use of it. This diagram gives examples of goods in each category.

PUBLIC GOODS AND COMMON RESOURCES

- Not excludable
  - People cannot be prevented from using them
  - Available to everyone free of charge
- No price attached to it
- External effects
  - Positive externalities (public goods)
  - Negative externalities (common resources)
- Private decisions about consumption and production
  - Can lead to an inefficient allocation of resources
- Government intervention
  - Can potentially raise economic well-being

PUBLIC GOODS (1/4)

THE FREE-RIDER PROBLEM

- Persons who receive the benefit of a good but avoid paying for it
- Public goods are not excludable
- Prevents the private market from supplying the goods

Government can remedy the free-rider problem

- If total benefits of a public good exceeds its costs
- Provide the public good
- Pay for it with tax revenue
- Make everyone better off

PUBLIC GOODS (2/4)

Some important public goods

- National defense: very expensive public good ($717 billion; 2011)
- Basic research (general knowledge)
  - Subsidized by government
  - The public sector fails to pay for the right amount and the right kinds
- Antipoverty programs (financed by taxes) provide a small income for some poor families
  - E.g. food stamps (Supplemental Nutrition Assistance Program, SNAP) subsidize the purchase of food for those with low incomes
  - Government housing programs make shelter more affordable

PUBLIC GOODS (3/4)
ARE LIGHTHOUSES PUBLIC GOODS?

FRANKFURT UNIVERSITY OF APPLIED SCIENCES

Lighthouses

- Mark specific locations so that passing ships can avoid treacherous waters
  - Benefit: to the ship captain
    - Not excludable, not rival in consumption
  - Incentive: free ride without paying
- Most are operated by the government

What kind of good is this?

Decide whether something is a public good

- Determine who the beneficiaries are
- Determine whether the beneficiaries can be excluded from using the good

A free-rider problem

- When the number of beneficiaries is large
- Exclusion of any one of them is impossible

PUBLIC GOODS (4/4)

The difficult job of cost–benefit analysis

- Government
  - Decide what public goods to provide
  - In what quantities
- Cost–benefit analysis
  - Compare the costs and benefits to society of providing a public good
  - Doesn’t have any price signals to observe
  - Government findings
    - Rough approximations at best

EXAMPLE: HOW MUCH IS A LIFE WORTH? (1/2)

Cost: $10,000 for a new traffic light

Benefit: increased safety

- Risk of a fatal traffic accident: drops from 1.6% to 1.1 %

Obstacle

- Measure costs and benefits in the same units

Put a dollar value on a human life?

- Priceless = infinite dollar value

EXAMPLE: HOW MUCH IS A LIFE WORTH? (2/2)

Implicit dollar value of a human life

- Courts: award damages in wrongful-death suits
  - Total amount of money a person would have earned if he or she had lived
  - Ignores other opportunity costs of losing one's life
- Risks that people are voluntarily willing to take and how much they must be paid for taking them
  - Value of human life = $10 million

Cost-benefit analysis

- Traffic light reduces risk of fatality by 0.5 percentage points
- Expected benefit = 0.005 × $10 million = $50,000
- Cost ($10,000) < Benefit ($50,000)
- Approve the traffic light

COMMON RESOURCES (1/2)

Common resources

- Not excludable
- Rival in consumption

THE TRAGEDY OF THE COMMONS

- Parable that shows why common resources are used more than desirable
  - From society's standpoint
- Social and private incentives differ
- Arises because of a negative externality: one person uses a common resource, diminishes other people's enjoyment of it
- Government can solve the problem
  - Regulation or taxes to reduce consumption of the common resource
  - Turn the common resource into a private good

COMMON RESOURCES (2/2)

Some important common resources

- Clean air and water
  - Negative externality: pollution
  - Regulations or corrective taxes
- Congested roads
  - Negative externality: congestion
  - Corrective tax: charge drivers a tool
  - Tax on gasoline
- Fish, whales, and other wildlife
  - Oceans are the least regulated common resource
    - Needs international cooperation
    - Difficult to enforce an agreement
  - Fishing and hunting licenses
  - Limits on fishing and hunting seasons/ size of fish
  - Limits on quantity of animals killed

IMPORTANCE OF PROPERTY RIGHTS

Market fails to allocate resources efficiently

- Because property rights are not well established
- Some item of value does not have an owner with the legal authority to control it

The government can potentially solve the problem

- Help define property rights and thereby unleash market forces
- Regulate private behavior
- Use tax revenue to supply a good that the market fails to supply

04

CONSUMER BEHAVIOR

4.1 Consumer Preferences

4.2 Budget Constraints

4.3 Consumer Choice

4.4 Individual Demand

4.5 Network Externalities

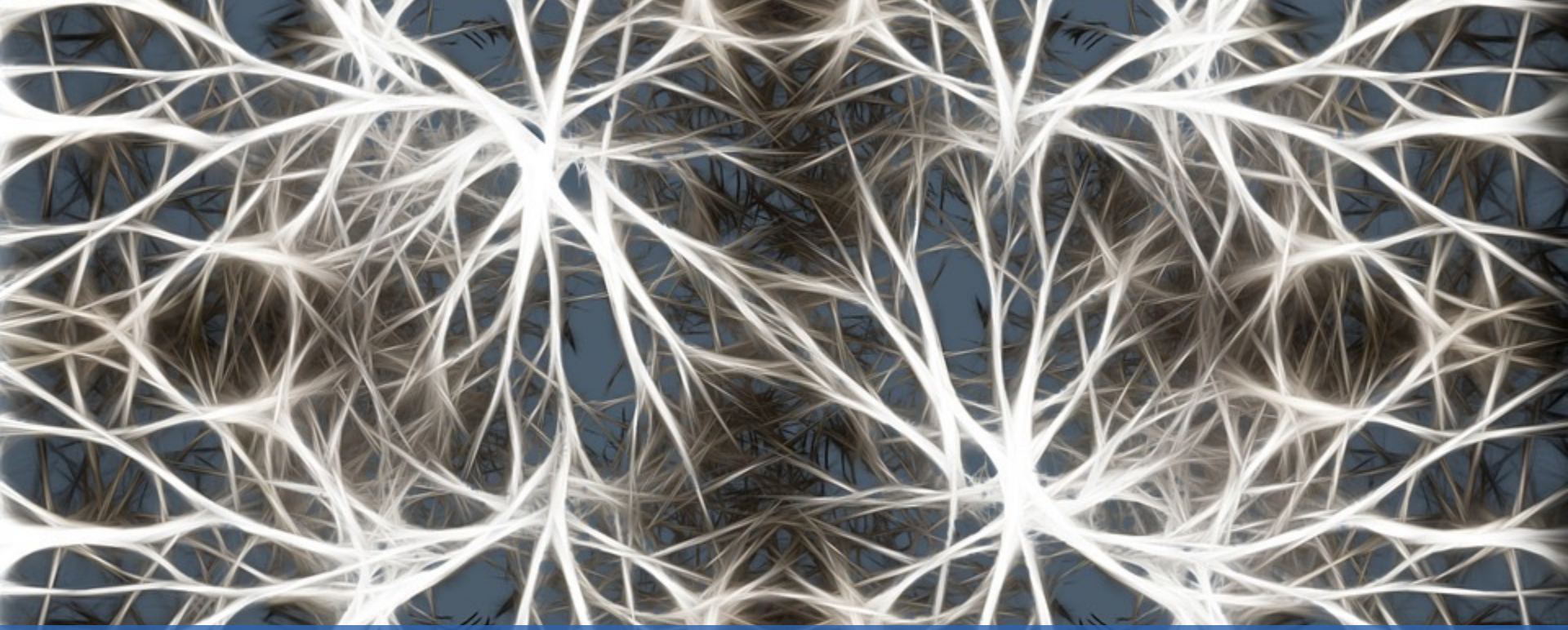
04 IDEA

Among the market baskets which are affordable, the consumer chooses the market basket that he/she likes most. Thus, demand describes optimal consumption that depends on prices and income.

This part deals with how consumer make consumption decision, how their preferences and budget constraints determine their demand for various goods and why different goods have different demand characteristics.

04 LEARNING OBJECTIVES

- Describe the basic assumptions on preferences
- Explain how preferences can be expressed through indifference curves
- Apply indifference curves to explain preferences and utility
- Recall the idea of perfect substitutes and complements
- Explain how the budget constraint restricts consumer choice
- Calculate the household optimum using the Lagrangian
- Analyze the impact of income and price changes on individual choices
- Discuss the different kind of goods
- Derive the individual demand curve
- Explain network effects and apply them to real-life examples



4.1 CONSUMER PREFERENCES

CONSUMER BEHAVIOR

Description of how consumers allocate incomes among different goods and services to maximize their well-being

(The labor supply decision will not be analyzed in this class)

Consumer behavior is best understood in three distinct steps:

1. Consumer Preferences
2. Budget Constraints
3. Consumer Choices -> individual demand

SOME BASIC ASSUMPTIONS ABOUT PREFERENCES

1. Completeness

Preferences are assumed to be *complete*. In other words, consumers can compare and rank all possible baskets. For any 2 market baskets *A* and *B*, a consumer will prefer *A* to *B*, will prefer *B* to *A*, or will be indifferent between the two. By *indifferent* we mean that a person will be equally satisfied with either basket. Note that preferences ignore costs. A consumer might prefer steak to hamburger but buy hamburger because it is cheaper.

2. Transitivity

Preferences are *transitive*. Transitivity means that if a consumer prefers basket *A* to basket *B* and basket *B* to basket *C*, then the consumer also prefers *A* to *C*. Transitivity is normally regarded as necessary for consumer consistency.

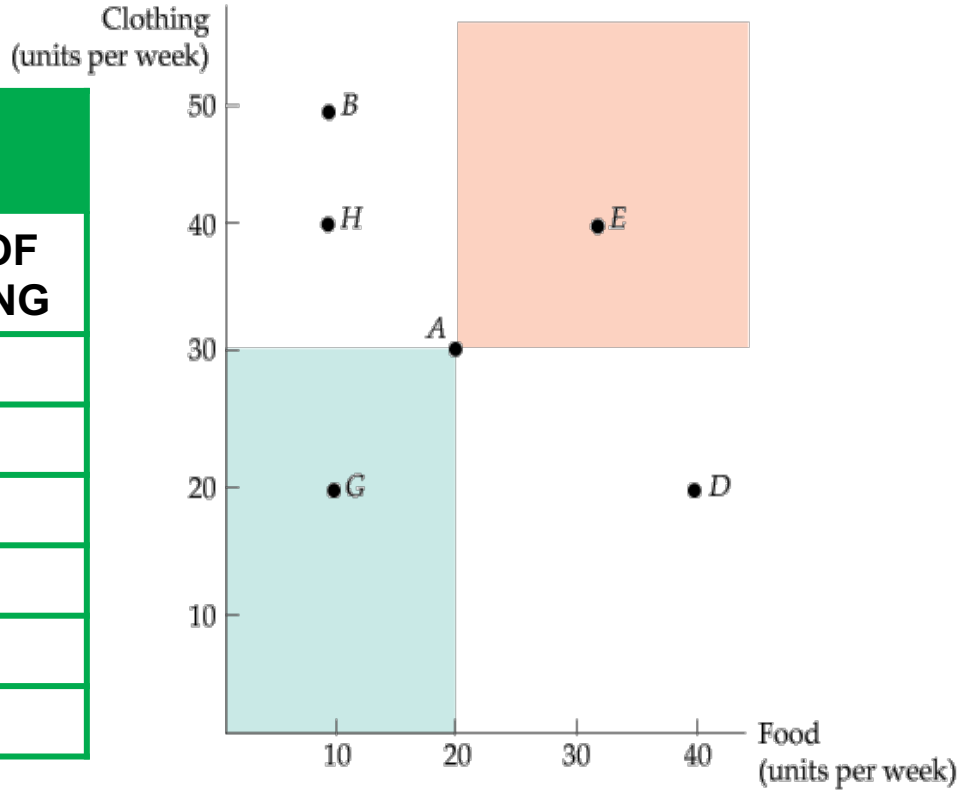
3. More is better than less

Goods are assumed to be desirable—i.e., to be *good*. Consequently, *consumers always prefer more of any good to less*. In addition, consumers are never satisfied or satiated; *more is always better, even if just a little better*.

DESCRIBING INDIVIDUAL PREFERENCES

Because more of each good is preferred to less, we can compare market baskets in the shaded areas. Basket *A* is clearly preferred to basket *G*, while *E* is clearly preferred to *A*. However, *A* cannot be compared with *B*, *D*, or *H* without additional information

ALTERNATIVE MARKET BASKETS		
MARKET BASKET	**UNITS OF FOOD**	**UNITS OF CLOTHING**
A	20	30
B	10	50
D	40	20
E	30	40
G	10	20
H	10	40

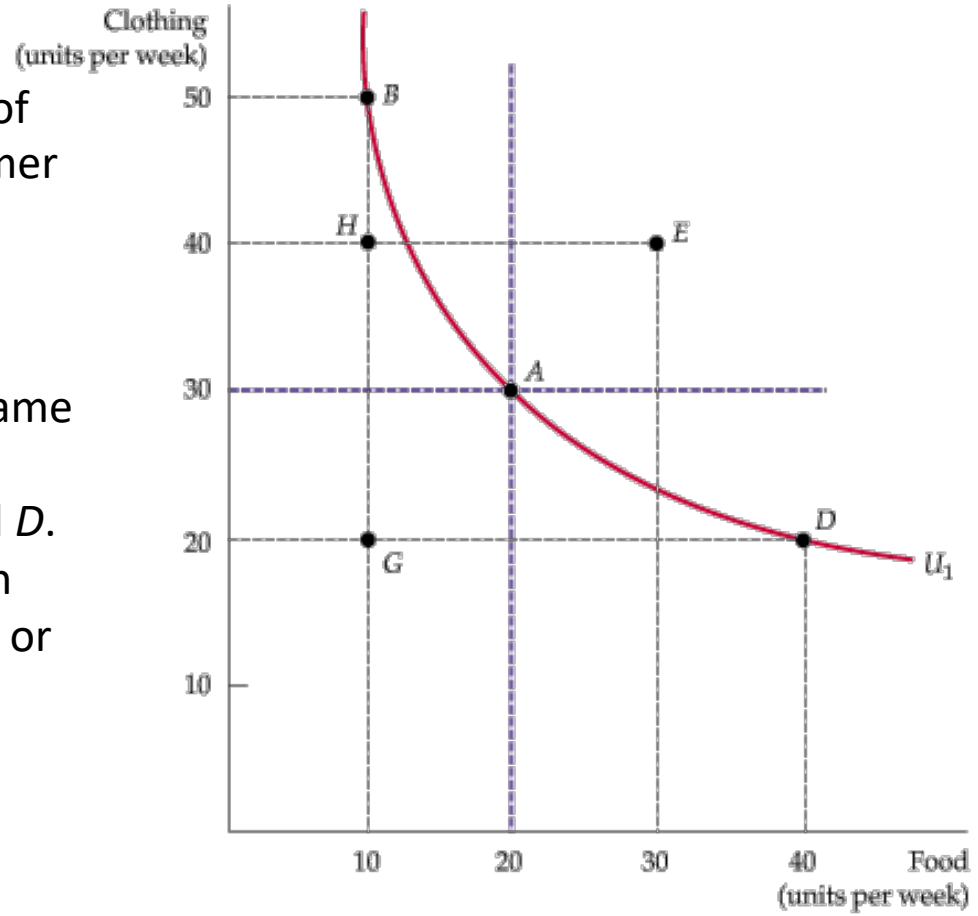


INDIFFERENCE CURVES

INDIFFERENCE CURVE

Curve representing all combinations of market baskets that provide a consumer with the same level of satisfaction

The indifference curve U_1 that passes through market basket *A* shows all baskets that give the consumer the same level of satisfaction as does market basket *A*; these include baskets *B* and *D*. Our consumer prefers basket *E*, which lies above U_1, to *A*, but prefers *A* to *H* or *G*, which lie below U_1.



UTILITY AND UTILITY FUNCTIONS

UTILITY Numerical score representing the satisfaction that a consumer gets from a given market basket

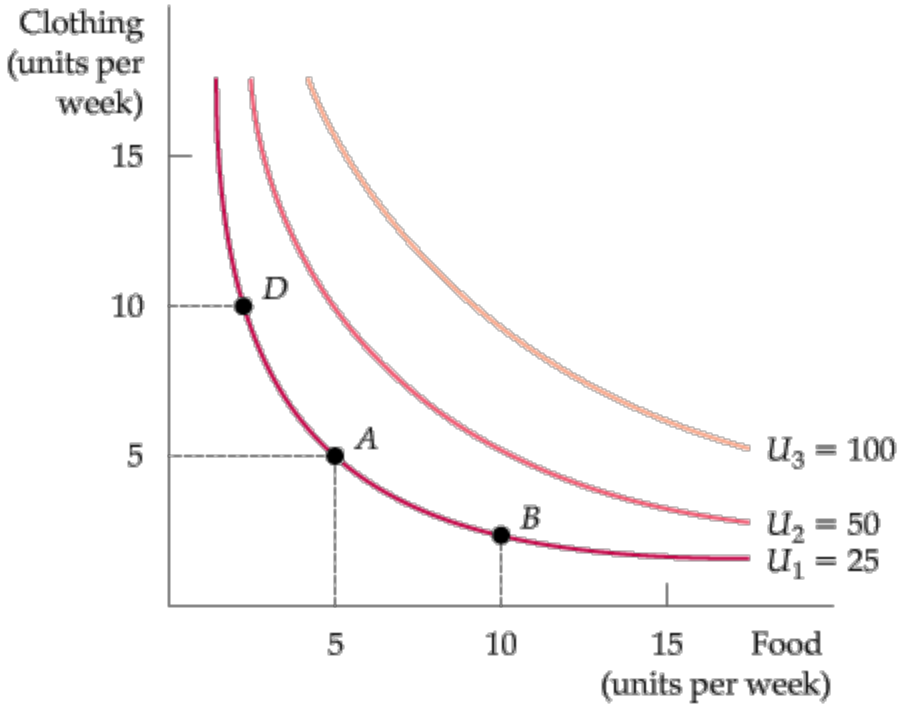
UTILITY FUNCTION Formula that assigns a level of utility to individual market baskets

UTILITY FUNCTIONS AND INDIFFERENCE CURVES

A utility function can be represented by a set of indifference curves, each with a numerical indicator.

This figure shows three indifference curves (with utility levels of 25, 50, and 100, respectively) associated with the utility function:

$$u\,(F,C\,) = FC$$

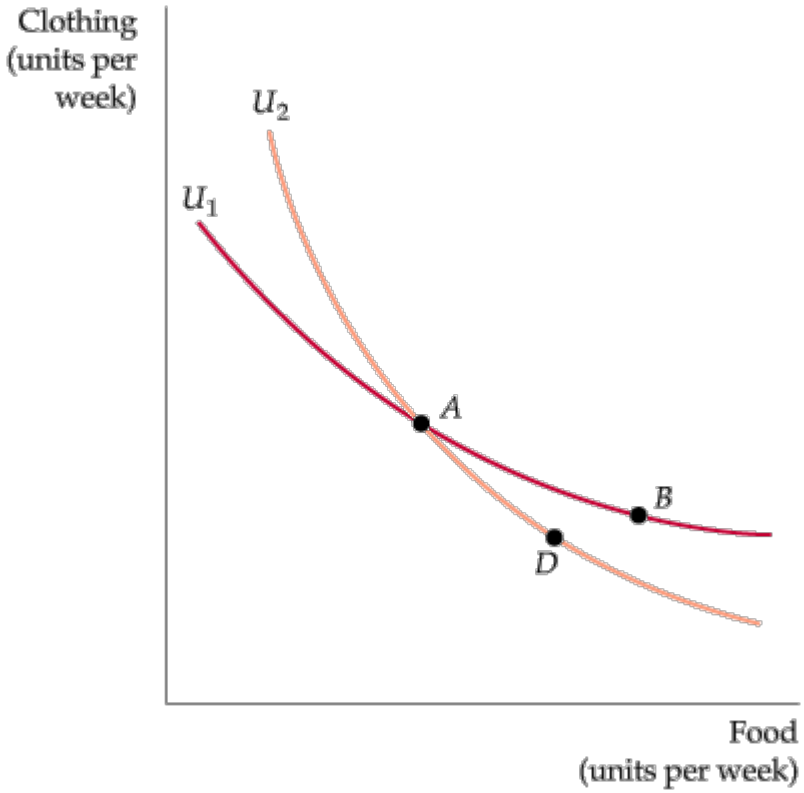


INDIFFERENCE CURVES

Indifference Curves Cannot Intersect

If indifference curves U_1 and U_2 intersect, one of the assumptions of consumer theory is violated

According to this diagram, the consumer should be indifferent among market baskets *A*, *B*, and *D*. Yet *B* should be preferred to *D* because *B* has more of both goods



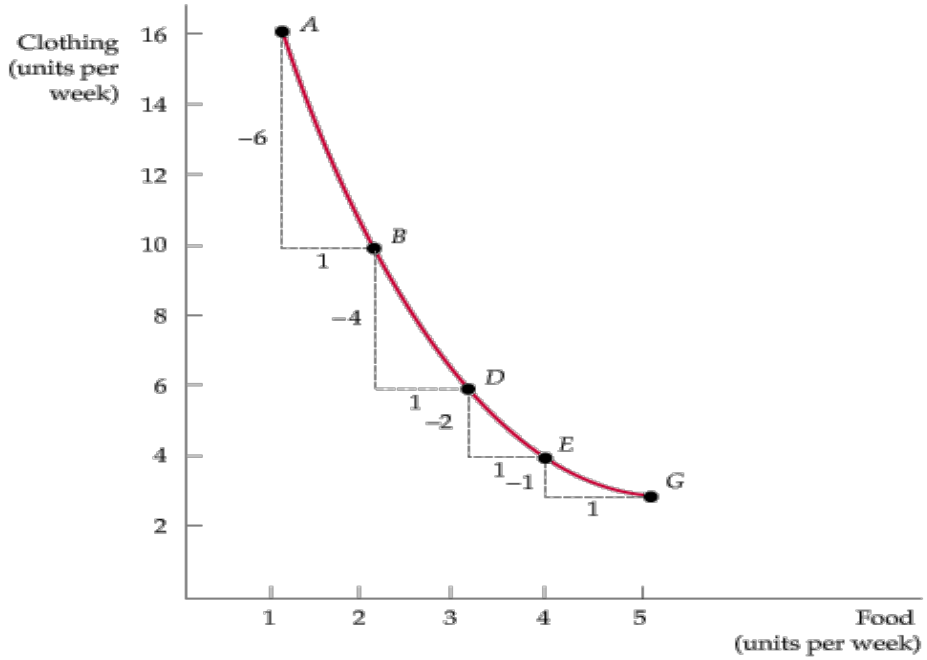
THE SHAPE OF INDIFFERENCE CURVES

THE MARGINAL RATE OF SUBSTITUTION

Maximum amount of a good that a consumer is willing to give up in order to obtain one additional unit of another good.

The magnitude of the slope of an indifference curve measures the consumer's marginal rate of substitution (MRS) between two goods

In this figure, the MRS between clothing (*C*) and food (*F*) falls from 6 (between *A* and *B*) to 4 (between *B* and *D*) to 2 (between *D* and *E*) to 1 (between *E* and *G*).



SOME BASIC ASSUMPTIONS ABOUT PREFERENCES (2/2)

4. CONVEXITY

Observe that the MRS falls as we move down the indifference curve The decline in the MRS reflects our fourth assumption regarding consumer preferences: a **diminishing marginal rate of substitution** When the MRS diminishes along an indifference curve, the curve is convex

PERFECT SUBSTITUTES AND PERFECT COMPLEMENTS

PERFECT SUBSTITUTES

Two goods for which the marginal rate of substitution of one for the other is a constant

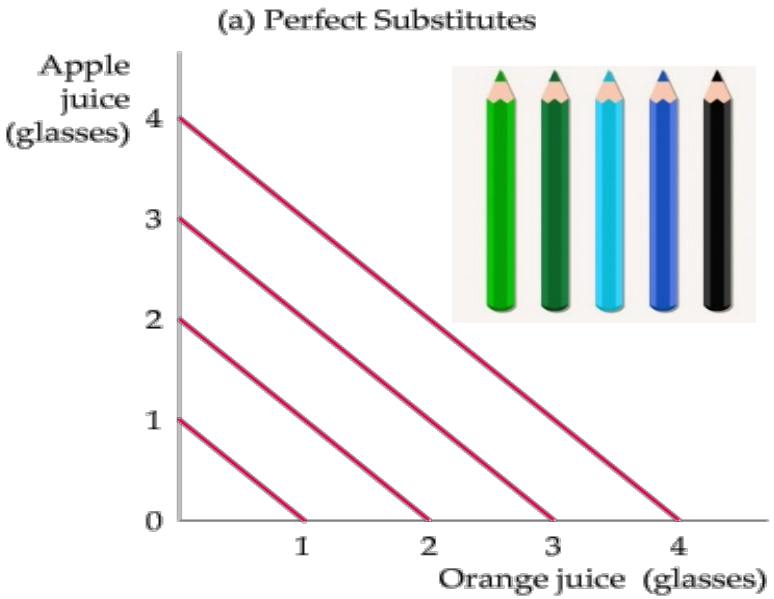
PERFECT COMPLEMENTS

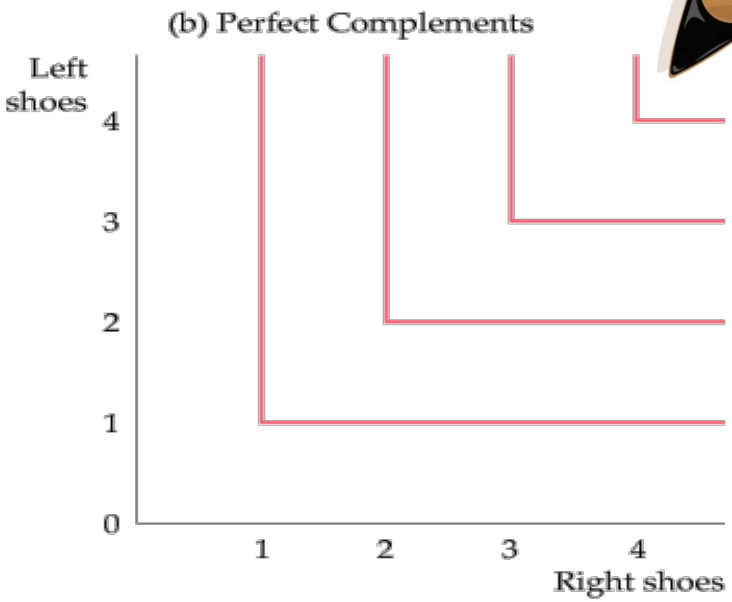
Two goods for which the MRS is zero or infinite; the indifference curves are shaped as right angles

BAD

Good for which less is preferred rather than more

PERFECT SUBSTITUTES AND PERFECT COMPLEMENTS



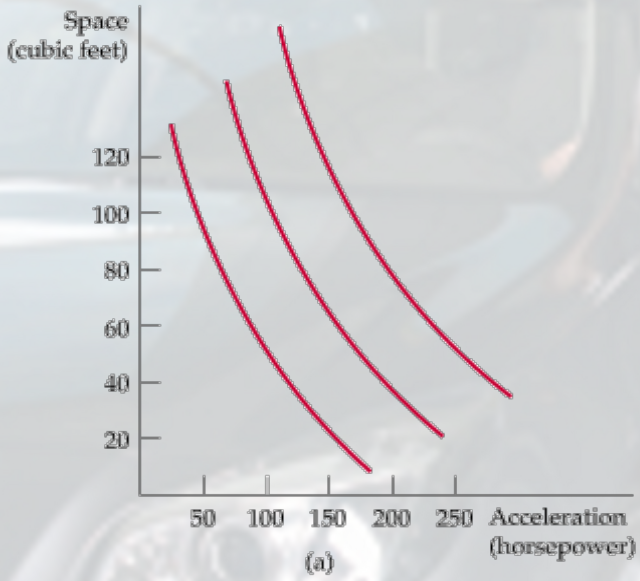


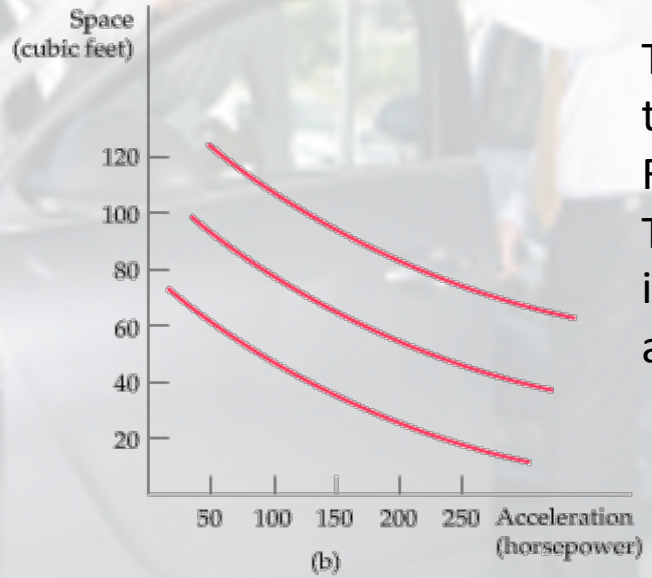
In (*a*), Bob views orange juice and apple juice as perfect substitutes: He is always indifferent between a glass of one and a glass of the other

In (*b*), Jane views left shoes and right shoes as perfect complements: An additional left shoe gives her no extra satisfaction unless she also obtains the matching right shoe

DESIGNING NEW AUTOMOBILES

Preferences for automobile attributes can be described by indifference curves. Each curve shows the combination of acceleration and interior space that give the same satisfaction.





The opposite is true for owners of Ford Explorers. They prefer interior space to acceleration (*b*)

Owners of Ford Mustang coupes (*a*) are willing to give up considerable interior space for additional acceleration

CASE STUDY

4.2 BUDGET CONSTRAINTS

BUDGET CONSTRAINT

THE BUDGET CONSTRAINT

$$P_F F + P_C C = I$$

- Constraints that consumers face as a result of limited incomes.
- All combinations of goods for which the total amount of money spent is equal to income.

MARKET BASKETS AND THE BUDGET LINE			
MARKET BASKET	**FOOD (*F*)**	**CLOTHING (*C*)**	**TOTAL SPENDING**
A	0	40	$80
B	20	30	$80
D	40	20	$80
E	60	10	$80
G	80	0	$80

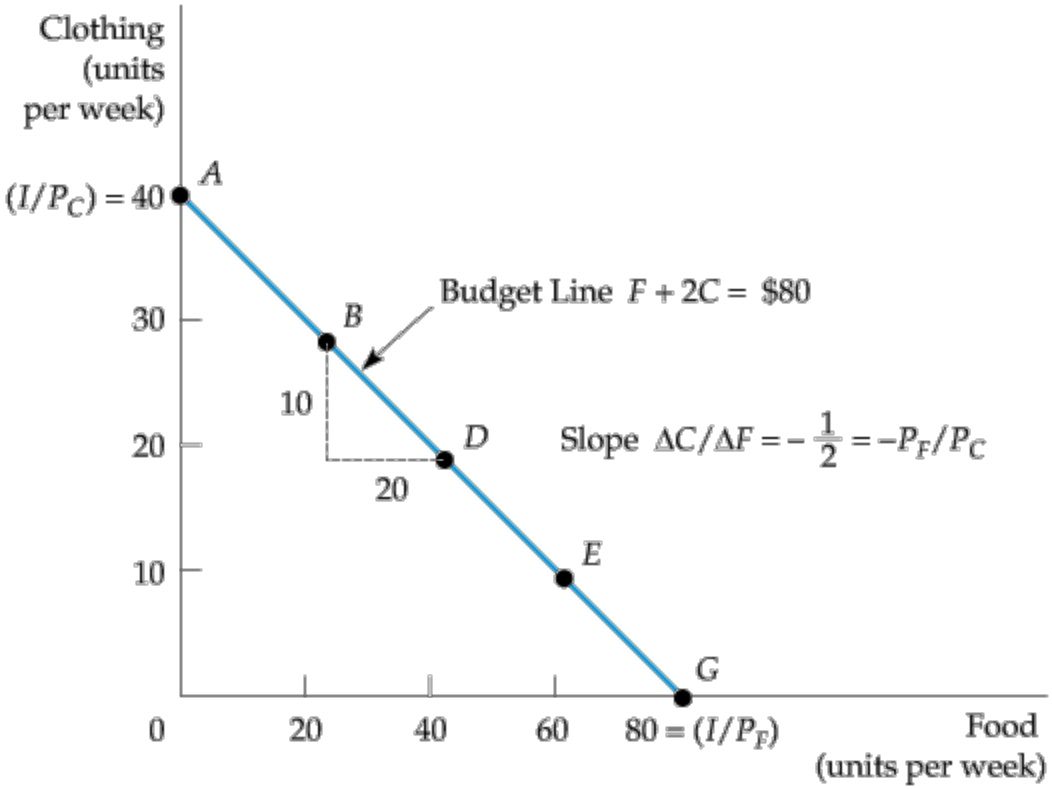
Market baskets associated with the budget line

$F + 2C = \$80$

BUDGET CONSTRAINT

Line *AG* (which passes through points *B*, *D*, and *E*) shows the budget associated with an income of \$80, a price of food of P_F = \$1 per unit, and a price of clothing of P_C = \$2 per unit.

The slope of the budget line (measured between points *B* and *D*) is $-P_F/P_C = -1/2$.



$$C = (I / P_C) - (P_F / P_C)F$$

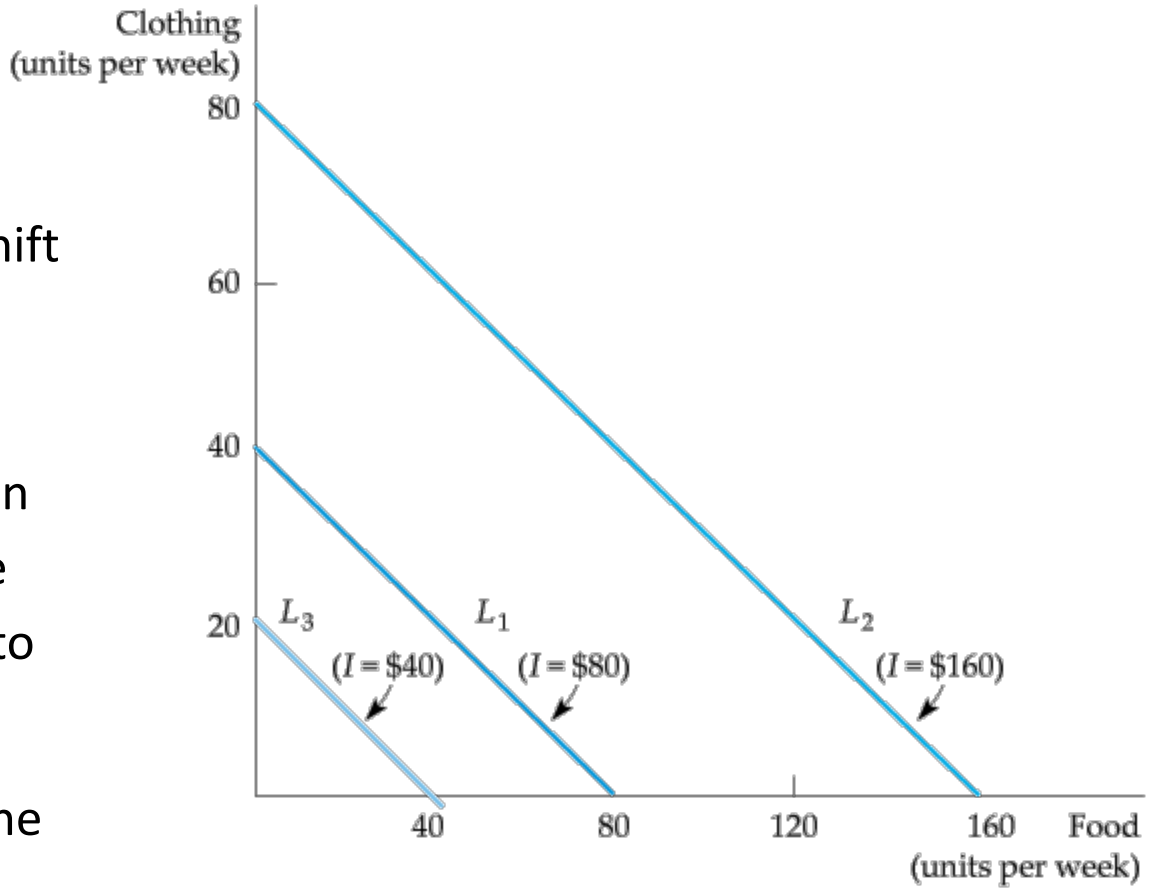
THE EFFECTS OF CHANGES IN INCOME AND PRICES ON THE BUDGET LINE

A change in income

(with prices unchanged) causes the budget line to shift parallel to the original line (L_1).

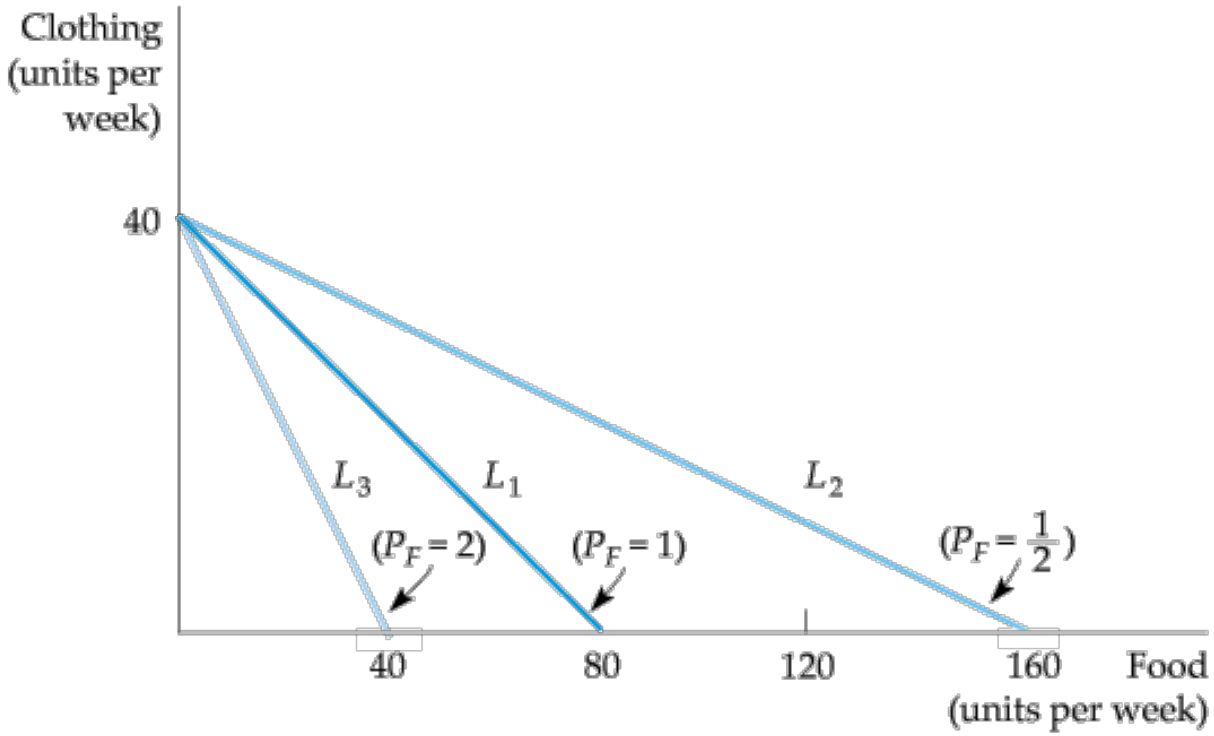
When the income of \$80 (on L_1) is increased to \$160, the budget line shifts outward to L_2.

If the income falls to \$40, the line shifts inward to L_3.



THE EFFECTS OF CHANGES IN INCOME AND PRICES ON THE BUDGET LINE

Price changes: A change in the price of one good (with income unchanged) causes the budget line to rotate about one intercept



When the price of food falls from \$1.00 to \$0.50, the budget line rotates outward from L_1 to L_2.

However, when the price increases from \$1.00 to \$2.00, the line rotates inward from L_1 to L_3.

CONSUMER CHOICE

CONSUMER CHOICE

The maximizing market basket must satisfy two conditions:

1. It must be located on the budget line.

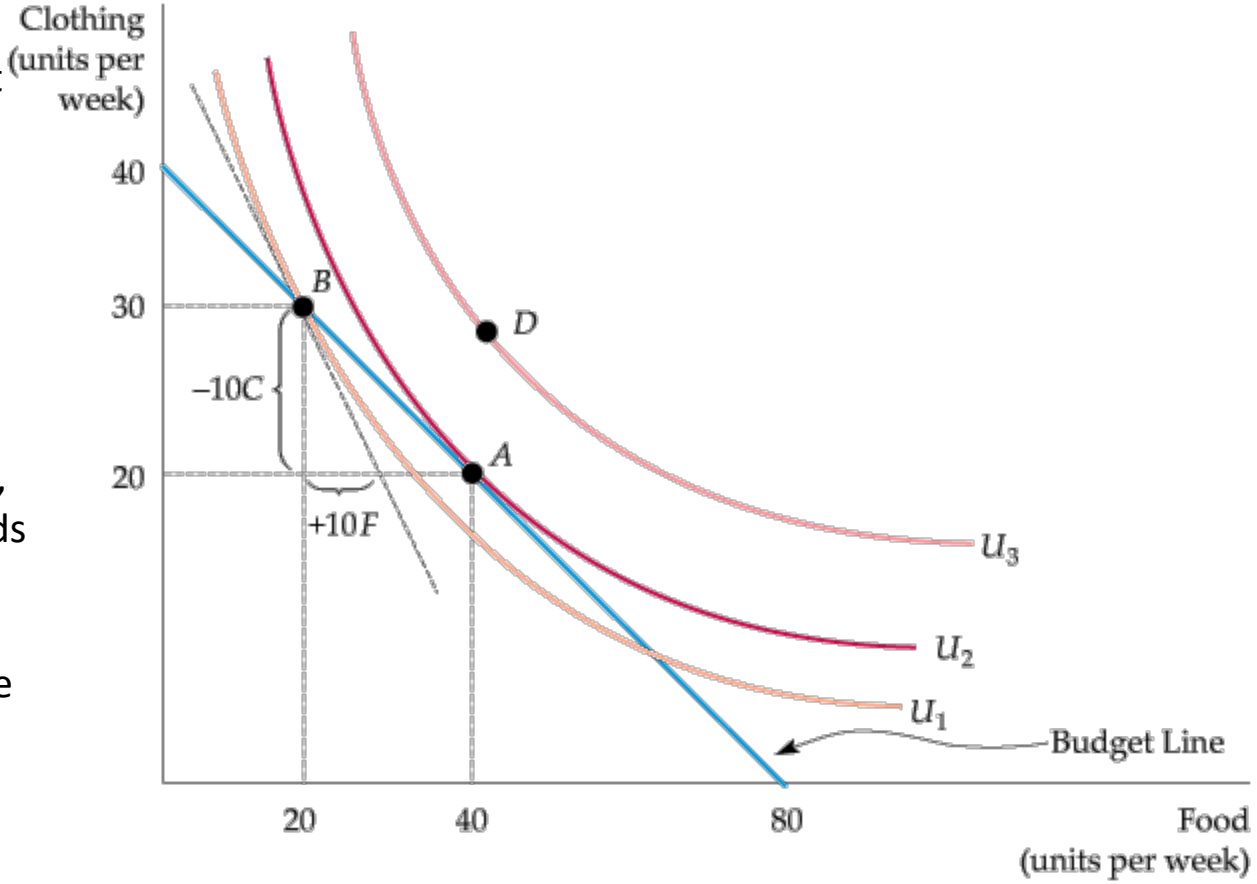
2. It must give the consumer the most preferred combination of goods and services.

MAXIMIZING CONSUMER SATISFACTION (1/2)

A consumer maximizes satisfaction by choosing market basket *A*. At this point, the budget line and indifference curve U_2 are tangent.

No higher level of satisfaction (e.g., market basket *D*) can be attained.

At *A*, the point of maximization, the MRS between the two goods equals the price ratio. At *B*, however, because the MRS [−(−10/10) = 1] is greater than the price ratio (1/2), satisfaction is not maximized



MAXIMIZING CONSUMER SATISFACTION (2/2)

Satisfaction is maximized (given the budget constraint) at the point where

$$\text{MRS} = P_F / P_C$$

MARGINAL BENEFIT

Benefit from the consumption of one additional unit of a good.

MARGINAL COST

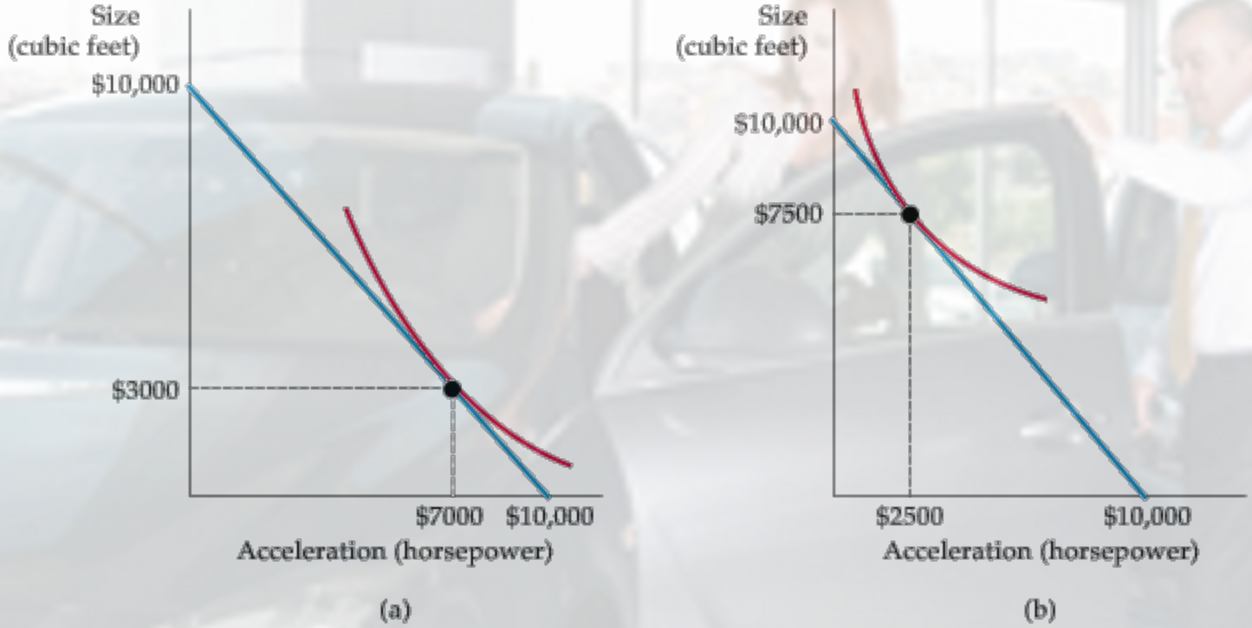
Cost of one additional unit of a good

So, we can then say that satisfaction is maximized when the **marginal benefit**—the benefit associated with the consumption of one additional unit of food—is equal to the **marginal cost**—the cost of the additional unit of food. The marginal benefit is measured by the MRS.

PRINCIPLE #3

DESIGNING NEW AUTOMOBILES (II)

Different preferences of consumer groups for automobiles can affect their purchasing decisions. Following up on the previous Example, we consider two groups of consumers planning to buy new cars



CONSUMER CHOICE OF AUTOMOBILE ATTRIBUTES

The consumers in (*a*) are willing to trade off a considerable amount of interior space for some additional acceleration

Given a budget constraint, they will choose a car that emphasizes acceleration.

The opposite is true for consumers in (*b*)

CASE STUDY

MARGINAL UTILITY AND CONSUMER CHOICE

MARGINAL UTILITY (MU) Additional satisfaction obtained from consuming one additional unit of a good

DIMINISHING MARGINAL UTILITY Principle that as more of a good is consumed, the consumption of additional amounts will yield smaller additions to utility

Utility Maximization

Suppose, for example, that Bob's utility function is given by $U(X, Y) = \log X + \log Y$, where X is used to represent food and Y represents clothing. In that case, the marginal utility associated with the additional consumption of X is given by *the partial derivative of the utility function with respect to good X.* Here, MU_X, representing the marginal utility of good X, is given by

$$\frac{\partial U(X,Y)}{\partial X} = \frac{\partial(\log X + \log Y)}{\partial X} = \frac{1}{X}$$

The consumer's optimization problem may be written as

$$\text{Maximize } U(X, Y) \qquad \textbf{(1)}$$

subject to the constraint that all income is spent on the two goods:

$$P_X X + P_Y Y = I \qquad \textbf{(2)}$$

The Method of Lagrange Multipliers

- **Method of Lagrange multipliers**: Technique to maximize or minimize a function subject to one or more constraints.

- **Lagrangian:** Function to be maximized or minimized, plus a variable (the Lagrange multiplier) multiplied by the constraint.

1. **Stating the Problem** First, we write the Lagrangian for the problem.

$$\Phi = U(X,Y) - \lambda(P_X X + P_Y Y - I) \qquad \textbf{(3)}$$

Note that we have written the budget constraint as

$$P_X X + P_Y Y - I = 0$$

2. **Differentiating the Lagrangian** We choose values of *X* and *Y* that satisfy the budget constraint, then the second term in equation (3) will be zero. By differentiating with respect to *X*, *Y*, and *I* and then equating the derivatives to zero, we can obtain the necessary conditions for a maximum.

$$\frac{\partial \Phi}{\partial X} = \mathrm{MU}_X(X,Y) - \lambda P_X = 0$$
$$\frac{\partial \Phi}{\partial Y} = \mathrm{MU}_Y(X,Y) - \lambda P_Y = 0 \qquad \textbf{(4)}$$
$$\frac{\partial \Phi}{\partial \lambda} = I - P_X X - P_Y Y = 0$$

3. **Solving the Resulting Equations** The three equations in (4) can be rewritten as

$$\mathrm{MU}_X = \lambda P_X$$
$$\mathrm{MU}_Y = \lambda P_Y$$
$$P_X X - P_Y Y = I$$

The Equal Marginal Principle

We combine the first two conditions above to obtain the *equal marginal principle*:

$$\lambda = \frac{\text{MU}_X(X,Y)}{P_X} = \frac{\text{MU}_Y(X,Y)}{P_Y} \quad \textbf{(5)}$$

To optimize, *the consumer must get the same utility from the last dollar spent by consuming either X or Y*. To characterize the individual's optimum in more detail, we can rewrite the information in (5) to obtain

$$\frac{\text{MU}_X(X,Y)}{\text{MU}_Y(X,Y)} = \frac{P_X}{P_Y} \quad \textbf{(6)}$$

Marginal Rate of Substitution

If U^* is a fixed utility level, the indifference curve that corresponds to that utility level is given by

$$U(X,Y) = U^*$$

$$MU_X(X,Y)dX + MU_Y(X,Y)dY = dU^* = 0 \quad \textbf{(7)}$$

Rearranging,

$$-dY/dX = \text{MU}_X(X,Y)/\text{MU}_Y(X,Y) = \text{MRS}_{XY} \quad \textbf{(8)}$$

An Example

Cobb-Douglas utility function: Utility function $U(X,Y) = X^a Y^{1-a}$, where X and Y are two goods and a is a constant.

The **Cobb-Douglas utility function** can be represented in two forms:

$$U(X,Y) = a\log(X) + (1-a)\log(Y)$$

and

$$U(X,Y) = X^a Y^{1-a}$$

To find the demand functions for X and Y, given the usual budget constraint, we first write the Lagrangian:

$$\Phi = a\log(X) + (1-a)\log(Y) - \lambda(P_X X + P_Y - I)$$

Now differentiating with respect to X, Y, and l and setting the derivatives equal to zero, we obtain

$$\partial\Phi/\partial X = a/X - \lambda P_X = 0$$

$$\partial\Phi/\partial Y = (1-a)/Y - \lambda P_Y = 0$$

$$\partial\Phi/\partial\lambda = P_X X + P_Y Y - I = 0$$

The first two conditions imply that

$$P_X X = a/\lambda \qquad \textbf{(13)}$$

$$P_Y Y = (1-a)/\lambda \qquad \textbf{(14)}$$

Combining these expressions with the last condition (the budget constraint) gives us

$$a/\lambda + (1-a)/\lambda - I = 0$$

or $\lambda = 1/I$. Now we can substitute this expression for λ back into (13) and (14) to obtain the demand functions:

$$X = (a/P_X)I$$

$$Y = [(1-a)\ /P_Y]I$$

Duality in Consumer Theory

DUALITY

Alternative way of looking at the consumer's utility maximization decision: Rather than choosing the highest indifference curve, given a budget constraint, the consumer chooses the lowest budget line that touches a given indifference curve.

Minimizing the cost of achieving a particular level of utility:

Minimize $P_X X + P_Y Y$ subject to the constraint that $U(X,Y) = U^*$

The corresponding Lagrangian is given by

$$\Phi = P_X X + P_Y Y - \mu(U(X,Y) - U^*)$$

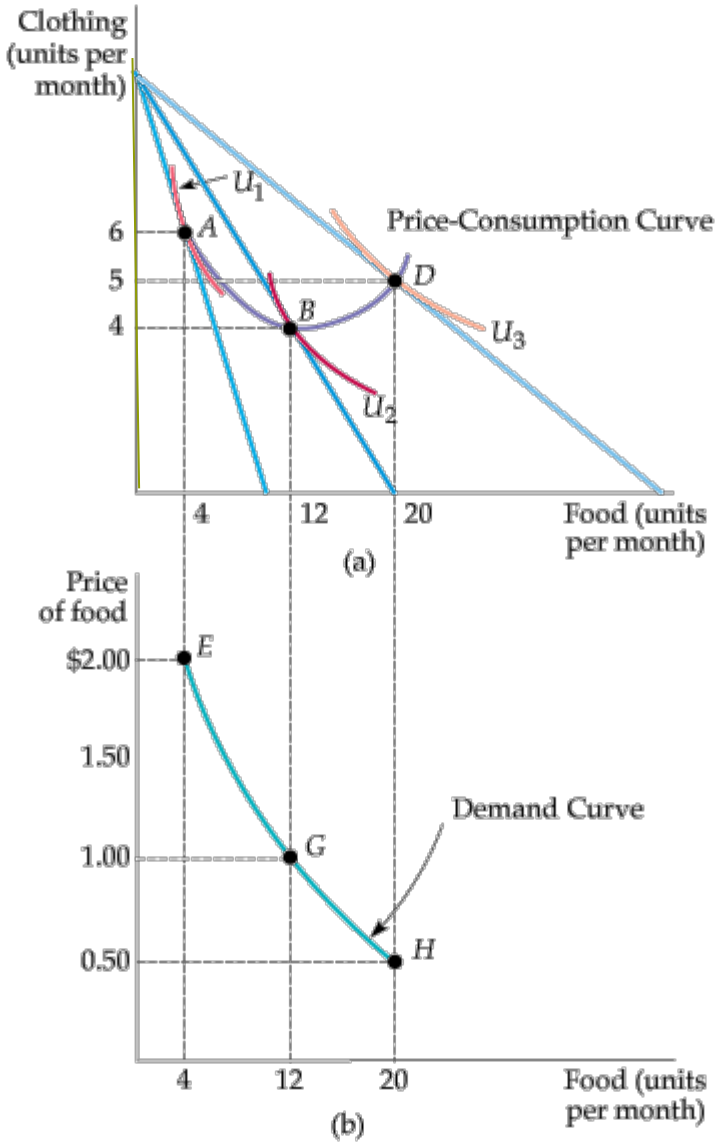
4.4 INDIVIDUAL DEMAND

EFFECT OF PRICE CHANGES

Demand Curve

A reduction in the price of food, with income and the price of clothing fixed, causes the consumer to choose a different market basket.

The graph gives the demand curve, which relates the price of food to the quantity demanded. (Points E, G, and H correspond to points A, B, and D, respectively).



THE INDIVIDUAL DEMAND CURVE

INDIVIDUAL DEMAND CURVE

Curve relating the quantity of a good that a single consumer will buy to its price.

Two important properties

1. The level of utility that can be attained changes as we move along the curve.

2. At every point on the demand curve, the consumer is maximizing utility by satisfying the condition that the marginal rate of substitution (MRS) of food for clothing equals the ratio of the prices of food and clothing.

EFFECT OF INCOME CHANGES

An increase in income, with the prices of all goods fixed, causes consumers to alter their choice of market baskets

In part (a), the baskets that maximize consumer satisfaction for various incomes (point A, $10; B, $20; D, $30) trace out the income-consumption curve.

The shift to the right of the demand curve in response to the increases in income is shown in part (b). (Points E, G, and H correspond to points A, B, and D, respectively.)

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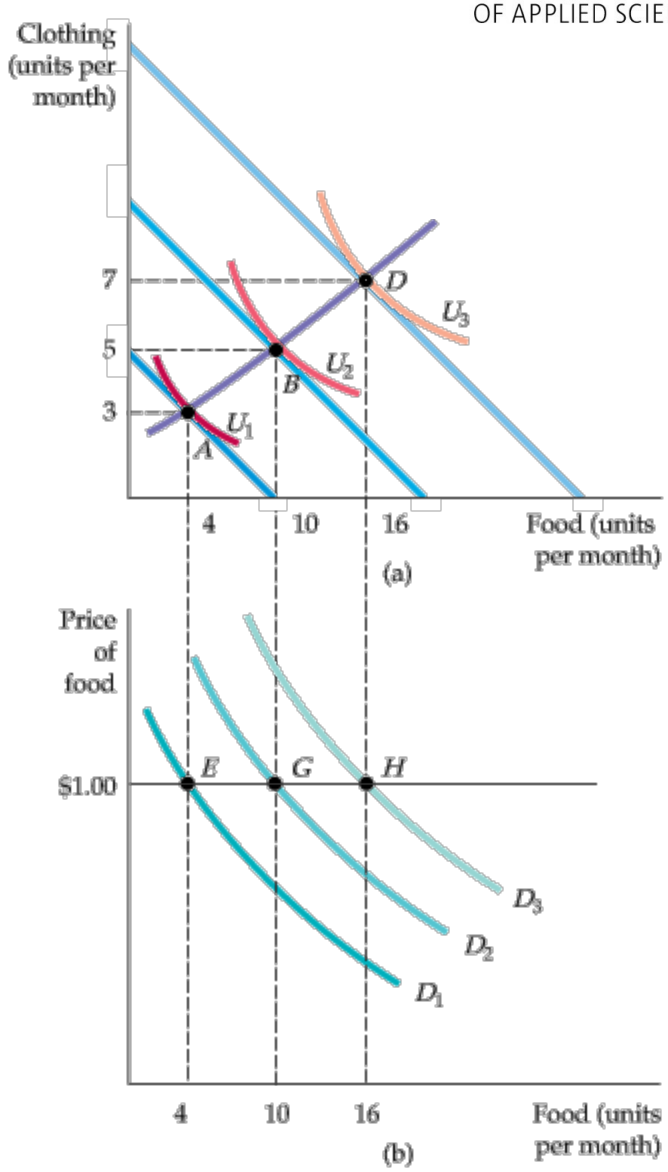
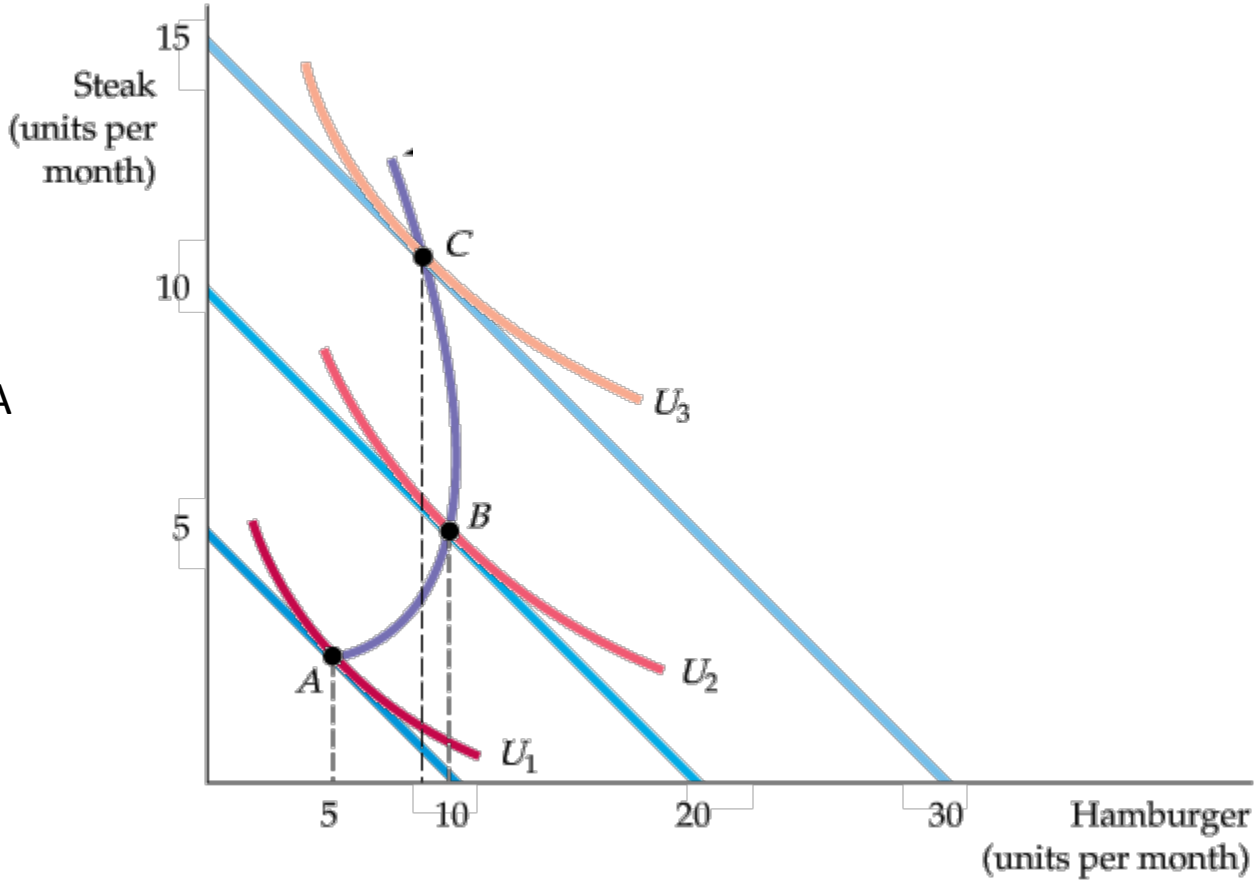


NORMAL VERSUS INFERIOR GOODS

An increase in a person's income can lead to less consumption of one of the two goods being purchased.

Here, hamburger, though a normal good between A and B, becomes an inferior good when the income-consumption curve bends backward between B and C.



INCOME AND SUBSTITUTION EFFECTS

A Fall in the Price of a Good has two Effects

Consumers will tend to buy more of the good that has become cheaper and less of those goods that are now relatively more expensive. This response to a change in the relative prices of goods is called the **SUBSTITUTION EFFECT**.

Because one of the goods is now cheaper, consumers enjoy an increase in real purchasing power. The change in demand resulting from this change in real purchasing power is called the **INCOME EFFECT.**

INCOME AND SUBSTITUTION EFFECTS

SUBSTITUTION EFFECT

Change in consumption of a good associated with a change in its price, with the level of utility held constant.

INCOME EFFECT

Change in consumption of a good resulting from an increase in purchasing power, with relative prices held constant.

The total effect of a change in price is given theoretically by the sum of the substitution effect and the income effect (see next slide):

Total Effect (F_1F_2) = Substitution Effect (F_1E) + Income Effect (EF_2)

INCOME AND SUBSTITUTION EFFECTS

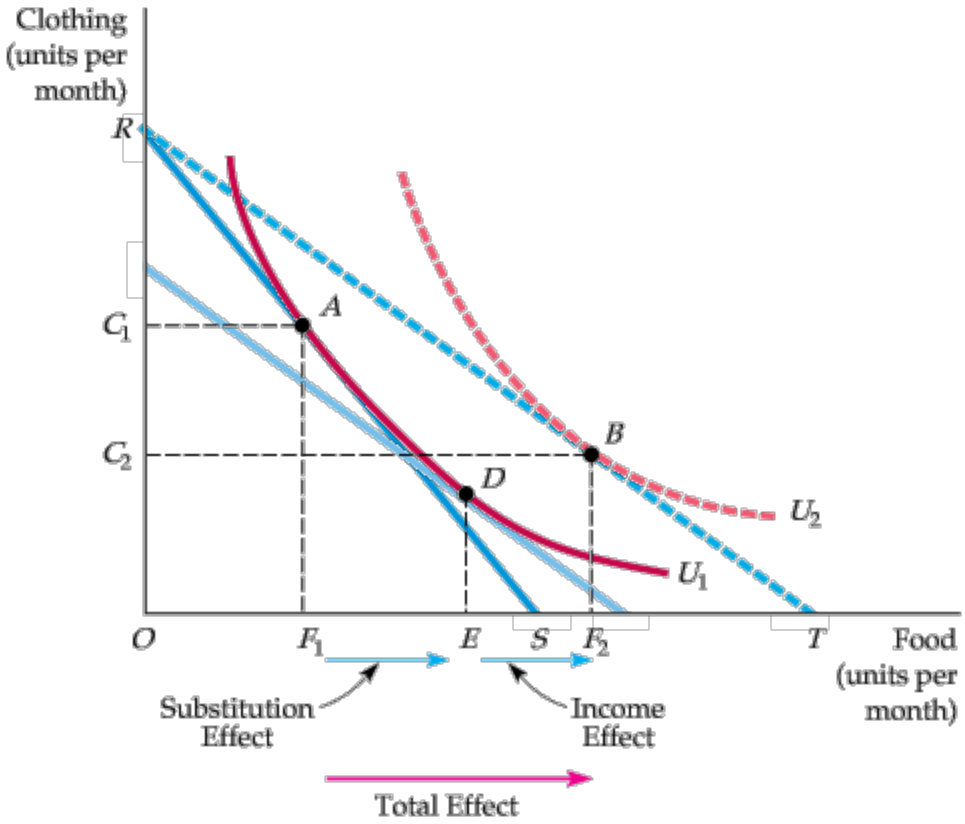
Normal Good

The consumer is initially at *A*, on budget line *RS*. When the price of food falls, consumption increases by *F1F2* as the consumer moves to *B*.

The substitution effect *F1E* (move from A to D) changes the relative prices of food and clothing but keeps real income (satisfaction) constant.

The income effect *EF2* (a move from *D* to *B*) keeps relative prices constant but increases purchasing power.

Food is a normal good because the income effect *EF2* is positive.



INCOME AND SUBSTITUTION EFFECTS

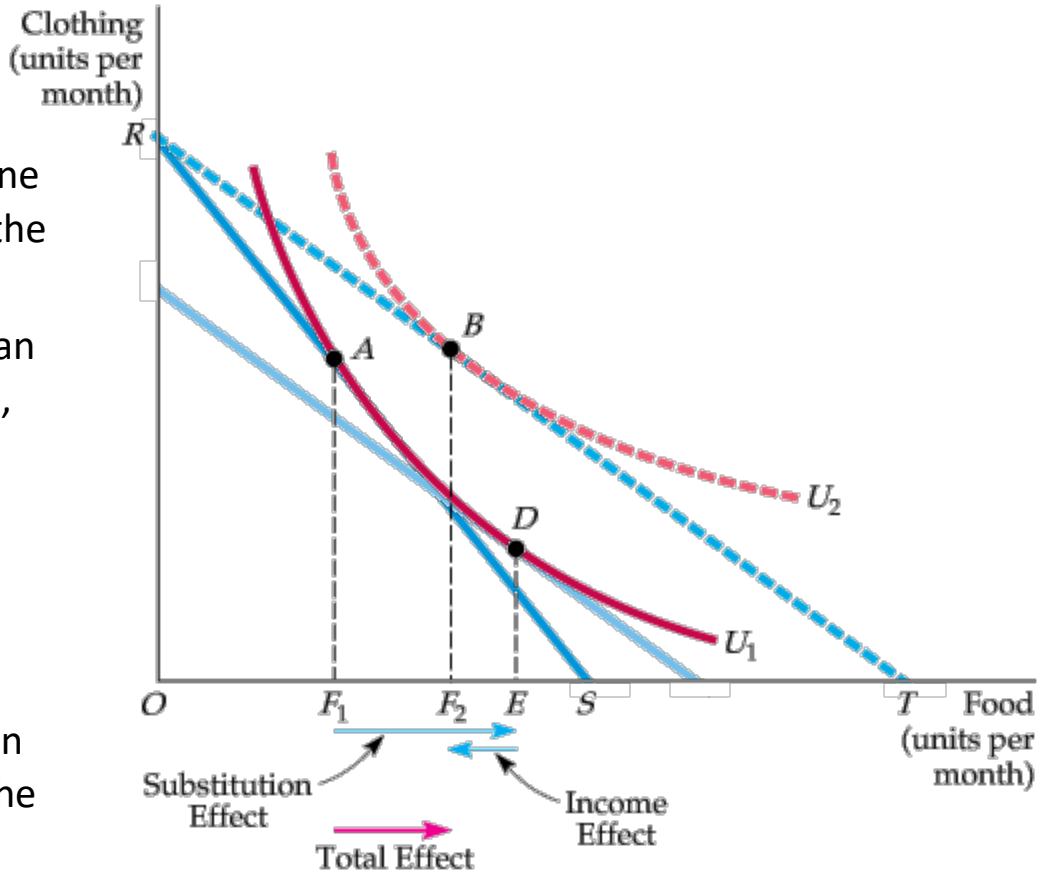
Inferior Good

The consumer is initially at *A* on budget line *RS*. With a decrease in the price of food, the consumer moves to *B*.

The resulting change in food purchased can be broken down into a substitution effect, F_1E (move from *A* to *D*), and an income effect, EF_2 (move from *D* to *B*).

In this case, food is an inferior good because the income effect is negative.

However, because the substitution effect exceeds the income effect, the decrease in the price of food leads to an increase in the quantity of food demanded.



INCOME AND SUBSTITUTION EFFECTS

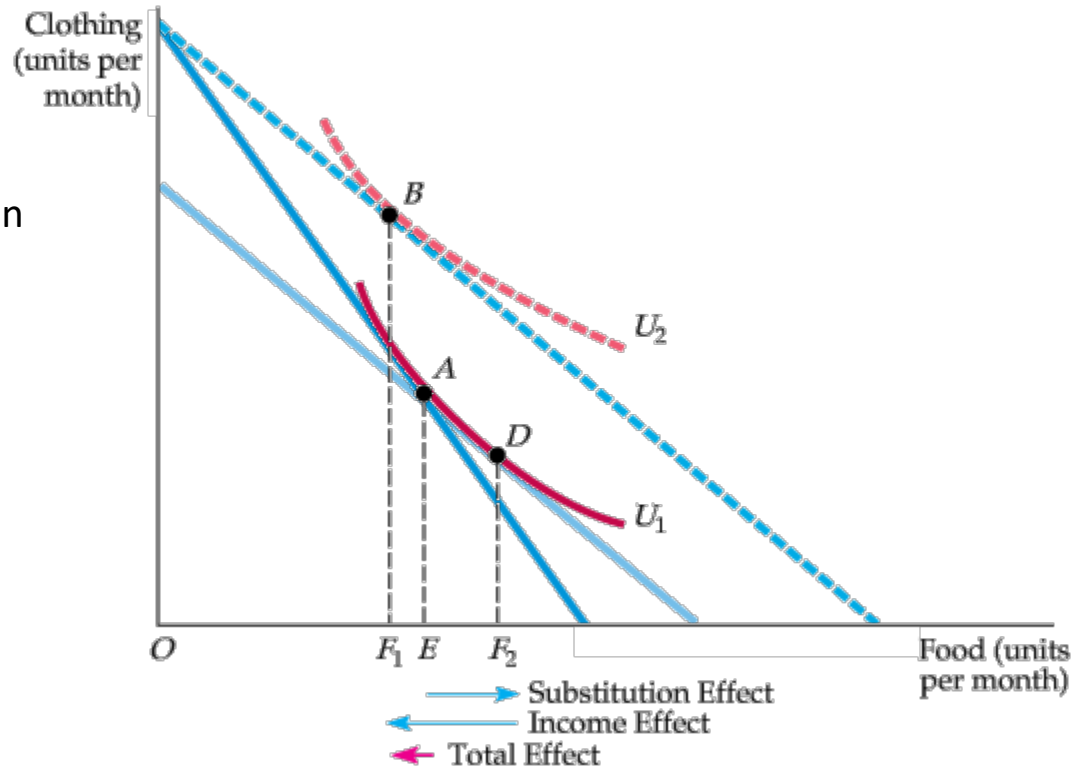
A Special Case:

The Giffen Good

When food is an inferior good, and when the income effect is large enough to dominate the substitution effect, the demand curve will be upward-sloping.

The consumer is initially at point *A*, but, after the price of food falls, moves to *B* and consumes less food.

Because the income effect F_2F_1 is larger than the substitution effect EF_2, the decrease in the price of food leads to a lower quantity of food demanded.



THE INDIVIDUAL DEMAND CURVE

GIFFEN GOOD

Good whose demand curve slopes upward because
the (negative) income effect is larger than the substitution effect.

The demand curve is upward-sloping

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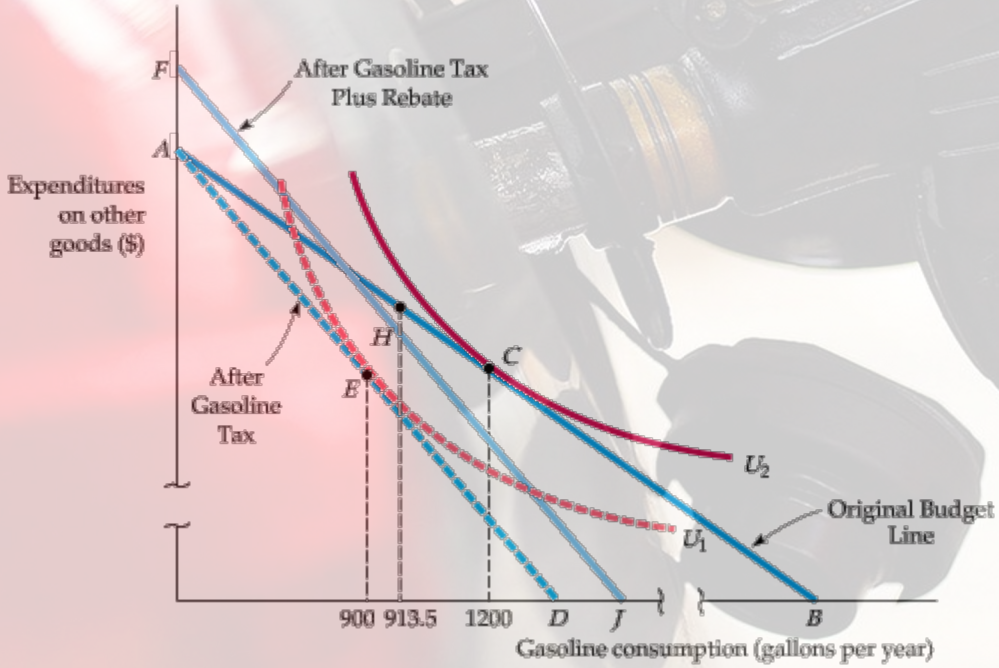
THE EFFECT OF A GASOLINE TAX WITH A RE BATE



A gasoline tax is imposed when the consumer is initially buying 1200 gallons of gasoline at point *C*.

After the tax takes effect, the budget line shifts from *AB* to *AD* and the consumer maximizes his preferences by choosing E; gasoline consumption of 900 gallons.

However, when the proceeds of the tax are rebated to the consumer, his consumption increases somewhat, to 913.5 gallons at H.

Despite the rebate program, the consumer's gasoline consumption has fallen, as has his level of satisfaction.

EXAMPLE

SUMMARY: THE DIFFERENT KIND OF GOODS

How does demand change if the income changes?

- If income ↑ then demand ↓ **INFERIOR GOOD**
- If income ↑ then demand ↑ **NORMAL GOOD**
  - If income ↑ then demand ↑ overproportional **SUPERIOR GOOD**

How does demand change if the price changes?

- If price ↑ then demand ↓ **ORDINARY GOOD**
- If price ↑ then demand ↑ **GIFFEN GOOD**

How does demand change if the price of the other good changes?

- If price (other good) ↑ then demand ↑ **SUBSTITUTES**
- If price (other good) ↑ then demand ↓ **COMPLEMENTS**

4.5 NETWORK EXTERNALITIES

NETWORK EXTERNALITY

NETWORK EXTERNALITIES

When each individual's demand depends on the purchases of other individuals

POSITIVE NETWORK EXTERNALITIES

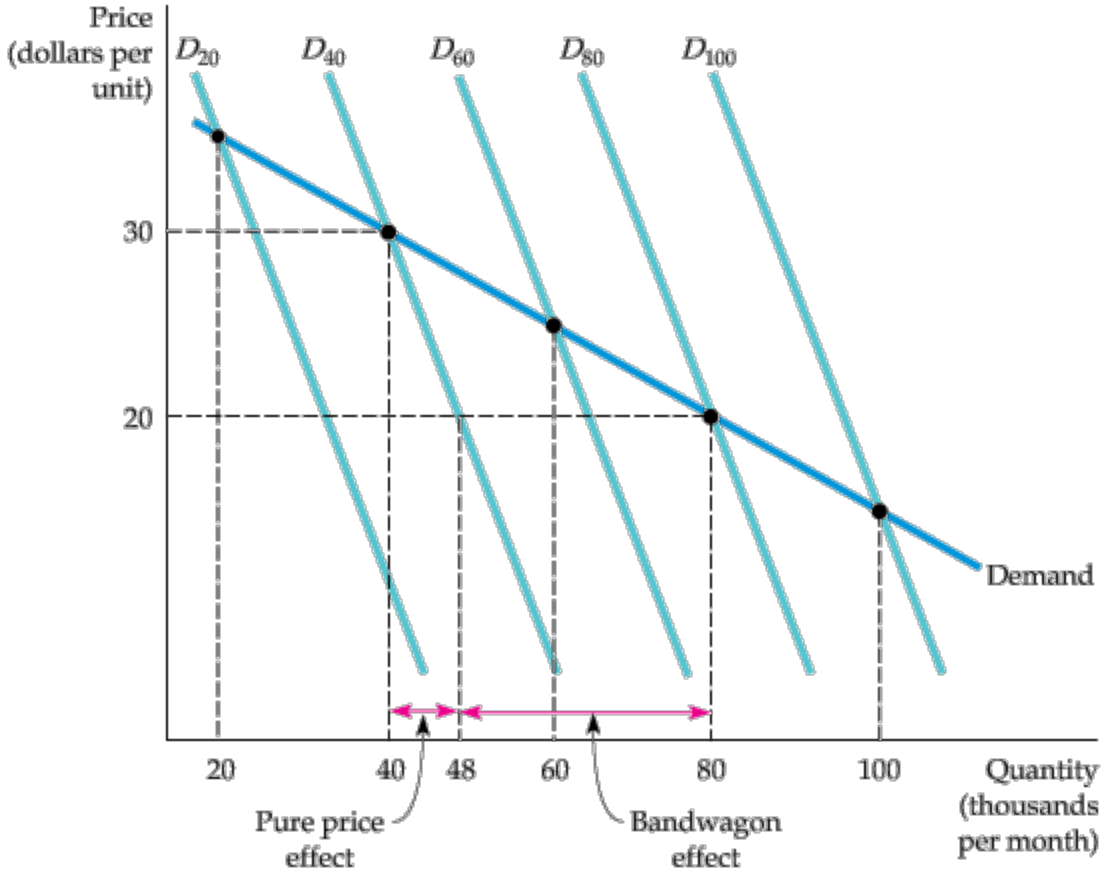
A positive network externality exists if the quantity of a good demanded by a typical consumer increases in response to the growth in purchases of other consumers

BANDWAGON EFFECT

Positive network externality in which a consumer wishes to possess a good in part because others do

POSITIVE NETWORK EXTERNALITIES

With a positive network externality, the quantity of a good that an individual demands grows in response to the growth of purchases by other individuals. Here, as the price of the product falls from \$30 to \$20, the bandwagon effect causes the demand for the good to shift to the right, from D_{40} to D_{80}



NEGATIVE NETWORK EXTERNALITIES

NEGATIVE NETWORK EXTERNALITIES

If the quantity demanded decreases, there is a negative network externality

SNOB EFFECT

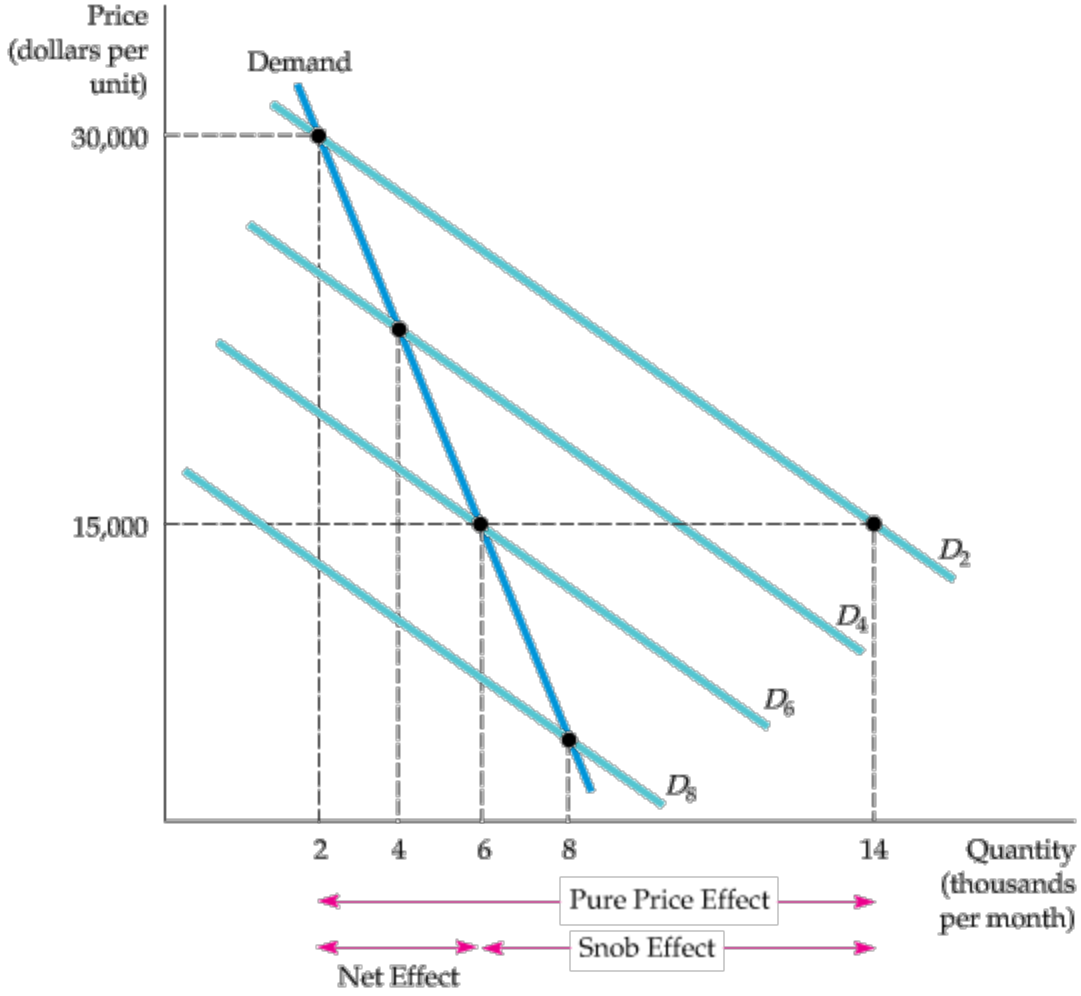
Negative network externality in which a consumer wishes to own an exclusive or unique good

.

NEGATIVE NETWORK EXTERNALITIES

The snob effect is a negative network externality in which the quantity of a good that an individual demands falls in response to the growth of purchases by other individuals.

Here, as the price falls from $30,000 to $15,000 and more people buy the good, the snob effect causes the demand for the good to shift to the left, from D_2 to D_6.



By early 2011, with over 600 million users, Facebook became the world's second most visited website (after Google). A strong positive network externality was central to Facebook's success

	FACEBOOK USERS	
YEAR	FACEBOOK USERS (MILLIONS)	HOURS PER USER PER MONTH
2004	1	
2005	5.5	
2006	12	<1
2007	50	2
2008	100	3
2009	350	5.5
2010	500	7

Network externalities have been crucial drivers for many modern technologies over many years

05

FIRMS IN COMPETITIVE MARKETS

5.1 Firms and their Production Decision

5.2 Costs

5.3 Profit Maximization and Competitive Supply

05 IDEA

The main lesson of this part is that firms are not black boxes that mysteriously transform inputs into outputs. Economic theory explains how firms make decisions about production processes, types of inputs and the volume of output to produce.

The process of transforming inputs into output is described by the production function. Using the production function, the firm‘s cost function can be determined. This plays an important role for profit maximiziation of the firm. Finally, one of the major questions firms face is „how much should we produce“ and will be addressed. The answer to this question crucially depends on the market structure: the ease with which firms can enter and leave the market and the ability of firms to differentiate their products from those of their rivals.

05 LEARNING OBJECTIVES

- Explain why firms exist
- Illustrate the production function
- Discuss the law of diminishing marginal returns
- Graphically analyze the substitution of inputs along the possible range of input substitution
- Interpret the economic consequences of returns to scale
- Define and interpret the different cost types
- Differentiate between economic and accounting costs
- Interpret sunk costs and assign it to the short versus long term view
- Find the cost minimizing inputs
- Define perfect competition
- Explain profit maximization in case of perfect competition
- Derive the supply case in case of perfect competition

5.1 FIRMS & THEIR PRODUCTION DECISION

FIRMS
AND THEIR PRODUCTION DECISION

Explanation of how a firm makes cost-minimizing production decisions and how its cost varies with its output.

The production decisions of firms are analogous to the purchasing decisions of consumers, and can likewise be understood in three steps:

1. **Production Technology**
2. **Cost Constraints**
3. **Input Choices**

THE PRODUCTION FUNCTION

PRODUCTION FUNCTION

Function showing the highest output that a firm can produce for every specified combination of inputs. $q = F(K, L)$

Production functions describe what is technically feasible when the firm operates efficiently—that is, when the firm uses each combination of inputs as effectively as possible.

The Short Run versus the Long Run

SHORT RUN: Period of time in which quantities of one or more production factors cannot be changed

FIXED INPUT: Production factor that cannot be varied

LONG RUN: Amount of time needed to make all production inputs variable

PRODUCTION WITH ONE VARIABLE INPUT (LABOR)

	PRODUCTION WITH ONE VARIABLE INPUT			
AMOUNT OF LABOR (L)	AMOUNT OF CAPITAL (K)	TOTAL OUTPUT (q)	AVERAGE PRODUCT (q/L)	MARGINAL PRODUCT (dq/dL)
0	10	0	—	—
1	10	10	10	10
2	10	30	15	20
3	10	60	20	30
4	10	80	20	20
5	10	95	19	15
6	10	108	18	13
7	10	112	16	4
8	10	112	14	0
9	10	108	12	–4
10	10	100	10	–8

PRODUCTION WITH ONE VARIABLE INPUT (LABOR)

PRODUCTION FUNCTION

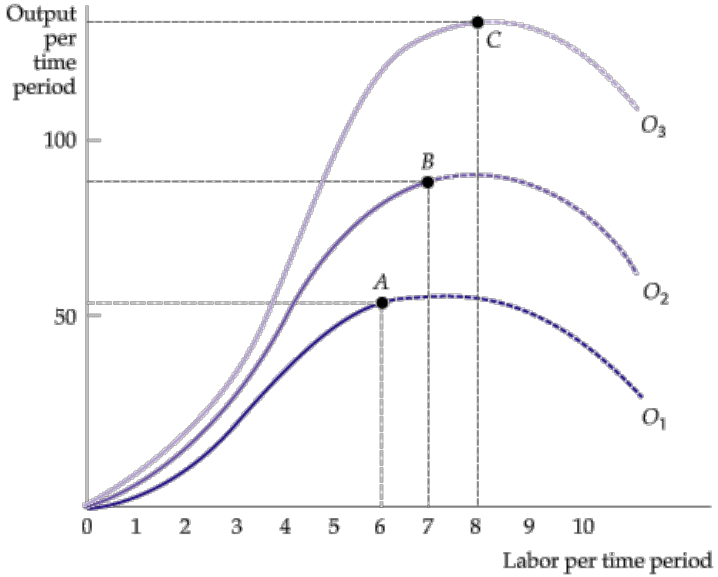
Output produced for different amounts of labor input

LAW OF DIMINISHING MARGINAL RETURNS

If the use of an input increases with other inputs fixed, the resulting additions to output will eventually decrease

THE EFFECT OF TECHNOLOGICAL IMPROVEMENT

Labor productivity (output per unit of labor) can increase if there are improvements in technology, even though any given production process exhibits diminishing returns to labor. As we move from point *A* on curve O_1 to *B* on curve O_2 to *C* on curve O_3 over time, labor productivity increases.



AVERAGE AND MARGINAL PRODUCTS

AVERAGE PRODUCT

Output per unit of a particular input

MARGINAL PRODUCT

Additional output produced as an input is increased by one unit

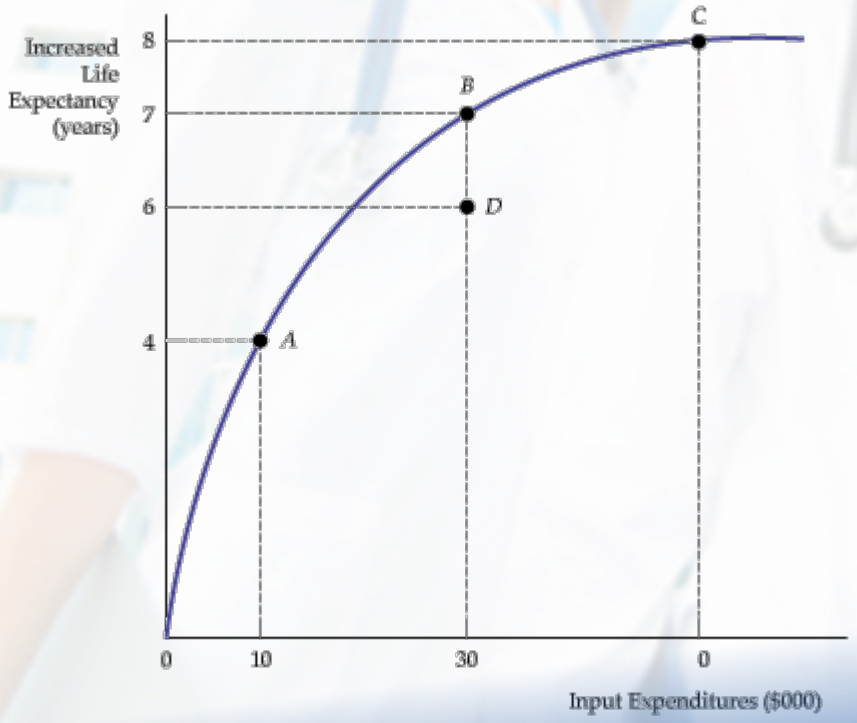
Remember that the marginal product of labor depends on the amount of capital used. If the capital input increased from 10 to 20, the marginal product of labor most likely would increase.

Average product of labor = Output/labor input = q/L

Marginal product of labor = Change in output/change in labor input = dq/dL

A PRODUCTION FUNCTION FOR HEALTH CARE

Do increases in health care expenditures reflect increases in output or do they reflect inefficiencies in the production process?



The US is relatively wealthy, and it is natural for consumer preferences to shift toward more health care as incomes grow. However, it may be that the production of health care in the United States is inefficient. Additional expenditures on health care (inputs) increase life expectancy (output) along the production frontier.

Points A, B, and C represent points at which inputs are efficiently utilized, although there are diminishing returns when moving from B to C.

Point D is a point of input inefficiency

EXAMPLE

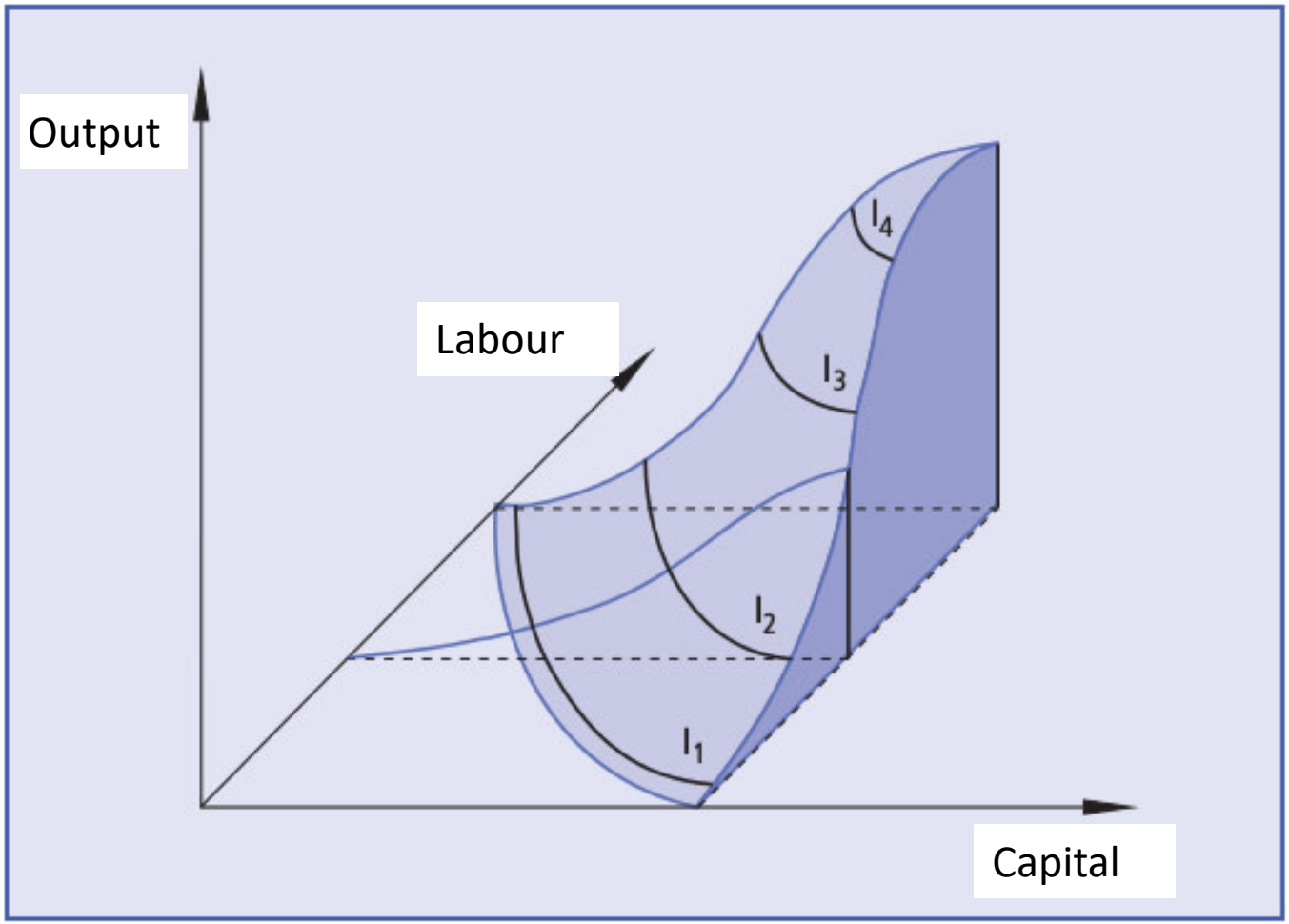
PRODUCTION WITH TWO VARIABLE INPUTS

PRODUCTION WITH TWO VARIABLE INPUTS					
	LABOR INPUT				
CAPITAL INPUT	1	2	3	4	5
1	20	40	55	65	(75)
2	40	60	(75)	85	90
3	55	(75)	90	100	105
4	65	85	100	110	115
5	(75)	90	105	115	120

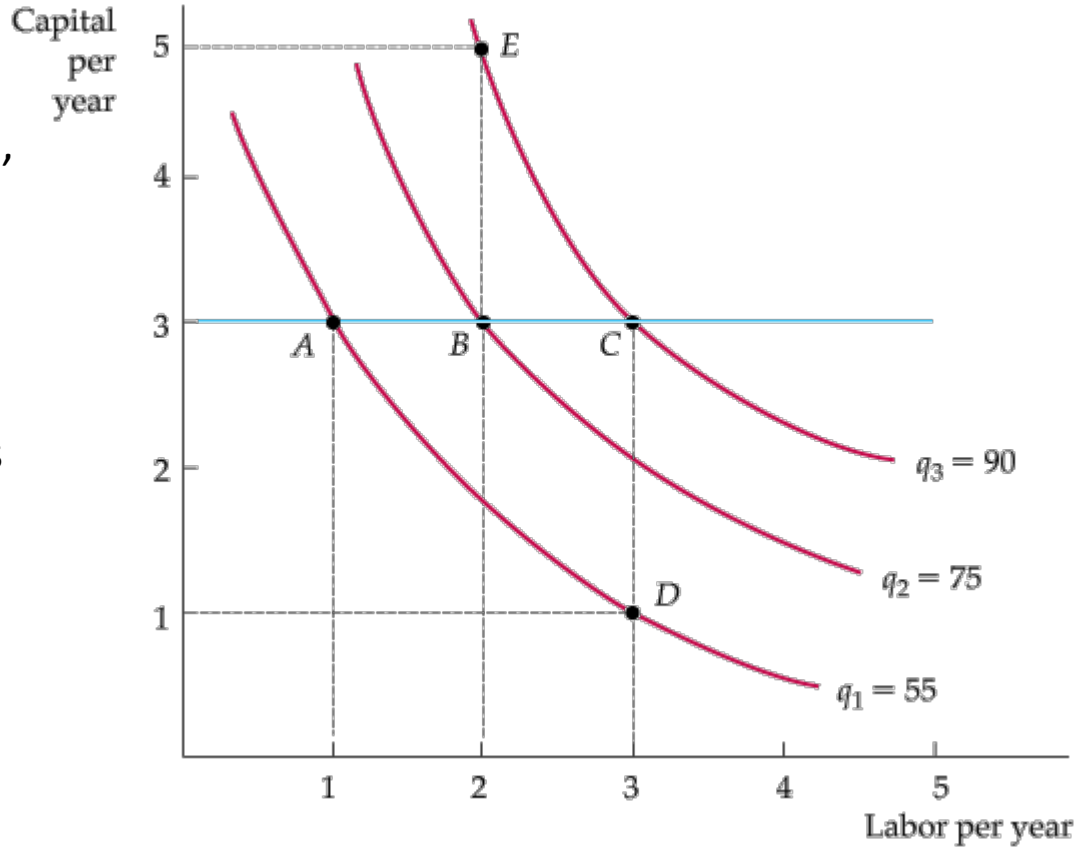
ISOQUANT

Curve showing all possible combinations of inputs that yield the same output.

PRODUCTION WITH TWO VARIABLE INPUTS



PRODUCTION WITH TWO VARIABLE INPUTS



A set of isoquants, or isoquant map, describes the firm's production function.

Output increases as we move from isoquant q_1 (at which 55 units per year are produced at points such as *A* and *D*),

to isoquant q_2 (75 units per year at points such as *B*), and

to isoquant q_3 (90 units per year at points such as *C* and *E*)

By drawing a horizontal line at a particular level of capital—say 3, we can observe diminishing marginal returns. Reading the levels of output from each isoquant as labor is increased, we note that each additional unit of labor generates less and less additional output

INPUT FLEXIBILITY

Isoquants show the flexibility that firms have when making production decisions: They can usually obtain a particular output by substituting one input for another. It is important for managers to understand the nature of this flexibility

DIMINISHING MARGINAL RETURNS

Even though both labor and capital are variable in the long run, it is useful for a firm that is choosing the optimal mix of inputs to ask what happens to output as each input is increased, with the other input held fixed

Because adding one factor while holding the other factor constant eventually leads to lower and lower incremental output, the isoquant must become steeper as more capital is added in place of labor and flatter when labor is added in place of capital (isoquants are convex)
There are also diminishing marginal returns to capital. With labor fixed, the marginal product of capital decreases as capital is increased

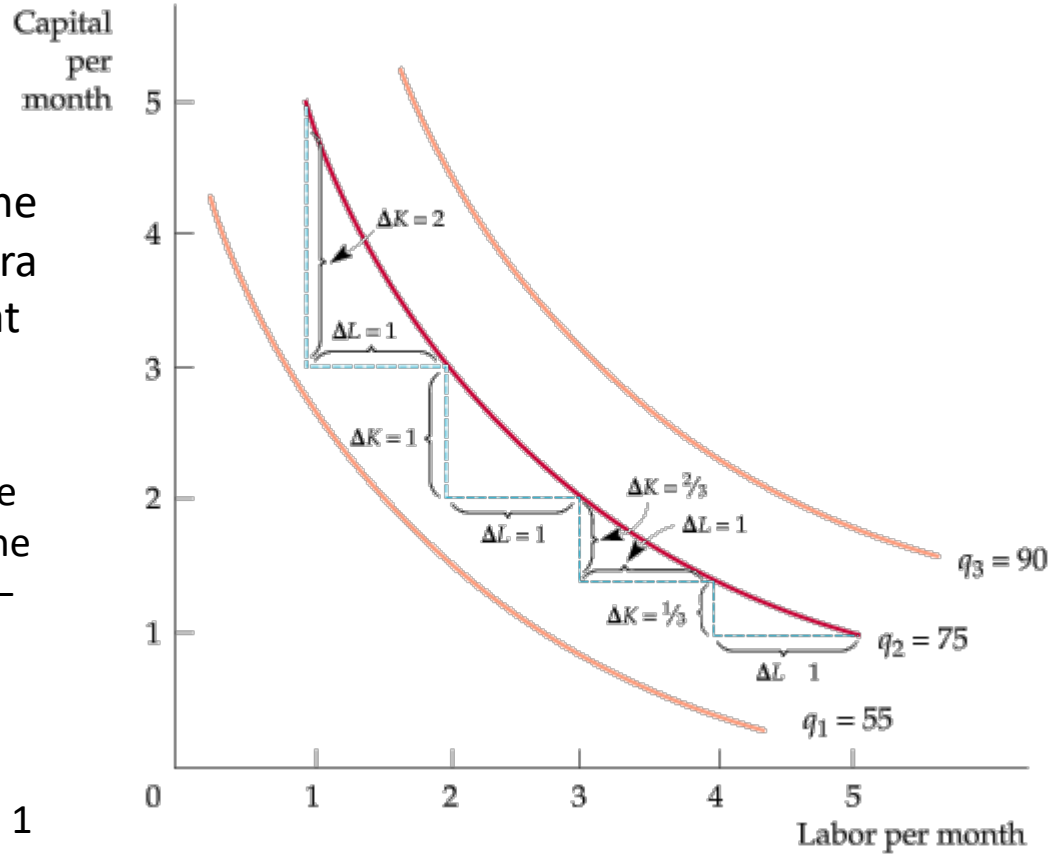
SUBSTITUTION AMONG INPUTS

MARGINAL RATE OF TECHNICAL SUBSTITUTION (MRTS)

Amount by which the quantity of one input can be reduced when one extra unit of another input is used, so that output remains constant.

Like indifference curves, isoquants are downward sloping and convex. The slope of the isoquant at any point measures the marginal rate of tech-nical substitution—the ability of the firm to replace capital with labor while maintaining the same level of output.

On isoquant q_2, the MRTS falls from 2 to 1 to 2/3 to 1/3.



MRTS = –Change in capital input/change in labor input

$= -\Delta K/\Delta L$ (for a fixed level of q)

PRODUCTION FUNCTIONS
TWO SPECIAL CASES

Two extreme cases of production functions show the possible range of input substitution in the production process: the case of perfect substitutes and the case of perfect complements

LEONTIEF PRODUCTION FUNCTION

- Inputs are perfect complements
- L-shaped isoquants, so that only one combination of labor and capital can be used to produce each level of output ("fixed proportions production function")
- Describes situations in which methods of production are limited

PRODUCTION FUNCTION WITH PERFECT SUBSTITUTES

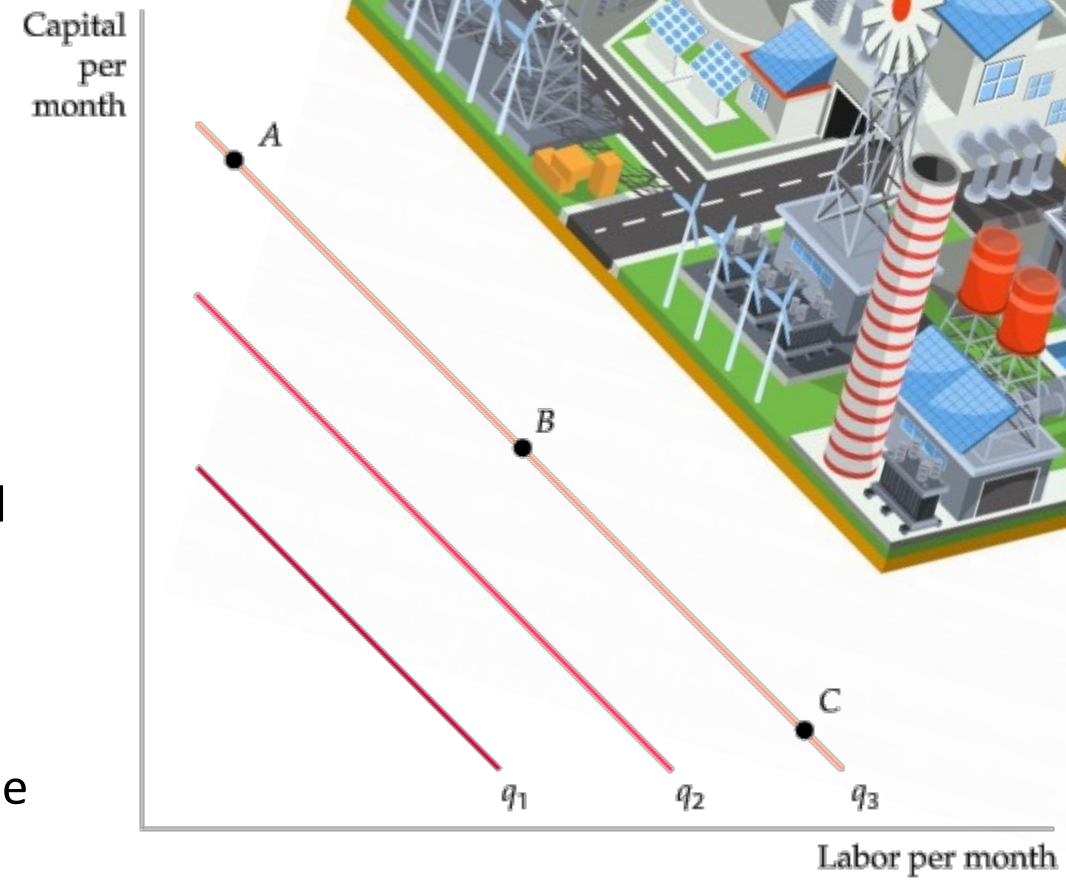
- Isoquants are straight lines, so that every combination of labor and capital can be used to produce each level of output

PRODUCTION FUNCTIONS TWO SPECIAL CASES

Production Function with Perfect Substitutes

When the isoquants are straight lines, the MRTS is constant. Thus the rate at which capital and labor can be substituted for each other is the same no matter what level of inputs is being used.

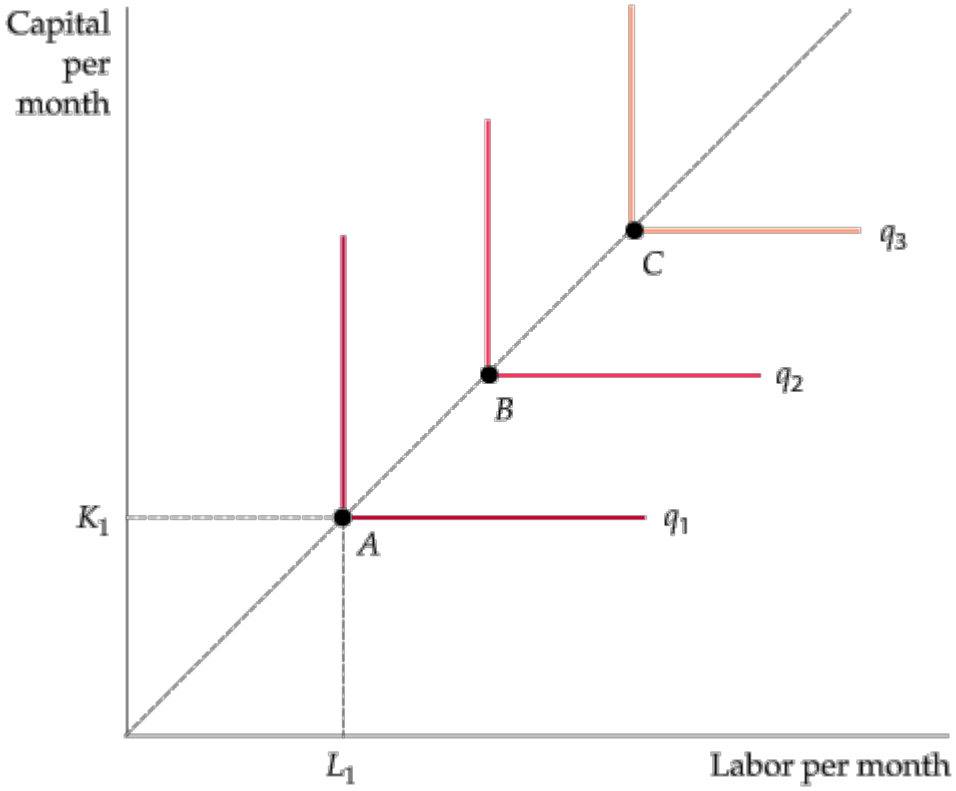
Points A, B, and C represent three different capital-labor combinations that generate the same output q_3



PRODUCTION FUNCTIONS: TWO SPECIAL CASES

Leontief Production Function

When the isoquants are L-shaped, only one combination of labor and capital can be used to produce a given output (as at point *A* on isoquant q_1, point *B* on isoquant q_2, and point *C* on isoquant q_3). Adding more labor alone does not increase output, nor does adding more capital alone



A PRODUCTION FUNCTION FOR WHEAT (1/2)

Food grown on large farms in the United States is usually produced with a capital-intensive technology. However, food can also be produced using very little capital (a hoe) and a lot of labor
(several people with the patience and stamina to work the soil)

Most farms in the United States and Canada, where labor is relatively expensive, operate in the range of production in which the MRTS is relatively high (with a high capital-to-labor ratio), whereas farms in developing countries, in which labor is cheap, operate with a lower MRTS (and a lower capital-to-labor ratio)

EXAMPLE

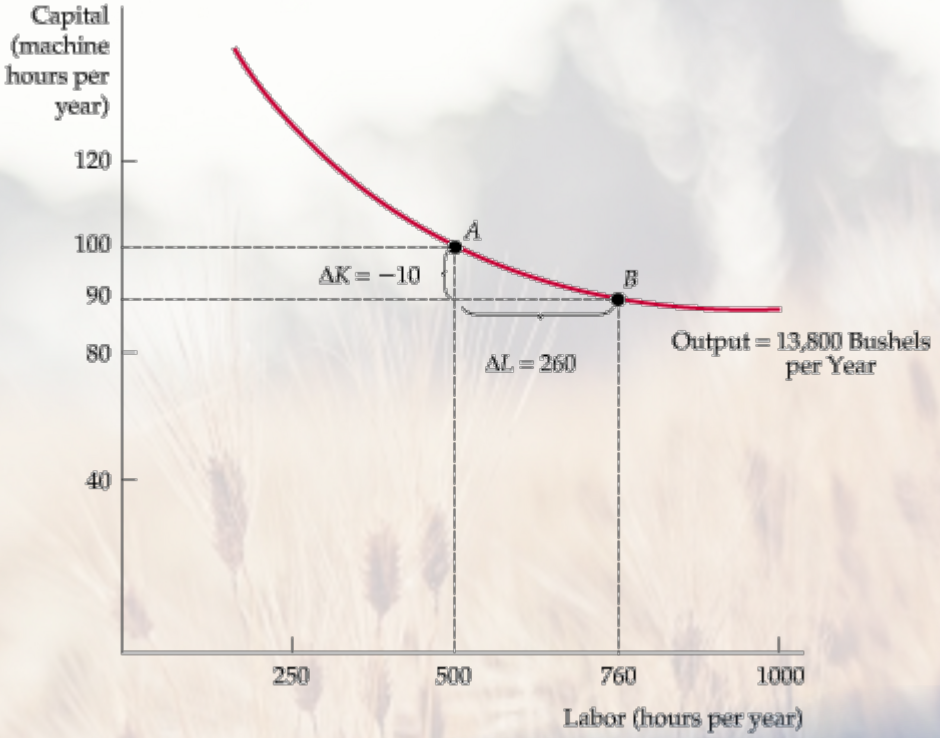
A PRODUCTION FUNCTION FOR WHEAT (2/2)

ISOQUANT DESCRIBING THE PRODUCTION OF WHEAT

A wheat output of 13,800 bushels per year can be produced with different combinations of labor and capital.

The more capital-intensive production process is shown as point *A*, the more labor- intensive process as point *B*.

The marginal rate of technical substitution between *A* and *B* is 10/260 = 0.04.



EXAMPLE

RETURNS TO SCALE

RETURNS TO SCALE

Rate at which output increases as inputs are increased proportionately

- Increasing returns to scale

Situation in which output more than doubles when all inputs are doubled

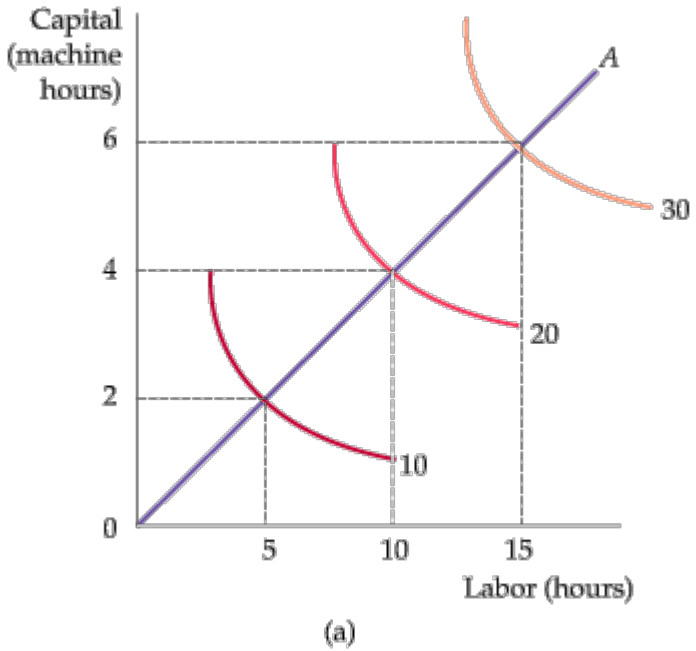
- Constant returns to scale

Situation in which output doubles when all inputs are doubled

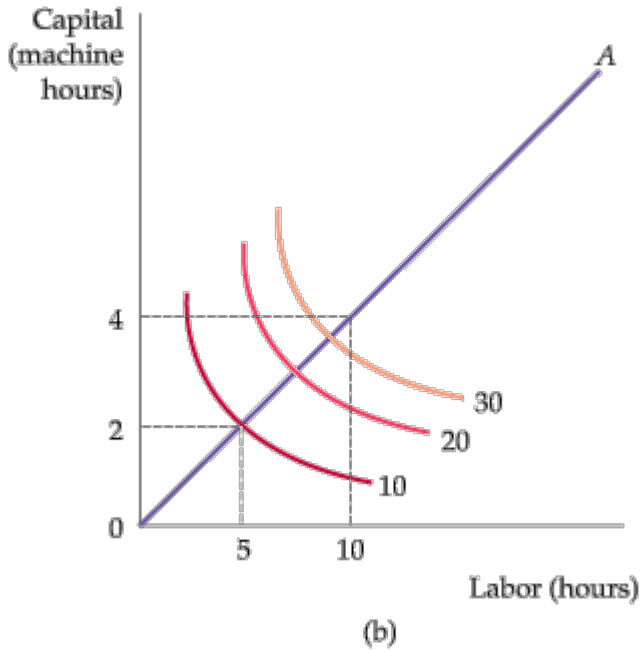
- Decreasing returns to scale

Situation in which output less than doubles when all inputs are doubled

RETURNS TO SCALE



When a firm's production process exhibits constant returns to scale as shown by a movement along line 0*A* in part **(a),** the isoquants are equally spaced as output increases proportionally.



However, when there are increasing returns to scale as shown in **(b),** the isoquants move closer together as inputs are increased along the line.

RETURNS TO SCALE

- Need not be uniform across all possible levels of output. For example, at lower levels of output, the firm could have increasing returns to scale, but constant and eventually decreasing returns at higher levels of output
- In the previous figure (a), the firm's production function exhibits constant returns. Twice as much of both inputs is needed to produce 20 units, and three times as much is needed to produce 30 units
- In the previous figure (b), the firm's production function exhibits increasing returns to scale. *Less* than twice the amount of both inputs is needed to increase production from 10 units to 20; substantially less than three times the inputs are needed to produce 30 units
- Returns to scale vary considerably across firms and industries. Other things being equal, the greater the returns to scale, the larger the firms in an industry are likely to be

RETURNS TO SCALE IN THE CARPET INDUSTRY

Innovations have reduced costs and greatly increased carpet production. Innovation along with competition have worked together to reduce real carpet prices

THE U.S. CARPET INDUSTRY		
CARPET SALES, 2005 (MILLIONS OF DOLLARS PER YEAR)		
1.	Shaw	4346
2.	Mohawk	3779
3.	Beaulieu	1115
4.	Interface	421
5.	Royalty	298

Carpet production is capital intensive. Over time, the major carpet manufacturers have increased the scale of their operations by putting larger and more efficient tufting machines into larger plants. At the same time,
the use of labor in these plants has also increased significantly. The result?
Proportional increases in inputs have resulted in a more than
Proportional increase in output for these larger plants.

EXAMPLE

5.2 COSTS

WHAT ARE COSTS?

Assumption

- The goal of a firm is to maximize profit

Profit: Total revenue minus total cost

Total revenue, TR = P × Q

- Amount a firm receives for the sale of its output
- Quantity of output the firm produces times the price at which it sells its output

Total cost, TC

- Market value of the inputs a firm uses in production

WHAT ARE COSTS?

#2

Costs as opportunity costs

- The cost of something is what you give up to get it

Firm's cost of production

- Include all the opportunity costs of making its output of goods and services
- Explicit costs
- Implicit costs
- Total costs =

  Explicit costs +

  Implicit costs

ECONOMISTS VERSUS ACCOUNTANTS #1

Economic profit

Total revenue minus total cost: total costs includes both explicit and implicit costs

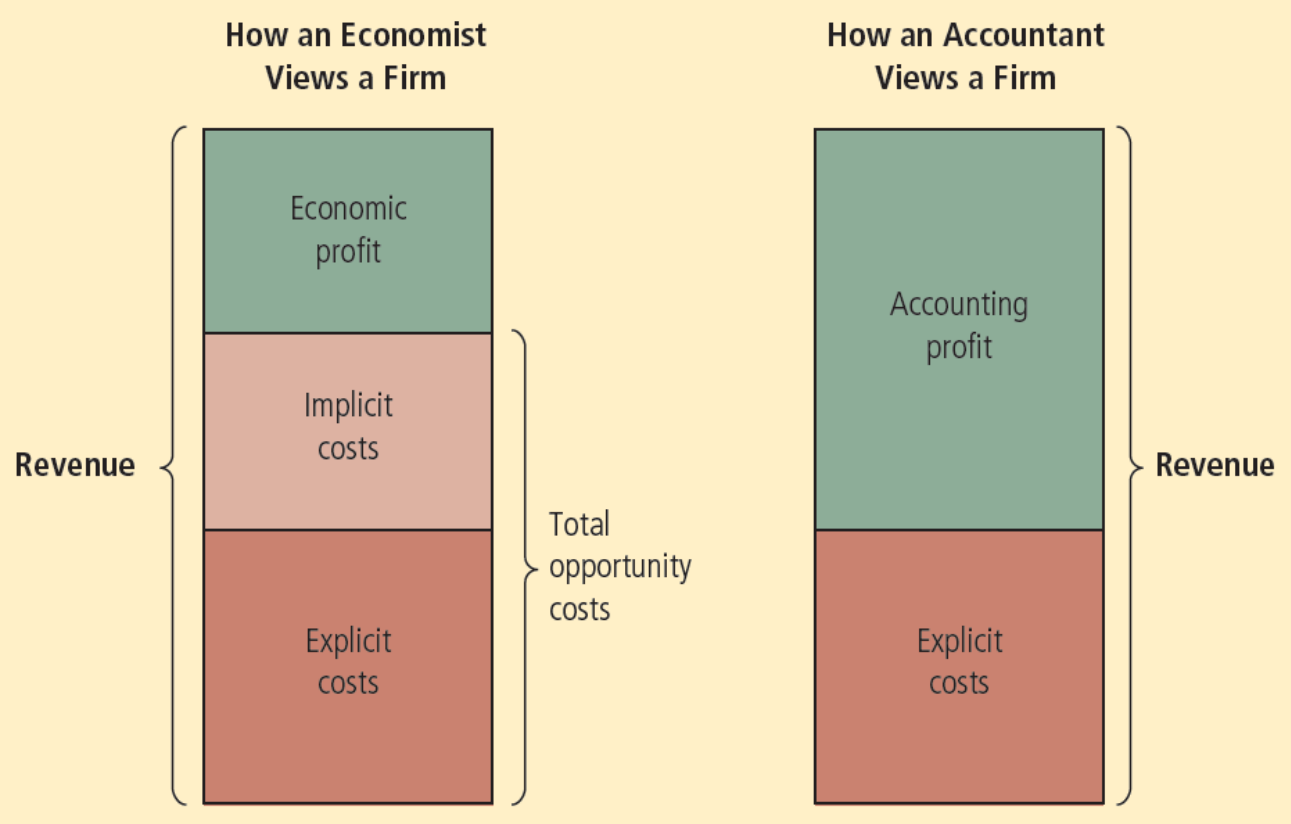
- Explicit costs: Input costs that require an outlay of money by the firm
- Implicit costs:
  - Input costs that do not require an outlay of money by the firm
  - Ignored by accountants

Accounting profit

Total revenue minus total explicit cost

Usually larger than economic profit

ECONOMISTS VERSUS ACCOUNTANTS #2



Economists include all opportunity costs when analyzing a firm, whereas accountants measure only explicit costs. Therefore, economic profit is smaller than accounting profit

ACCOUNTING VERSUS ECONOMIC PROFIT

- To calculate ***accounting profit***, subtract the explicit costs from total revenue.
- To calculate ***economic profit***, subtract both the explicit and implicit costs from total revenue.
- Notice how economic profits are less than the accounting profits (because of the implicit costs).
- What does it mean for economic profits to be negative (as in this example) when accounting profits are positive?

Total Revenue	
Sales (groceries)	$170,000
Costs (Explicit)	
Groceries (wholesale)	$76,000
Utilities	4,000
Taxes	6,000
Advertising	2,000
Labor (employees)	12,000
Total (explicit) costs	$100,000
Accounting Profit:	***$70,000***
Additional (implicit) costs	
Interest (personal investment)	$7,000
Rent (owner's building)	18,000
Salary (owner's labor)	50,000
Total (implicit) costs	$75,000
Total Explicit & Implicit costs:	$175,000
Economic Profit:	***-$5,000***

THE VARIOUS MEASURES OF COST

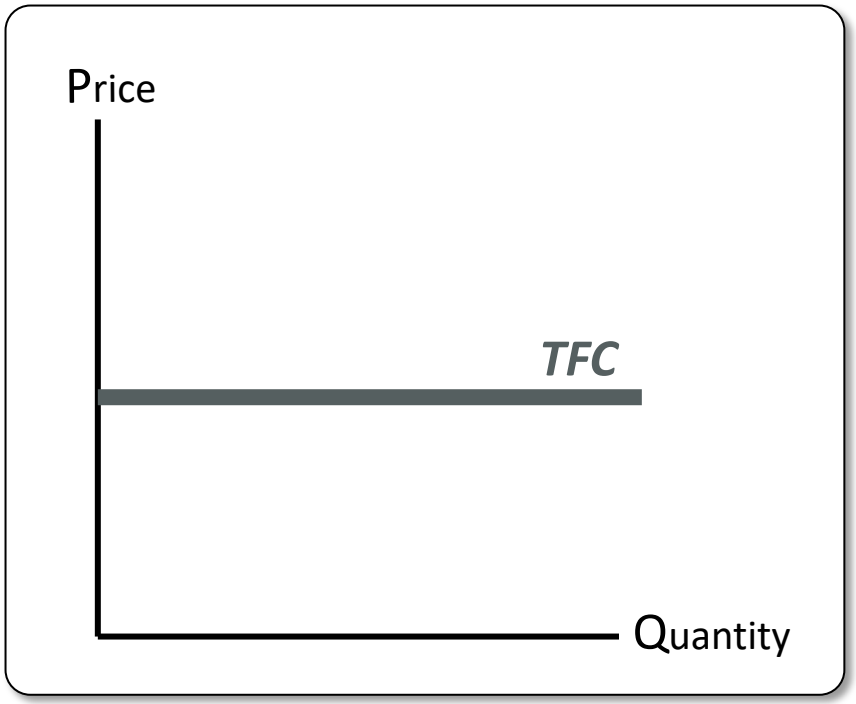
- Total cost: Fixed cost + Variable cost
- Fixed costs: Costs that do not vary with the quantity of output produced
- Variable costs: Costs that vary with the quantity of output produced
- Marginal cost, MC: Increase in total cost from producing an additional unit of output

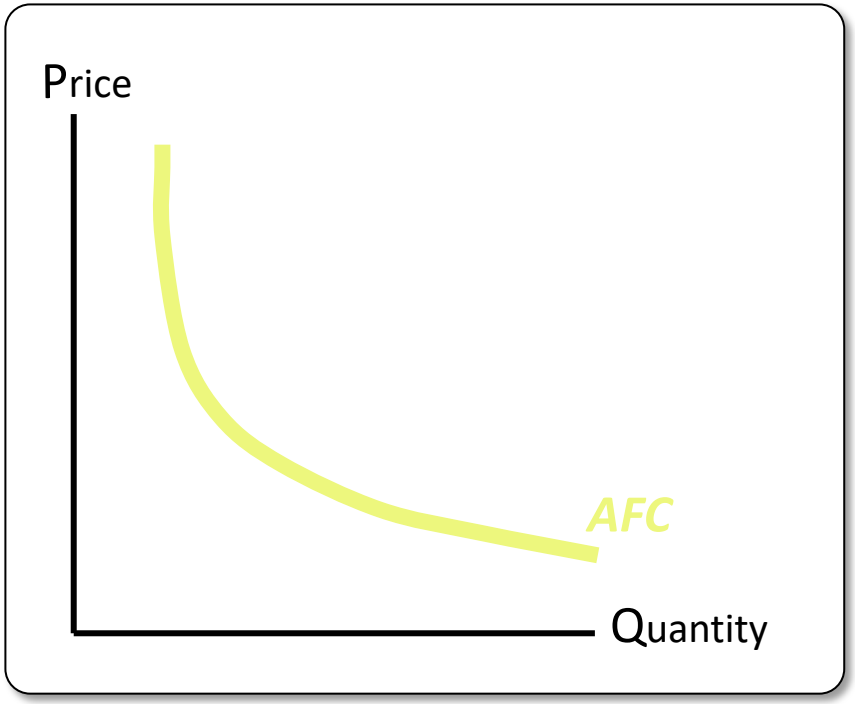
- Average total cost, ATC: Total cost divided by the quantity of output
- Average fixed cost, AFC: Fixed cost divided by the quantity of output
- Average variable cost, AVC: Variable cost divided by the quantity of output

TYPICAL AVERAGE AND MARGINAL COST CURVES IN THE SHORT RUN #1

- ***Total Fixed Costs***:
  do not vary with output; hence, they are the same whether output is set to 100,000 units or 0.

- ***Average Fixed Costs***:
  will be high for small rates of output (as total fixed costs are divided by few units), but will always decline with output (as total fixed costs are divided by more and more units).

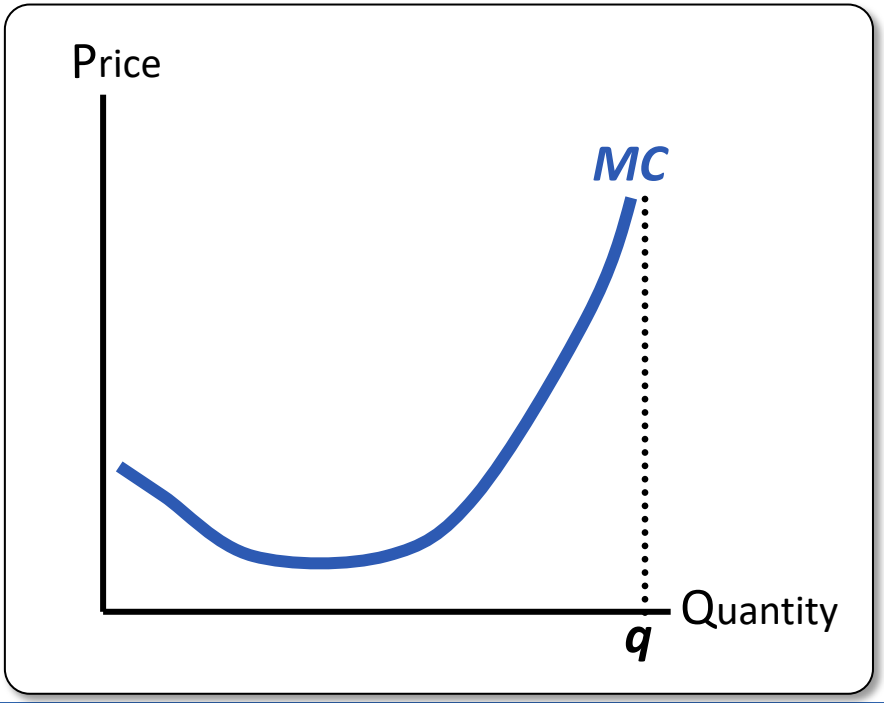


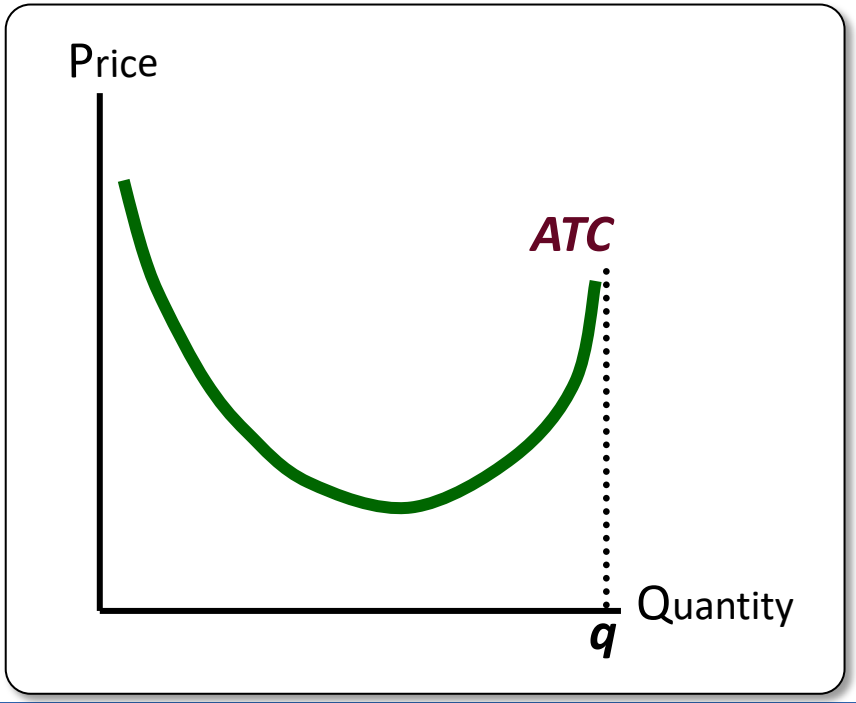


TYPICAL AVERAGE AND MARGINAL COST CURVES IN THE SHORT RUN #2

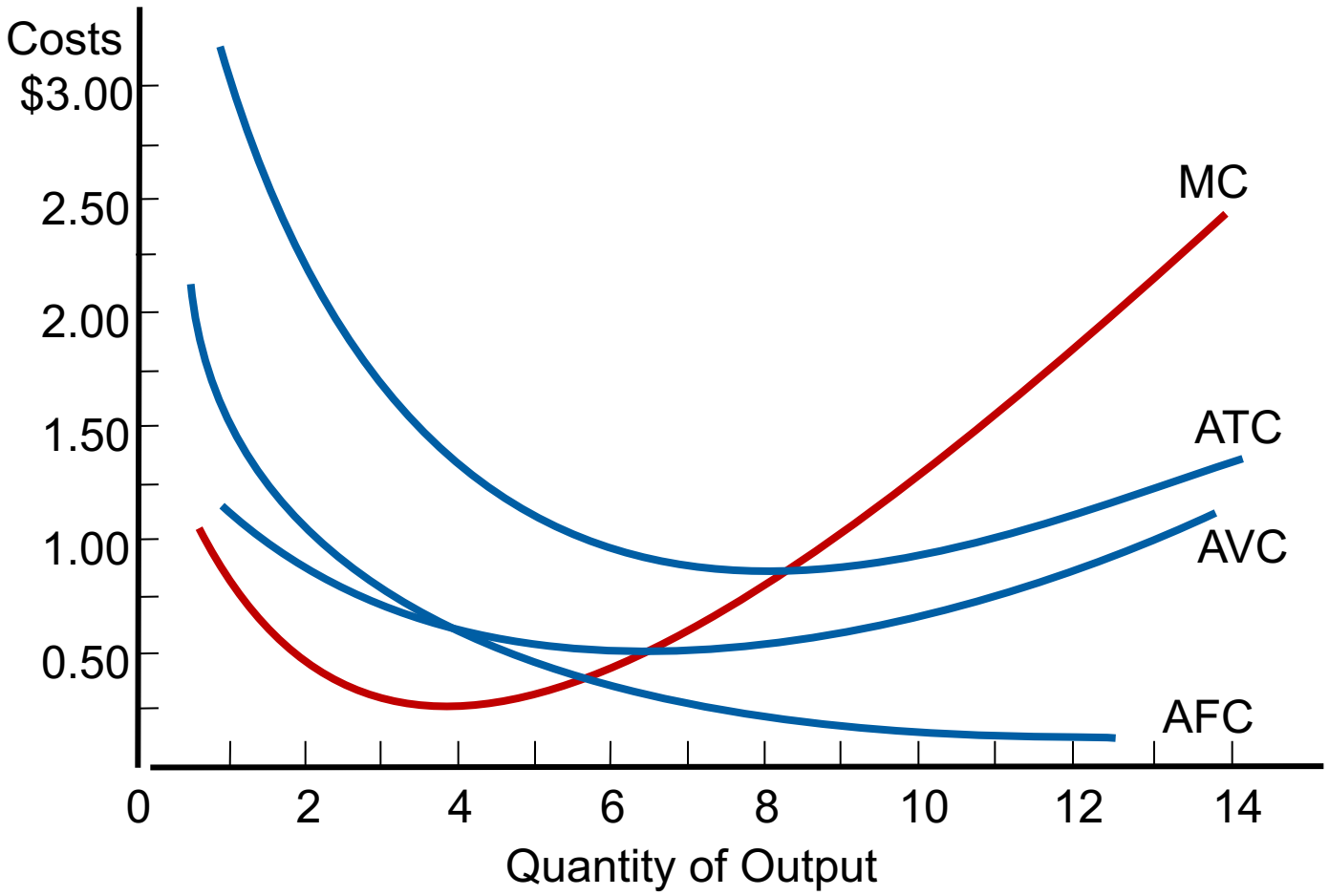
- ***Marginal Costs***:
  rise sharply as the plant's production capacity (***q***) is approached.

- ***Average Total Costs***:
  will be a U-shaped curve since ***AFC*** will be high for small rates of output and ***MC*** will be high as the plant's production capacity (*q*) is approached.





TYPICAL AVERAGE AND MARGINAL COST CURVES IN THE SHORT RUN



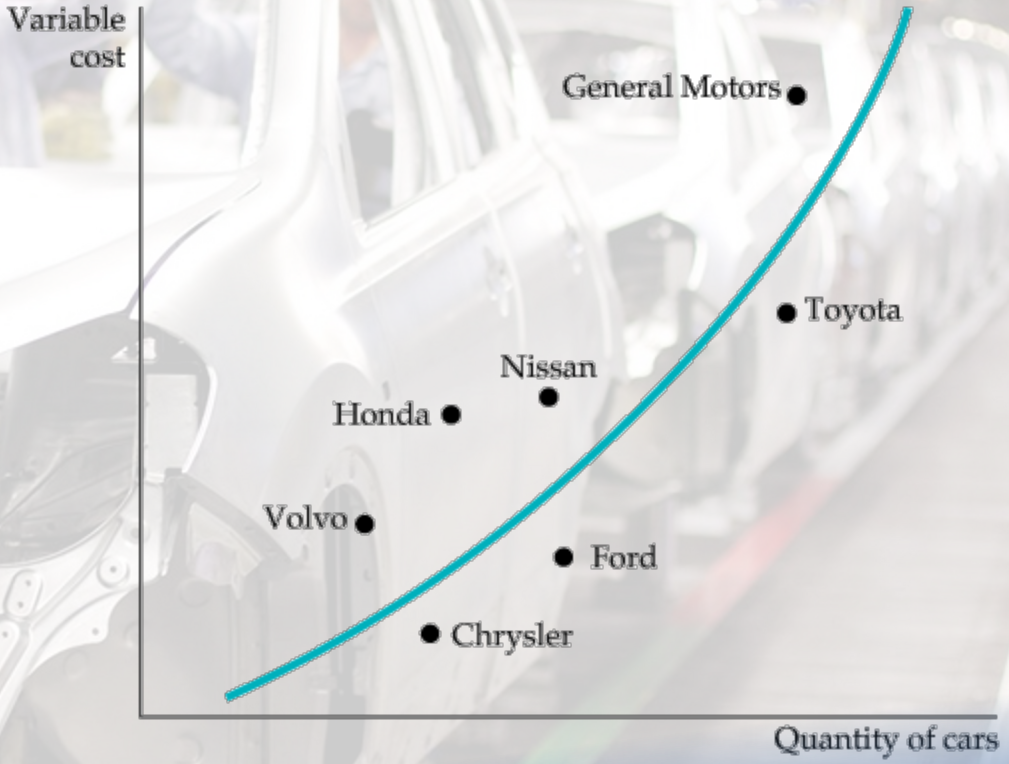
Many firms experience increasing marginal product before diminishing marginal product. As a result, they have cost curves shaped like those in this figure. Notice that marginal cost and average variable cost fall for a while before starting to rise.

ESTIMATING AND PREDICTING COST

VARIABLE COST CURVE FOR THE AUTOMOBILE INDUSTRY

An empirical estimate of the variable cost curve can be obtained by using data for individual firms in an industry.

The variable cost curve for automobile production is obtained by determining statistically the curve that best fits the points that relate the output of each firm to the firm's variable cost of production.



EXAMPLE

SUNK COSTS

FRANKFURT UNIVERSITY OF APPLIED SCIENCES

SUNK COST: Expenditure that has been made and cannot be recovered

Because a sunk cost cannot be recovered, it should not influence the firm's decisions
For example, consider the purchase of specialized equipment for a plant. Suppose the equipment can be used to do only what it was originally designed for and cannot be converted for alternative use. The expenditure on this equipment is a sunk cost. *Because it has no alternative use, its opportunity cost is zero.* Thus it should not be included as part of the firm's economic costs.
A *prospective* sunk cost is an *investment.* Here the firm must decide whether that investment in specialized equipment is *economical.*

CHOOSING THE LOCATION FOR A NEW LAW SCHOOL BUILDING

The Northwestern University Law School has long been located in Chicago, along the shores of Lake Michigan. However, the main campus of the university is located in the suburb of Evanston. In the mid-1970s, the law school began planning the construction of a new building.

The downtown location had many prominent supporters. They argued in part that it was cost-effective to locate the new building in the city because the university already owned the land. A large parcel of land would have to be purchased in Evanston if the building were to be built there.

Does this argument make economic sense? No. It makes the common mistake of failing to appreciate opportunity cost. From an economic point of view, it is very expensive to locate downtown because the opportunity cost of the valuable lakeshore location is high: That property could have been sold for enough money to buy the Evanston land with substantial funds left over.

In the end, Northwestern decided to keep the law school in Chicago. This was a costly decision. It may have been appropriate if the Chicago location was particularly valuable to the law school, but it was inappropriate if it was made on the presumption that the downtown land had no cost.

COSTS IN THE LONG RUN

- In the long run, firms adjust all their inputs so that the cost of production is as low as possible
- Fixed costs: are sunk in the short run but avoidable in the long run
- Example: the rent per month a restaurant pas is fixed In the short run but avoidable in the long run if it shuts down; the long run is determined by the length of the rental contract
- Assumption**: all inputs can be varied in the long run so that there are no long-run fixed costs**
- In the long run, a firm is concerned about only three cost concepts: TC, ATC and MC (instead of seven cost concepts in the short run)

THE COST-MINIMIZING INPUT CHOICE #1

How do firms select inputs to produce a given output at minimum cost?

- Assume two variable inputs: labor (measured in hours of work per year) and capital (measured in hours of use of machinery per year)
- Total cost C of producing any particular output: C = wl + rK

ISOCOST LINE: Graph showing all possible combinations of labor and capital that can be purchased for a given total cost

$$K = C/r - (w/r)L$$

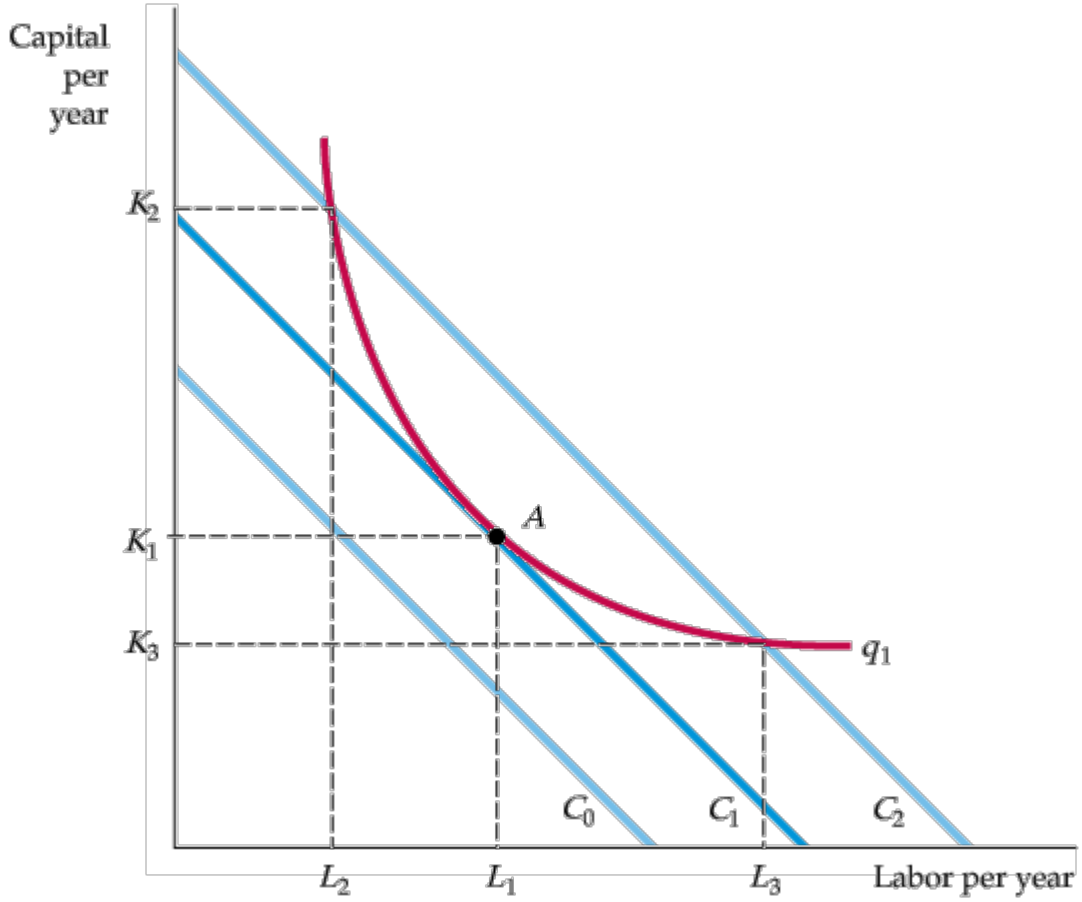
- Slope of $\Delta K/\Delta L = -(w/r)$

THE COST-MINIMIZING INPUT CHOICE #2

Isocost curves describe the combination of inputs to production that cost the same amount to the firm.

Isocost curve C_1 is tangent to isoquant q_1 at A and shows that output q_1 can be produced at minimum cost with labor input L_1 and capital input K_1.

Other input combinations—L_2, K_2 and L_3, K_3-yield the same output but at higher cost.



5.3 PROFIT MAXIMIZATION AND COMPETITIVE SUPPLY

ASSUMPTION: PERFECTLY COMPETITIVE MARKETS (1/2)

- **PRICE TAKING**

Firm that has no influence over market price and thus takes the price as given

Because each individual firm sells a sufficiently small proportion of total market output, its decisions have no impact on market price

- **PRODUCT HOMOGENEITY**

When the products of all of the firms in a market are perfectly substitutable with one another—that is, when they are homogeneous—no firm can raise the price of its product above the price of other firms without losing most or all of its business.

In contrast, when products are heterogeneous, each firm has the opportunity to raise its price above that of its competitors without losing all of its sales.

The assumption of product homogeneity is important because it ensures that there is a single market price, consistent with supply-demand analysis.

PROFIT MAXIMIZATION

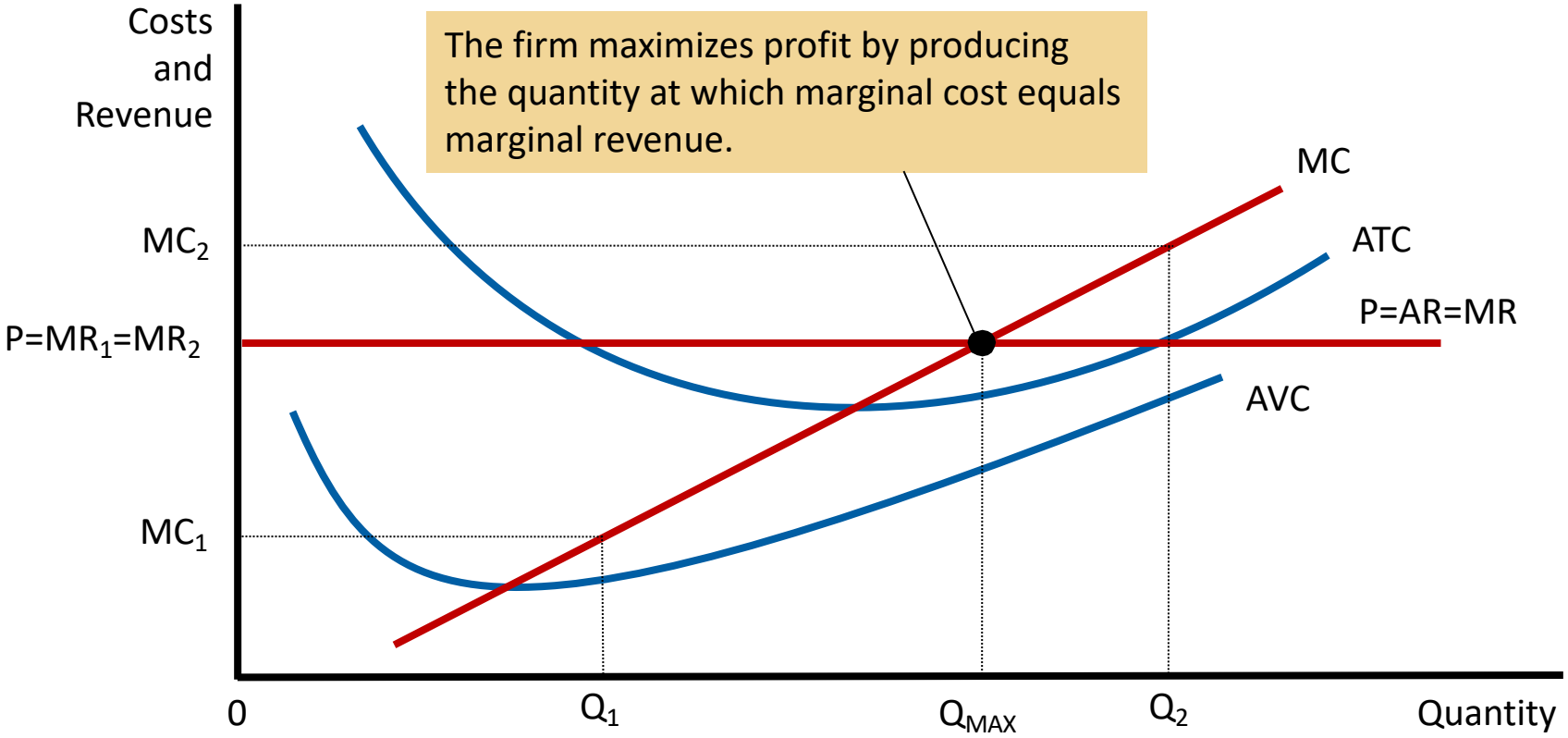
- Produce quantity where total revenue minus total cost is greatest
- Optimality condition: MR = MC
- Compare marginal revenue with marginal cost
  - If MR > MC: increase production
  - If MR < MC: decrease production
  - Maximize profit where MR = MC
- For competitive firms: MR = P so that the optimality condition reads

$$P=MC$$

PROFIT MAXIMIZATION: A NUMERICAL EXAMPLE

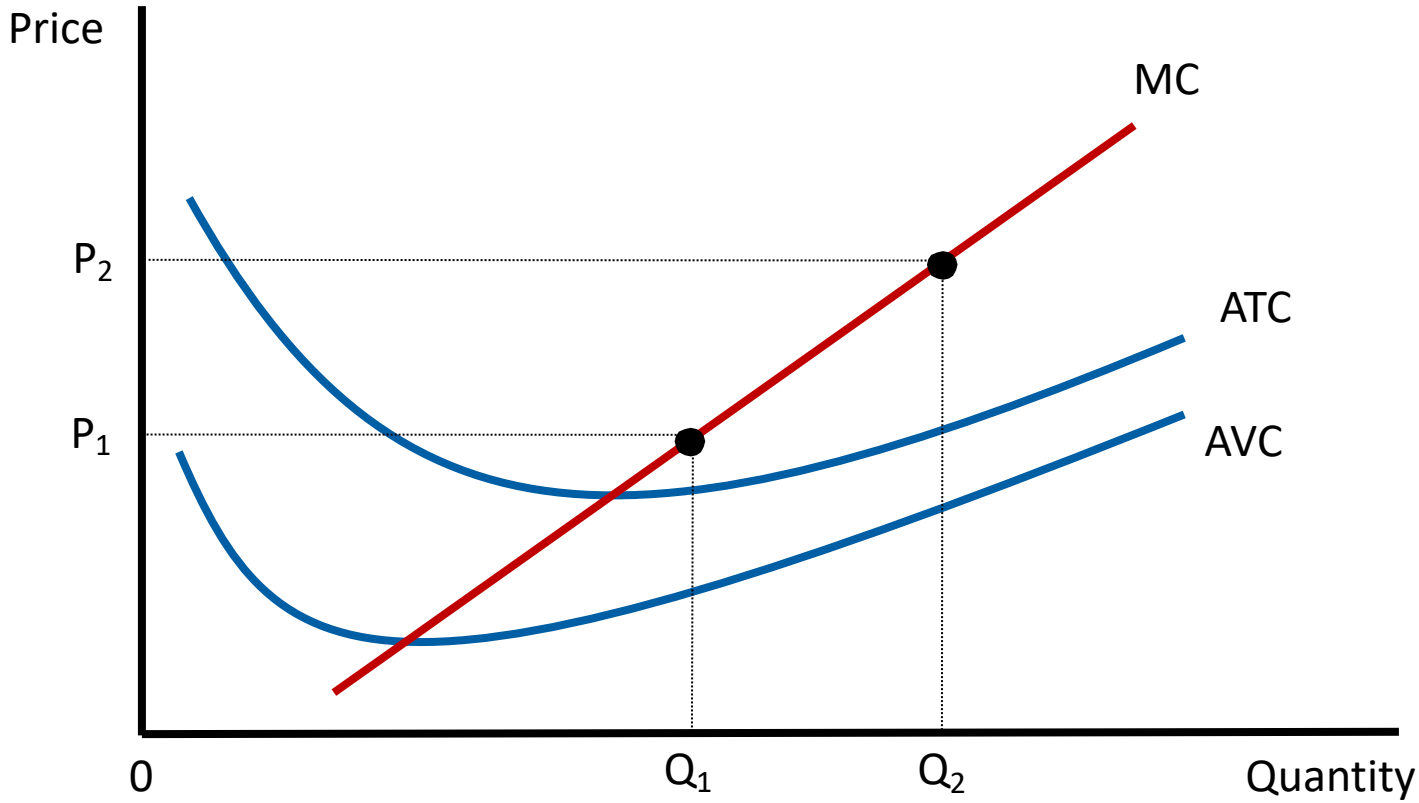
Quantity (Q)	Total Revenue (TR)	Total Cost (TC)	Profit ($TR - TC$)	Marginal Revenue ($MR = \Delta TR / \Delta Q$)	Marginal Cost ($MC = \Delta TC / \Delta Q$)	Change in Profit ($MR - MC$)
0 gallons	$ 0	$ 3	−$3			
				$6	$2	$4
1	6	5	1			
				6	3	3
2	12	8	4			
				6	4	2
3	18	12	6			
				6	5	1
4	24	17	7			
				6	6	0
5	30	23	7			
				6	7	−1
6	36	30	6			
				6	8	−2
7	42	38	4			
				6	9	−3
8	48	47	1			

PROFIT MAXIMIZATION FOR A COMPETITIVE FIRM



This figure shows the marginal-cost curve (MC), the average-total-cost curve (ATC), and the average-variable-cost curve (AVC). It also shows the market price (P), which for a competitive firm equals both marginal revenue (MR) and average revenue (AR). At the quantity Q_1, marginal revenue MR_1 exceeds marginal cost MC_1, so raising production increases profit. At the quantity Q_2, marginal cost MC_2 is above marginal revenue MR_2, so reducing production increases profit. The profit-maximizing quantity Q_{MAX} is found where the horizontal line representing the price intersects the marginal-cost curve.

MARGINAL COST AS THE COMPETITIVE FIRM'S SUPPLY CURVE



An increase in the price from P_1 to P_2 leads to an increase in the firm's profit-maximizing quantity from Q_1 to Q_2. Because the marginal-cost curve shows the quantity supplied by the firm at any given price, it is the firm's supply curve

PROFIT MAXIMIZATION IN THE SHORT RUN

The firm's short-run decision to shut down:

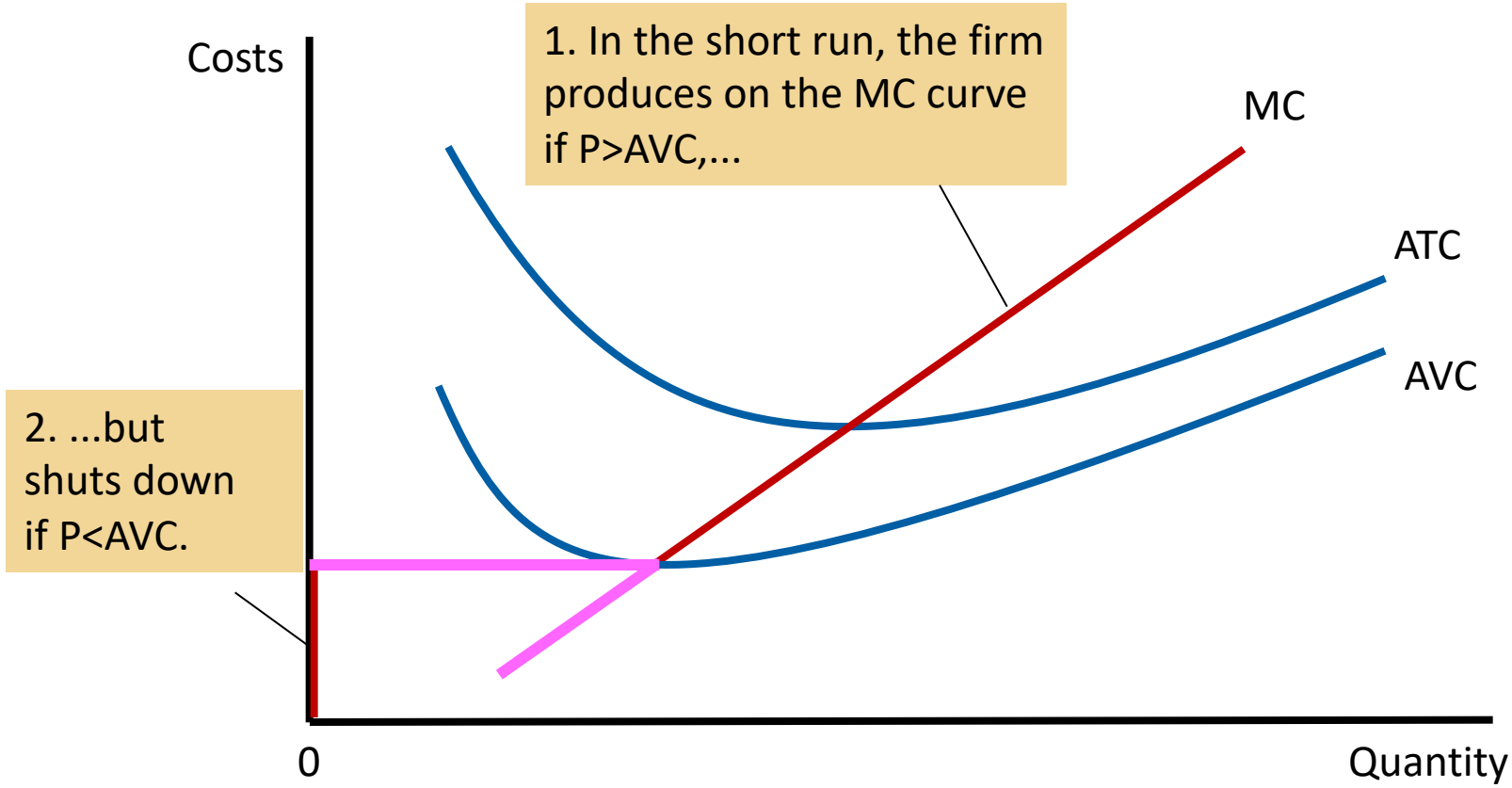
- Short-run decision not to produce anything during a specific period of time; because of current market conditions; firm still has to pay fixed costs
- Shut down if TR < VC (P < AVC)

  TR = total revenue; VC = variable costs

Competitive firm's short-run supply curve

- The portion of its marginal-cost curve that lies above average variable cost

THE COMPETITIVE FIRM'S SHORT-RUN SUPPLY CURVE



In the short run, the competitive firm's supply curve is its marginal-cost curve (MC) above average variable cost (AVC). If the price falls below average variable cost, the firm is better off shutting down temporarily

NEAR-EMPTY RESTAURANTS

Restaurant – stay open for lunch?

- Fixed costs
  - Not relevant
  - Are sunk costs in short run
- Variable costs – relevant
- Shut down if revenue from lunch < variable costs
- Stay open if revenue from lunch > variable costs

Staying open can be profitable, even with many tables empty.

CASE STUDY

PROFIT MAXIMIZATION IN THE LONG RUN

Firm's long-run decision: to exit the market

- Long-run decision to leave the market
- Firm doesn't have to pay any costs
- Exit the market if: total revenue < total costs; TR < TC

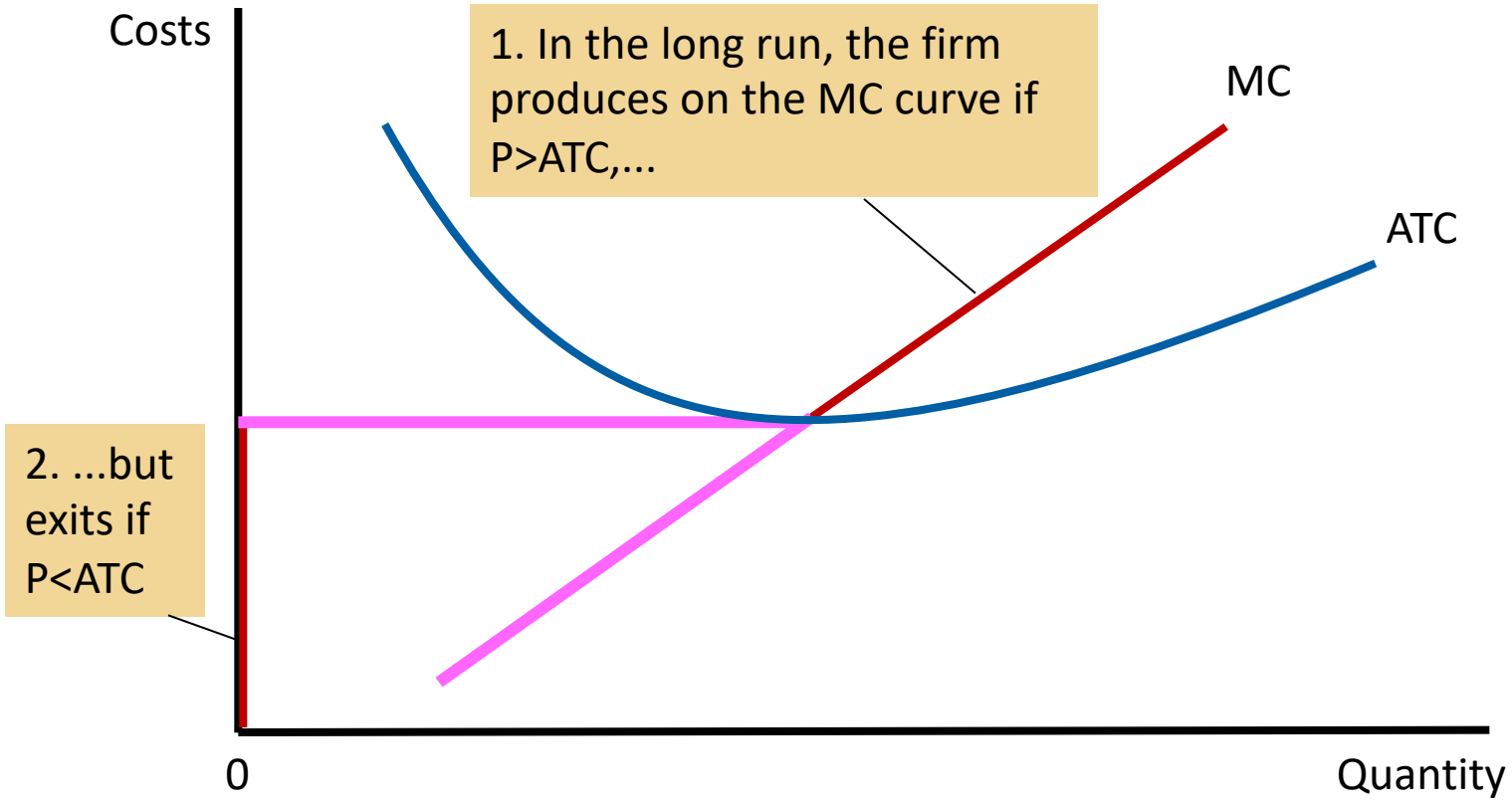
  Same as: P < ATC
- Enter the market if: total revenue > total costs; TR > TC

  Same as: P > ATC

Competitive firm's long-run supply curve

- The portion of its marginal-cost curve that lies above ATC

THE COMPETITIVE FIRM'S LONG-RUN SUPPLY CURVE

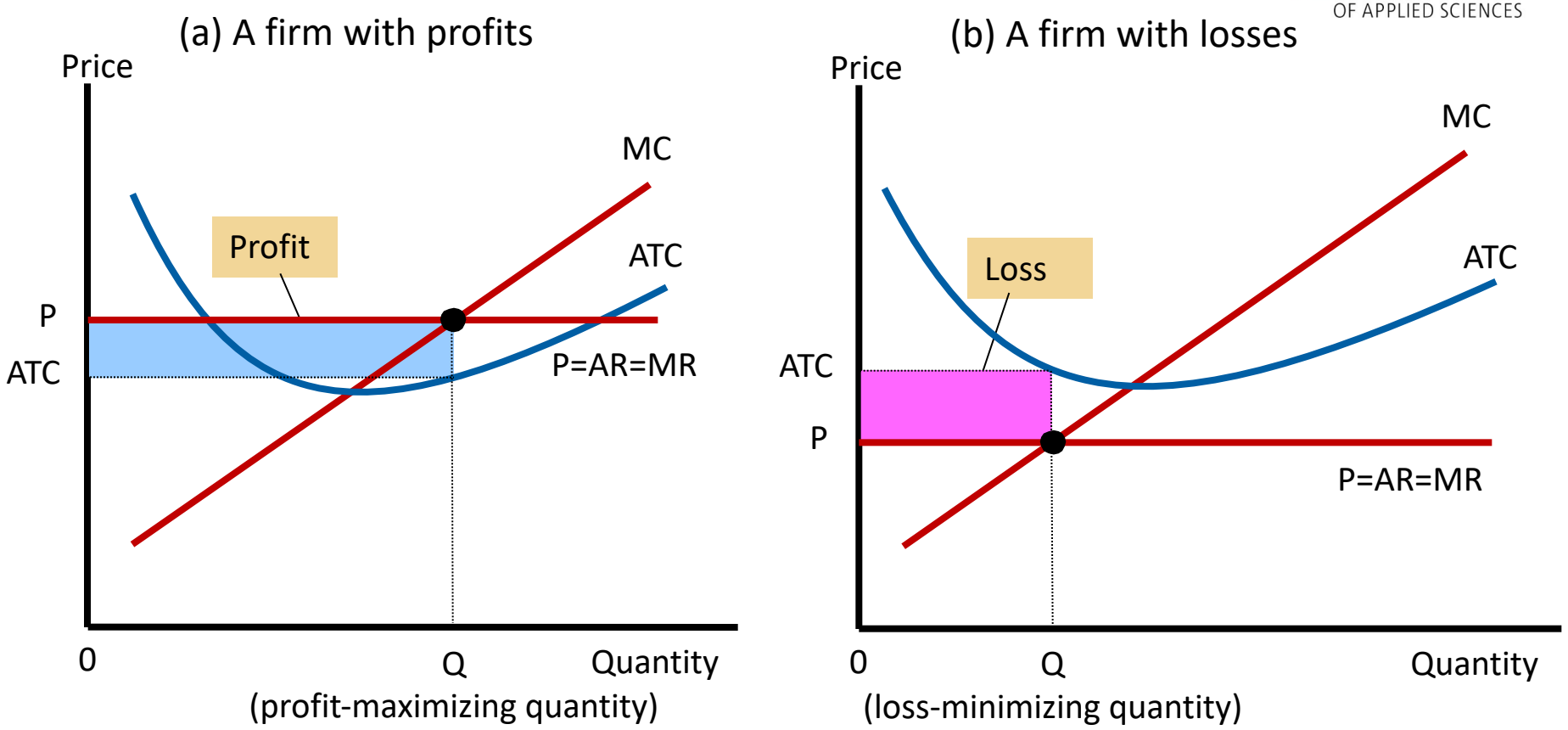


In the long run, the competitive firm's supply curve is its marginal-cost curve (MC) above average total cost (ATC). If the price falls below average total cost, the firm is better off exiting the market

MEASURING PROFIT (1/2)

- If P > ATC
  - Profit = TR – TC = (P – ATC) ˣ Q
- If P < ATC
  - Loss = TC - TR = (ATC – P) ˣ Q
  - = Negative profit

MEASURING PROFIT (2/2)



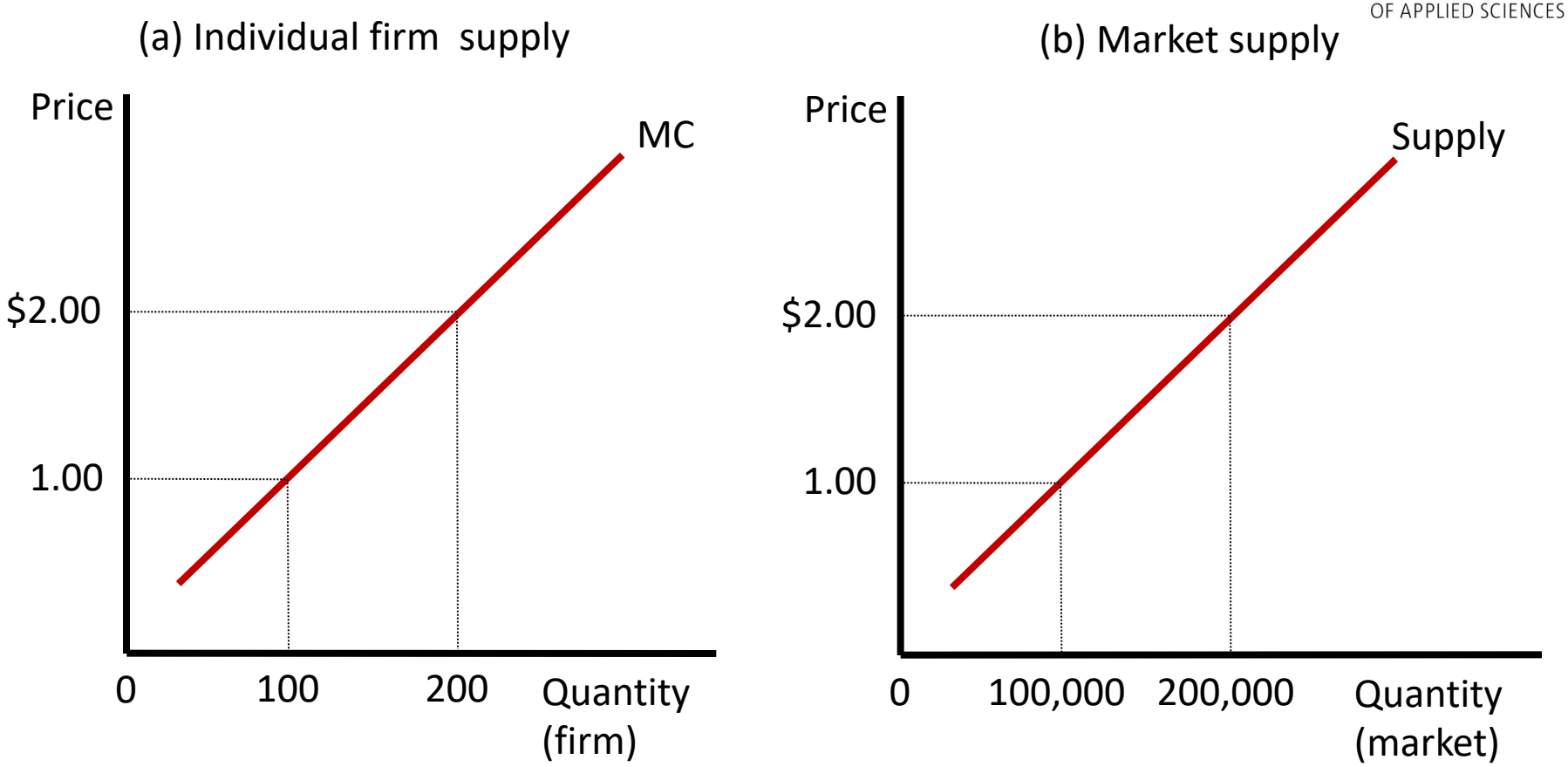
The area of the shaded box between price and average total cost represents the firm's profit. The height of this box is price minus average total cost (P – ATC), and the width of the box is the quantity of output (Q). In panel (a), price is above average total cost, so the firm has positive profit. In panel (b), price is less than average total cost, so the firm incurs a loss

MARKET SUPPLY IN THE SHORT-RUN VS LONG-RUN

Market supply: add up quantity supplied by each firm

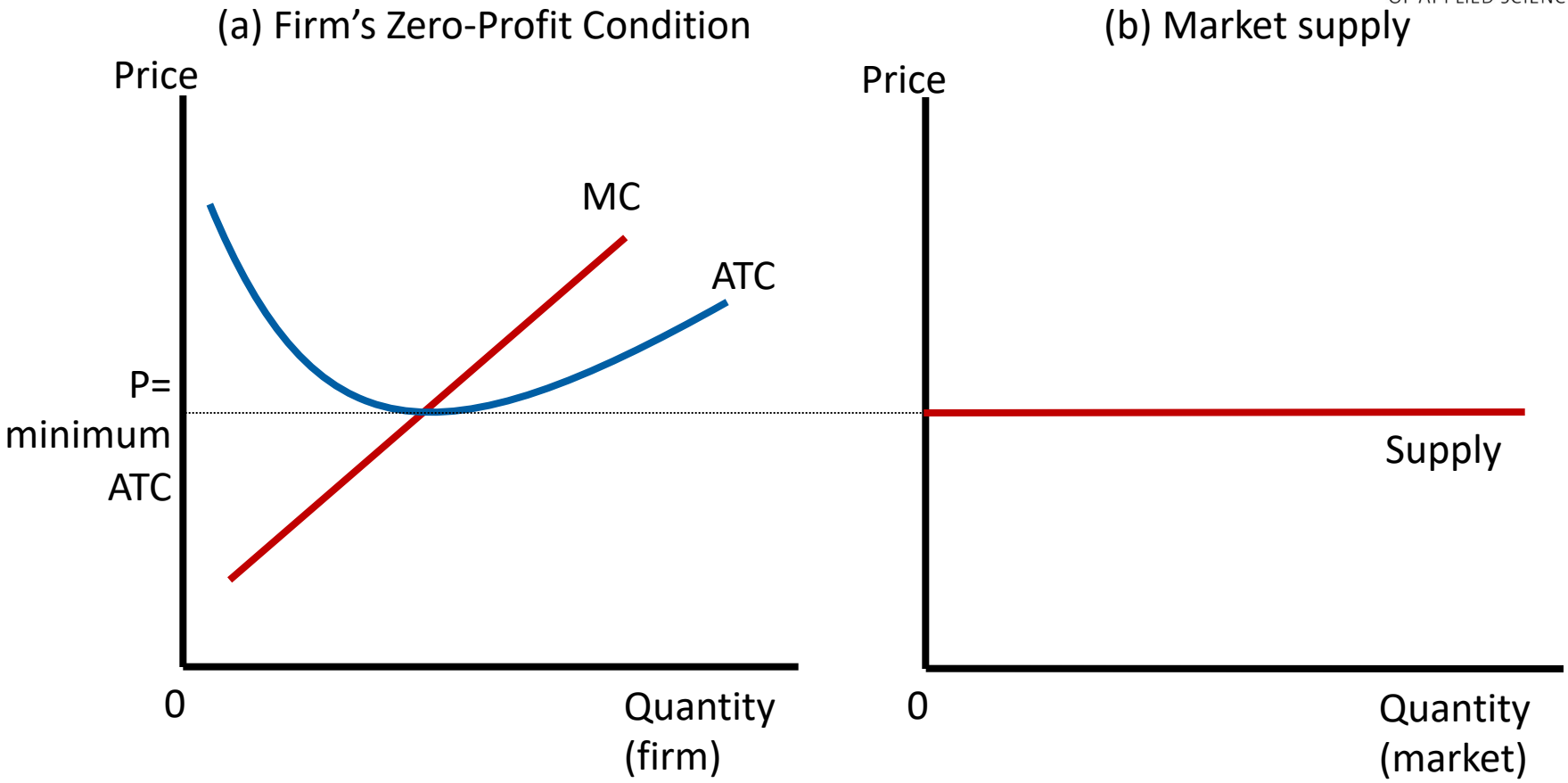
- Short run: market supply with a fixed number of firms
  - Each firm supplies quantity where P = MC
  - For P > AVC: supply curve is MC curve
- Long run: firms can enter and exit the market
  - If P > ATC, firms make positive profit: new firms enter the market
  - If P < ATC, firms make negative profit: firms exit the market
  - Process of entry and exit ends when firms still in market make zero economic profit (P = ATC)
  - Long run supply curve is perfectly elastic horizontal at minimum ATC

SHORT-RUN MARKET SUPPLY



In the short run, the number of firms in the market is fixed. As a result, the market supply curve, shown in panel (b), reflects the individual firms' marginal-cost curves, shown in panel (a). Here, in a market of 1,000 firms, the quantity of output supplied to the market is 1,000 times the quantity supplied by each firm

LONG-RUN MARKET SUPPLY



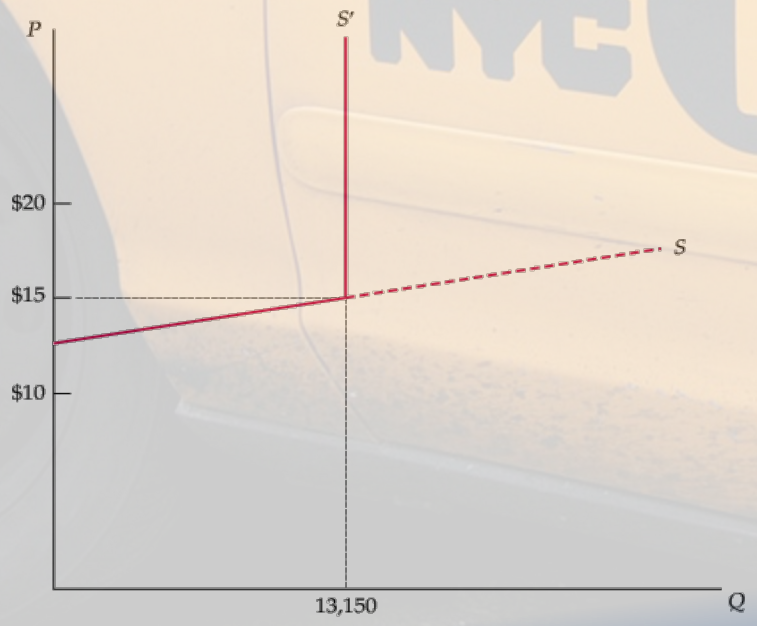
In the long run, firms will enter or exit the market until profit is driven to zero. As a result, price equals the minimum of average total cost, as shown in panel (a). The number of firms adjusts to ensure that all demand is satisfied at this price. The long-run market supply curve is horizontal at this price, as shown in panel (b)

WHY DO COMPETITIVE FIRMS STAY IN BUSINESS IF THEY MAKE ZERO PROFIT?

- Profit = total revenue – total cost
- Total cost includes all opportunity costs
- Zero-profit equilibrium
  - Economic profit is zero
  - Accounting profit is positive

THE SUPPLY OF TAXICABS IN NEW YORK

While reducing taxi fares will indeed cause a reduction in the quantity supplied, raising the price will not cause an increase in the quantity supplied. Why not? Because the number of medallions is fixed



If there were no restriction on the number of medallions, the supply curve would be highly elastic. Cab drivers work hard and don't earn much, so a drop in the price P (of a 5-mile ride) would lead many of them to find another job. Likewise, an increase in price would bring many new drivers into the market.

But the number of medallions—and therefore the number of taxicabs—is limited to 13,150, so the supply curve becomes vertical at this quantity.

EXAMPLE

06

MONOPOLY

6.1 Production and Pricing Decisions

6.2 The Welfare Cost of Monopolies

06 IDEA

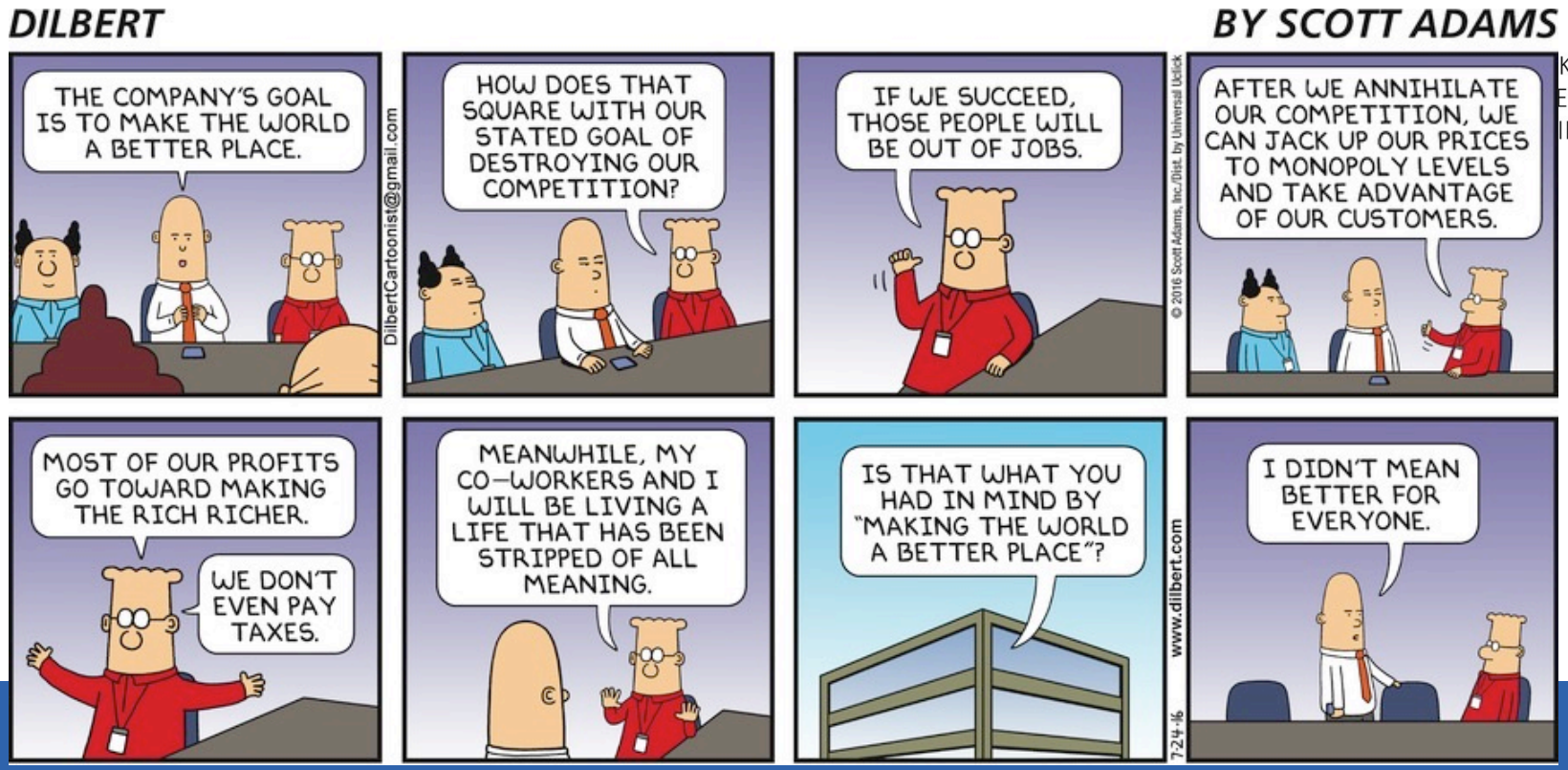
A firm that possesses market power, does not take the market price as given. Instead, it maximizes profits by choosing supply for which the price is higher than marginal costs.

The upside: Industry profits are highest in case of a monopoly.

The downside: When the monopolist raises prices above the competitive level in order to reap his monopoly profits, customers buy less of the product, less is produced and society is worse off.

06 LEARNING OBJECTIVES

- Explain why monopolies arise
- Apply the concept of natural oligopolies
- Evaluate the difference between monopolies and firms in perfect competition
- Calculate and interpret profit maximization
- Evaluate the welfare costs of monopolies
- Describe the practice of price differentiation



6.1 PRODUCTION AND PRICING DECISIONS

MONOPOLIES

Monopoly

- Firm that is the sole seller of a product without close substitutes
- Price maker: charges a price that exceeds marginal cost

Barriers to entry

- Other firms cannot enter the market and compete with it
- A monopoly remains the only seller in the market because other firms cannot enter the market and compete with it

The monopolist's impact

- A high price reduces the quantity purchased
- Outcome: often not the best for society

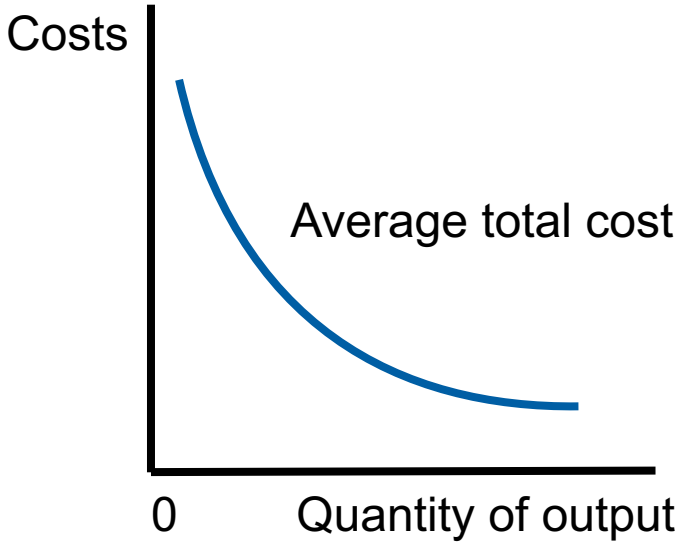
WHY MONOPOLIES ARISE #1

1. Monopoly resources
   - A key resource required for production is owned by a single firm
2. Government regulation
   - Government gives a single firm the exclusive right to produce some good or service
   - Patent and copyright laws: higher prices and higher profits
3. Network externalities
   - Provide an advantage to existing firms and may inhibit the entry of new ones

WHY MONOPOLIES ARISE #2

4. Natural monopoly

- A single firm can supply a good or service to an entire market at a smaller cost than could two or more firms
- Economies of scale over the relevant range of output
- Club goods: Excludable but not rival in consumption

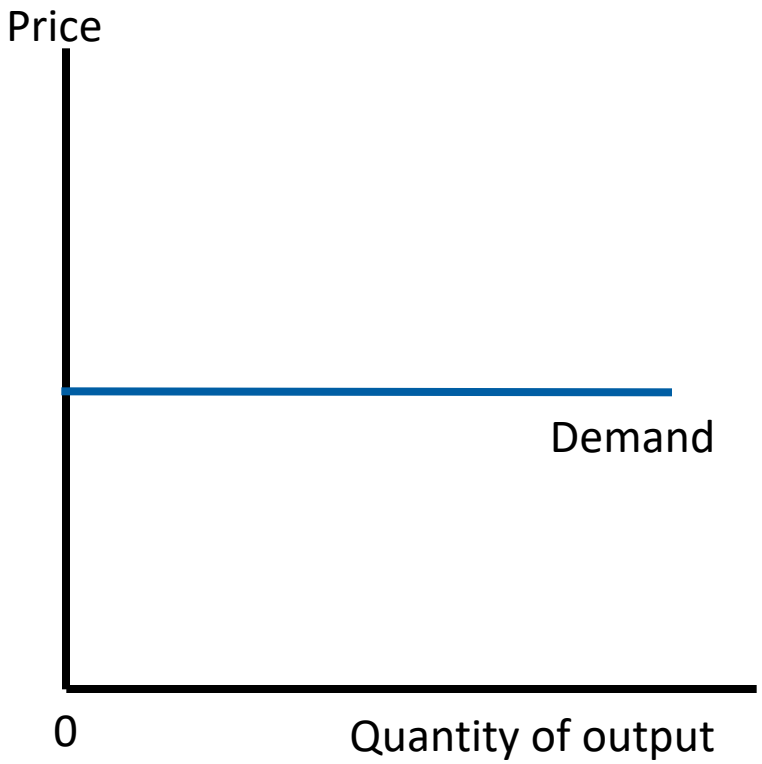


Economies of Scale as a Cause of Monopoly - Natural monopoly

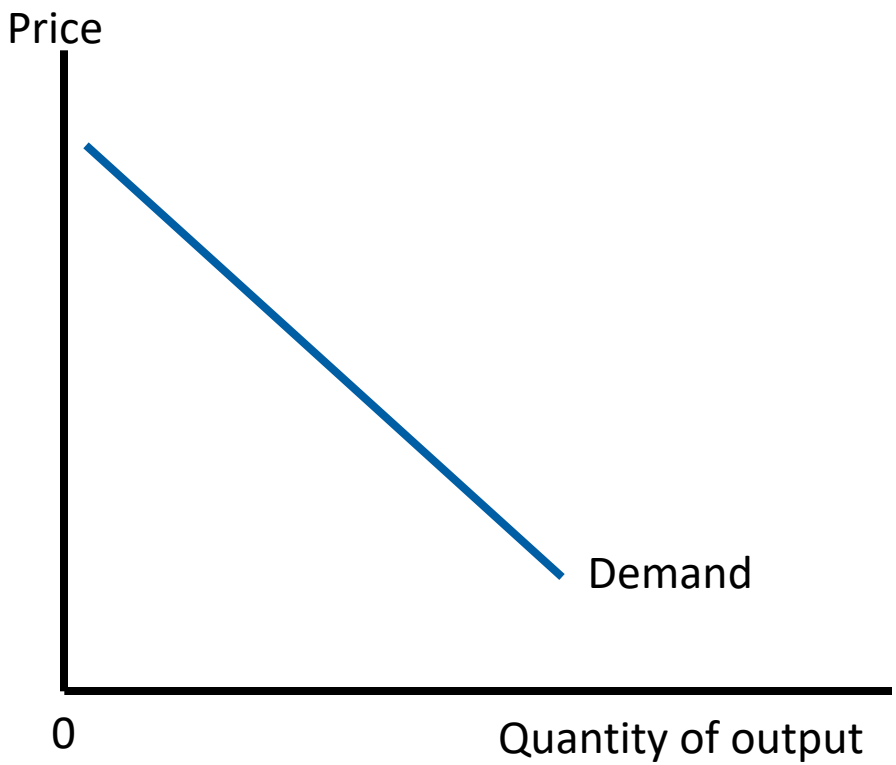
When a firm's average-total-cost curve continually declines, the firm has what is called a natural monopoly. In this case, when production is divided among more firms, each firm produces less, and average total cost rises. As a result, a single firm can produce any given amount at the least cost

DEMAND CURVES FOR COMPETITIVE AND MONOPOLY FIRMS

(a) A Competitive Firm's Demand Curve



(b) A Monopolist's Demand Curve

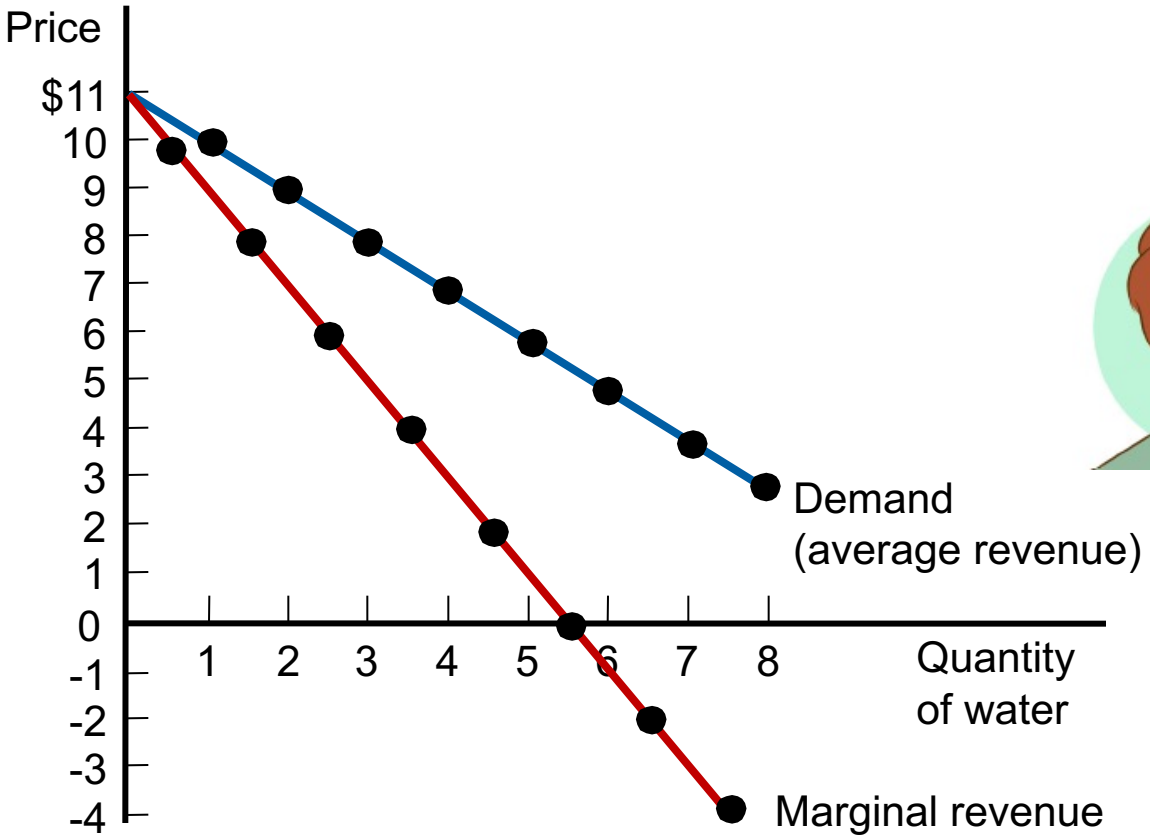


Because competitive firms are price takers, they in effect face horizontal demand curves, as in panel (a). Because a monopoly firm is the sole producer in its market, it faces the downward-sloping market demand curve, as in panel (b). As a result, the monopoly has to accept a lower price if it wants to sell more output.

EXAMPLE: WATER SUPPLY

Quantity of Water (Q)	Price (P)	Total Revenue ($TR = P \times Q$)	Average Revenue ($AR = TR / Q$)	Marginal Revenue ($MR = \Delta TR / \Delta Q$)
0 gallons	\$11	\$ 0	—	
				\$10
1	10	10	\$10	
				8
2	9	18	9	
				6
3	8	24	8	
				4
4	7	28	7	
				2
5	6	30	6	
				0
6	5	30	5	
				−2
7	4	28	4	
				−4
8	3	24	3	

EXAMPLE: WATER SUPPLY



What is the functional form of the demand curve and marginal revenues ?

The demand curve shows how the quantity affects the price of the good. The marginal-revenue curve shows how the firm's revenue changes when the quantity increases by 1 unit. Because the price on *all* units sold must fall if the monopoly increases production, marginal revenue is always less than the price.

PROFIT MAXIMIZATION FOR A MONOPOLY

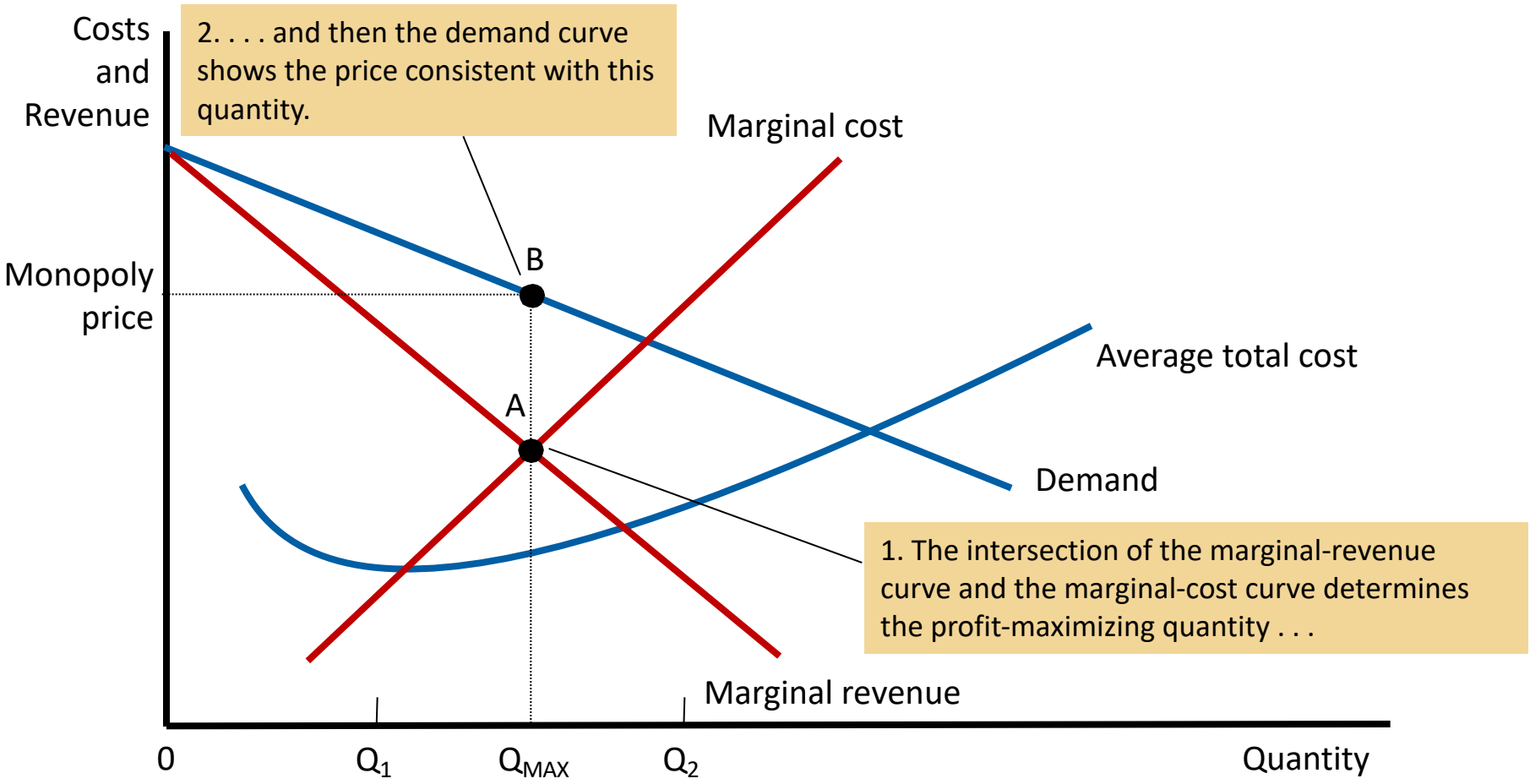
- A monopoly's profit

  Profit = TR – TC = (P – ATC) ˣ Q
- Profit maximization
  - If MR > MC: increase production
  - If MC > MR: produce less
  - Produce quantity where

MR=MC

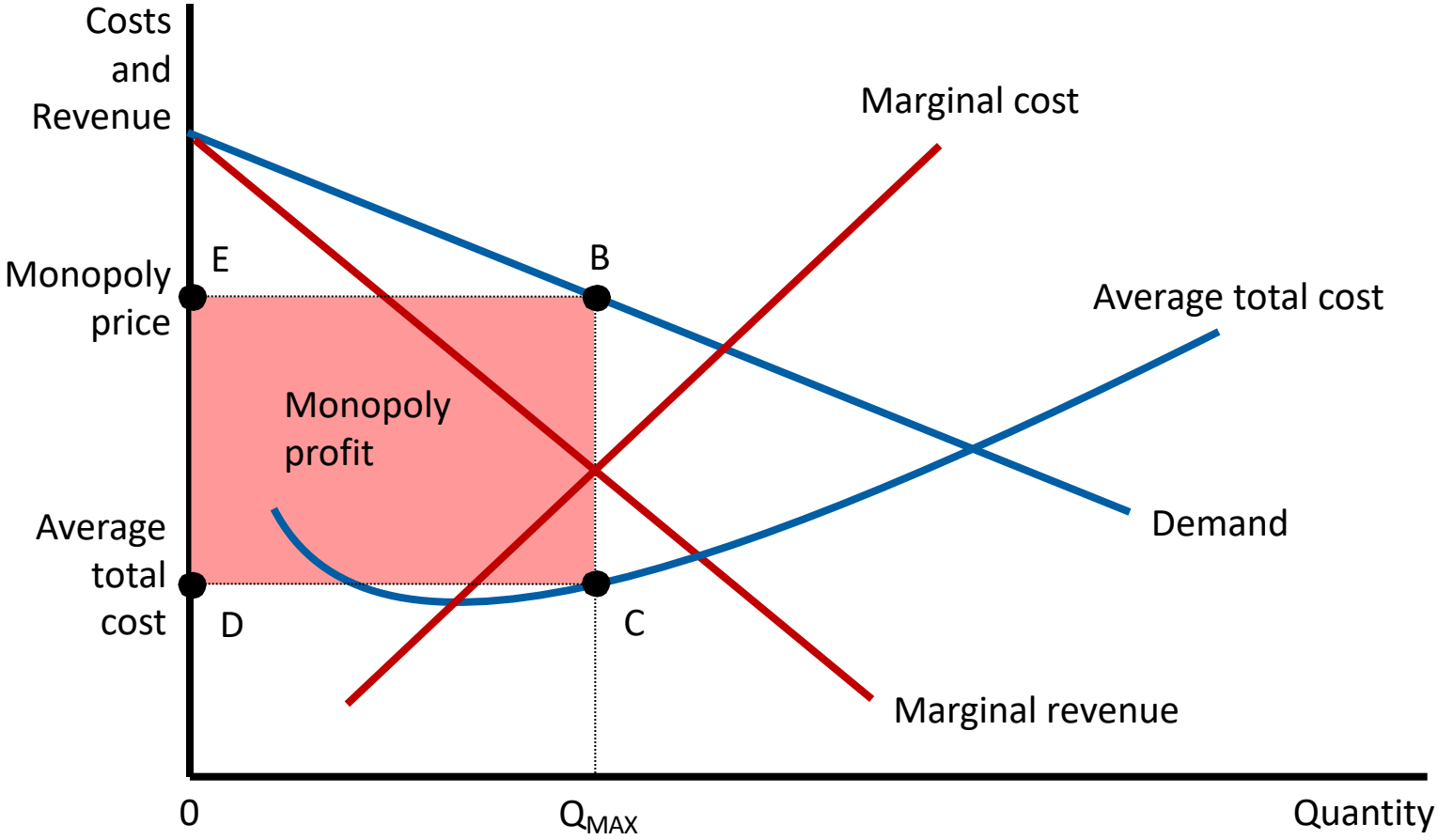
  - Intersection of the marginal-revenue curve and the marginal-cost curve
  - Price: on the demand curve

PROFIT MAXIMIZATION FOR A MONOPOLY



A monopoly maximizes profit by choosing the quantity at which marginal revenue equals marginal cost (point A). It then uses the demand curve to find the price that will induce consumers to buy that quantity (point B).

PROFIT MAXIMIZATION FOR A MONOPOLY



The area of the box BCDE equals the profit of the monopoly firm. The height of the box (BC) is price minus average total cost, which equals profit per unit sold. The width of the box (DC) is the number of units sold.

PRICE DISCRIMINATION

PRICE DISCRIMINATION: The practice of selling a good at different prices to different consumers

A firm has an opportunity for price discrimination if 3 conditions are met:

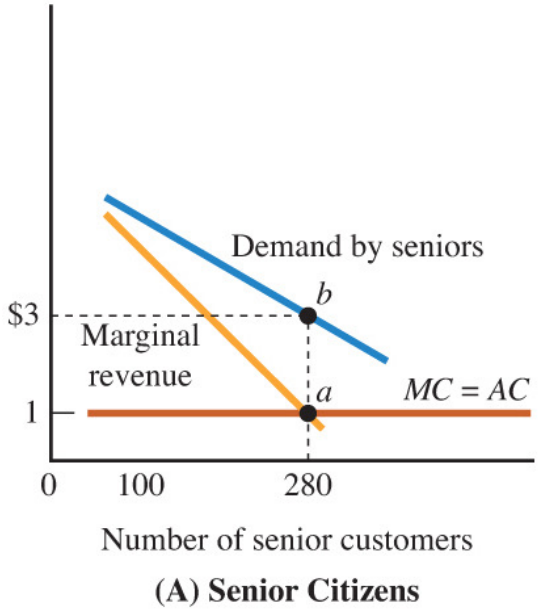
- Market power
- Different consumer groups
- Resale is not possible

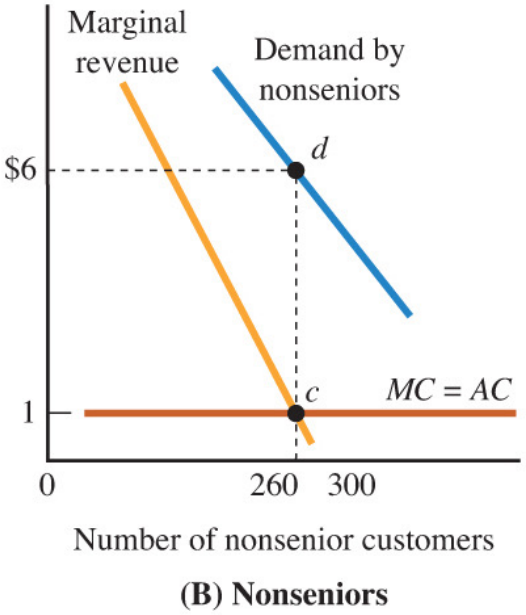
PRICE DISCRIMINATION

Senior Discounts in Restaurants

To engage in price discrimination, the firm divides potential customers into two groups and applies the marginal principle twice—once for each group.

Using the marginal principle, the profit-maximizing prices are $3 for seniors (point *b*) and $6 for nonseniors (point *d*).





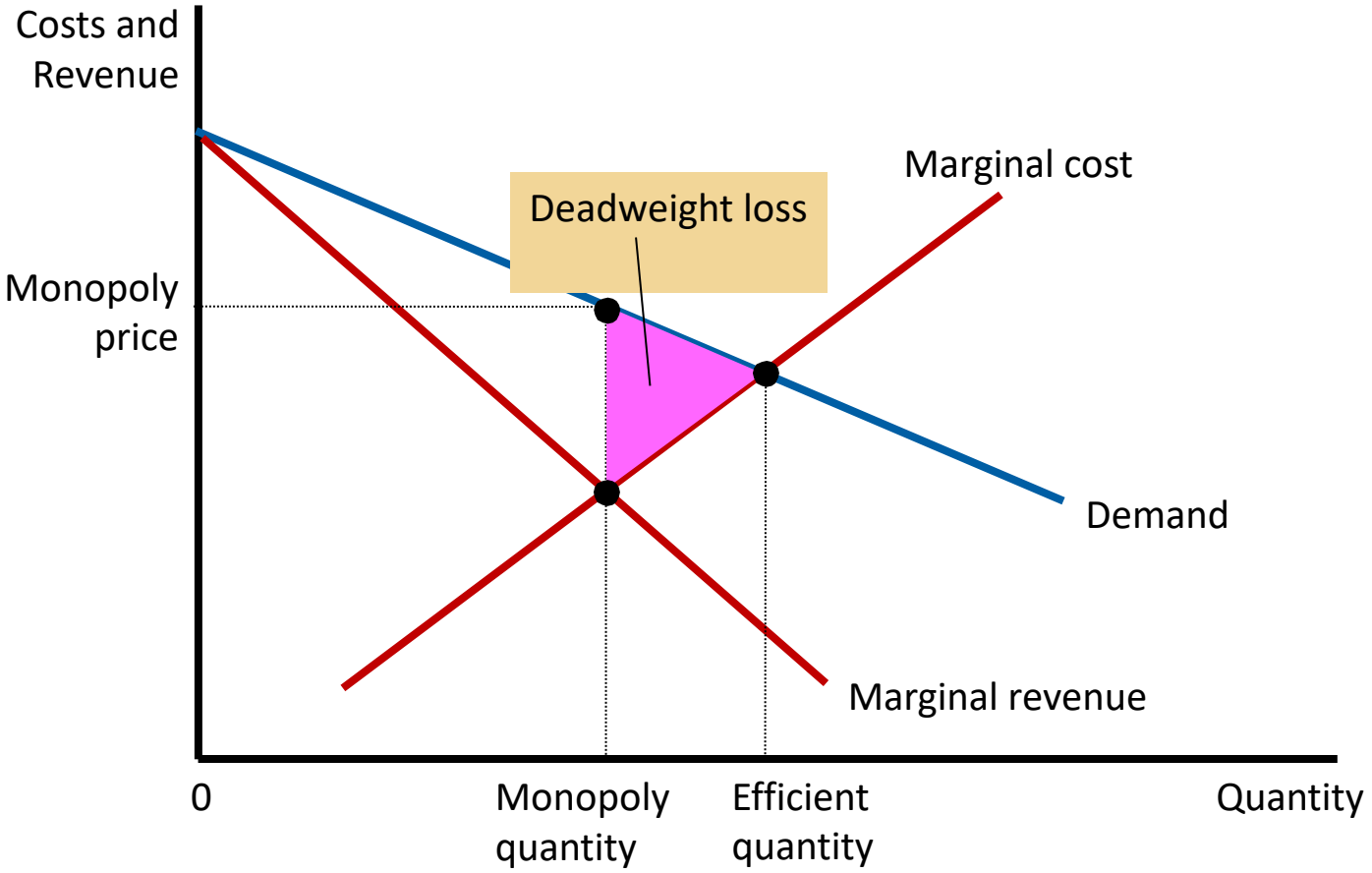
EXAMPLE

6.2 THE WELFARE COST OF MONOPOLIES

THE WELFARE COST OF MONOPOLIES (1/2)

- Benevolent planner: maximize total surplus
  - Consumer surplus + producer surplus
  - Socially efficient outcome
  - Produce quantity where marginal cost curve intersects demand curve
  - Charge P=MC
- Monopoly
  - Produce quantity where MC = MR
  - Produces less than the socially efficient quantity of output
  - Charge P > MC
  - Deadweight loss: triangle between the demand curve and MC curve

THE WELFARE COST OF MONOPOLIES (2/2)



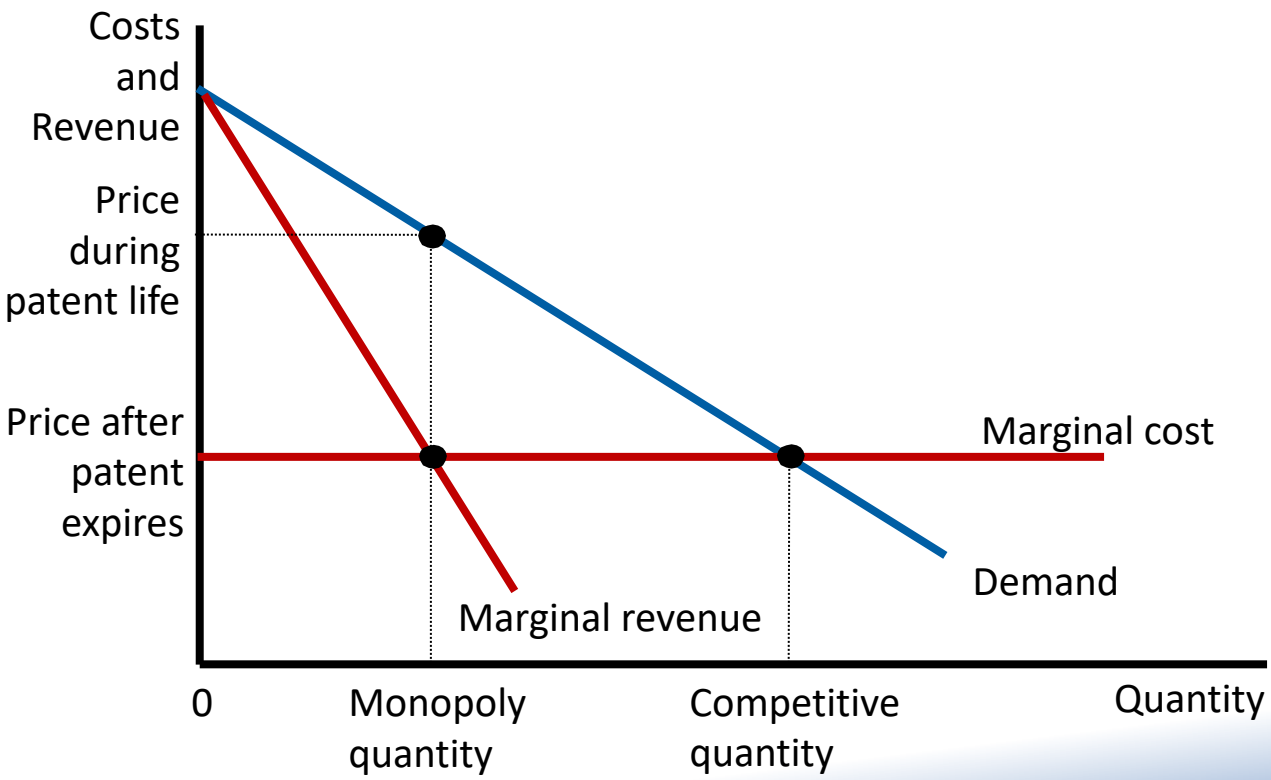
Because a monopoly charges a price above marginal cost, not all consumers who value the good at more than its cost buy it. Thus, the quantity produced and sold by a monopoly is below the socially efficient level. The deadweight loss is represented by the area of the triangle between the demand curve (which reflects the value of the good to consumers) and the marginal-cost curve (which reflects the costs of the monopoly producer).

MONOPOLY DRUGS VERSUS GENERIC DRUGS #1

- Market for pharmaceutical drugs
  - New drug, patent laws, monopoly
    - Produce Q where MR=MC
    - P>MC
  - Generic drugs: competitive market
    - Produce Q where MR=MC
    - And P=MC
- Price of the competitively produced generic drug
  - Below the monopolist's price

EXAMPLE

MONOPOLY DRUGS VERSUS GENERIC DRUGS #2



When a patent gives a firm a monopoly over the sale of a drug, the firm charges the monopoly price, which is well above the marginal cost of making the drug. When the patent on a drug runs out, new firms enter the market, making it more competitive. As a result, the price falls from the monopoly price to marginal cost.

EXAMPLE

COMPETITION VERSUS MONOPOLY: A SUMMARY COMPARISON

	Competition	Monopoly
Similarities		
Goal of firms	Maximize profits	Maximize profits
Rule for maximizing	$MR = MC$	$MR = MC$
Can earn economic profits in the short run?	Yes	Yes
Differences		
Number of firms	Many	One
Marginal revenue	$MR = P$	$MR < P$
Price	$P = MC$	$P > MC$
Produces welfare-maximizing level of output?	Yes	No
Entry in long run?	Yes	No
Can earn economic profits in long run?	No	Yes
Price discrimination possible?	No	Yes

07

THE DATA OF MACROECONOMICS

7.1 Measuring a Nation's Income

7.2 Measuring the Cost of Living

07 IDEA

The economic environment provides many of the critical parameters for companies doing business in a global setting. Recessions or inflation will change businesses forecasts and have an impact on profitability and success. In particular, a global recession like the one suffered recently can transform consumer behavior and, thus, has an impact on business strategies.

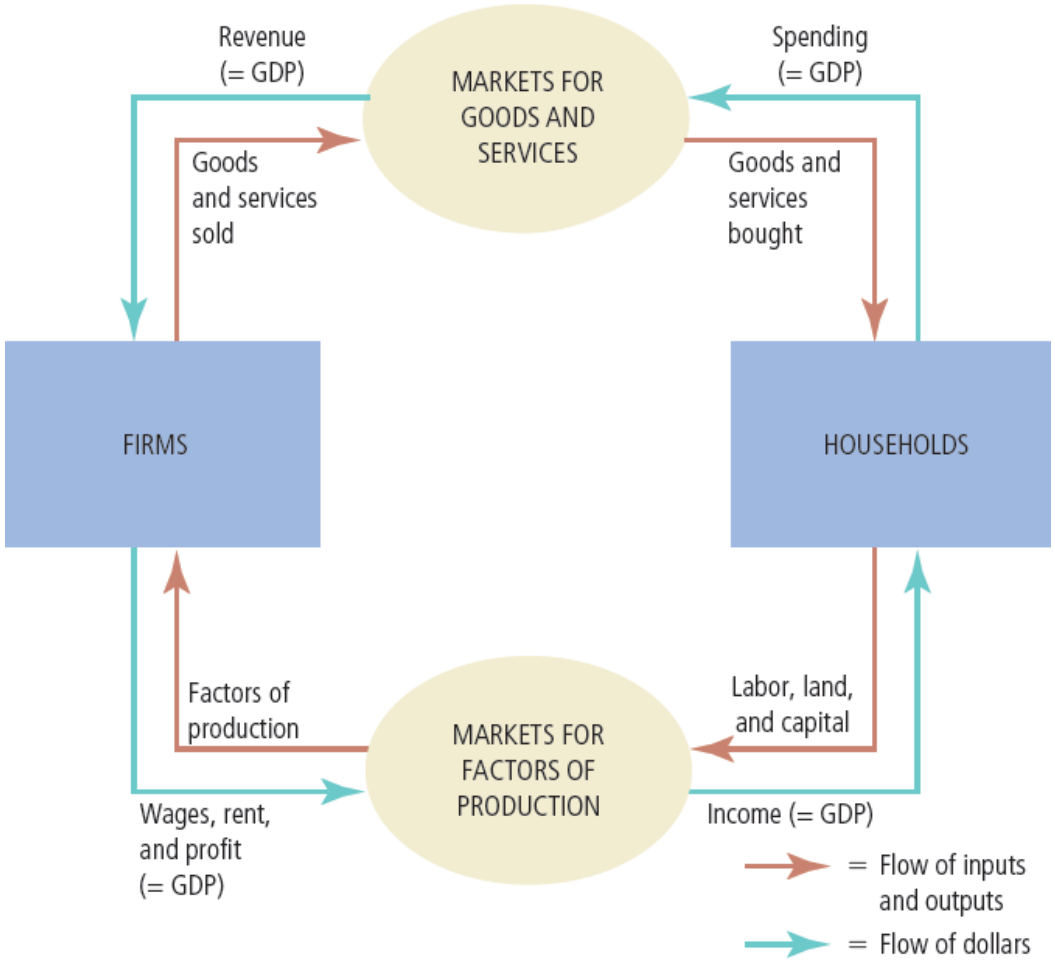
The basic macroeconomic concepts considered in this part are necessary ingredients to many types of managerial decisions.

07 LEARNING OBJECTIVES

- Illustrate flows of goods and dollars using the circular flow diagram
- Define the GDP
- Assess whether the GD is a good measure of well-being
- Define and calculate the CPI
- Understand the difference between real and nominal values

7.1 MEASURING A NATION'S INCOME

THE CIRCULAR-FLOW DIAGRAM



Households buy goods and services from firms; firms use their revenue from sales to pay wages to workers, rent to landowners, and profit to firm owners.

For an economy as a whole: income = expenditure:

-total amount spent by households in the market for goods and services

-the total wages, rent, and profit paid by firms in the markets for the factors of production.

GROSS DOMESTIC PRODUCT

GROSS DOMESTIC PRODUCT (GDP): The GDP is the market value of all final goods and services produced within a country in a given period of time.

- Measures the total income of everyone in the economy
- Measures the total expenditure on the economy's output of goods and services

$$Y = C + I + G + NX$$

GDP (Y) = consumption (C) + investment (I) + government purchases (G) + net exports (NX)

MEASUREMENT OF GDP

"GDP IS THE MARKET VALUE…"

- Market prices - reflect the value of the goods

"… OF ALL…"

- All items produced in the economy and sold legally in markets
- Excludes most items
  - Produced and sold illicitly
  - Produced and consumed at home

"… FINAL…"

- Value of intermediate goods is already included in the prices of the final goods

MEASUREMENT OF GDP

"… GOODS AND SERVICES…"

- Tangible goods & intangible services

"… PRODUCED…"

- Goods and services currently produced

"… WITHIN A COUNTRY…"

- Goods and services produced domestically; regardless of the nationality of the producer

"… IN A GIVEN PERIOD OF TIME."

- A year or a quarter

THE COMPONENTS OF GDP

- Consumption, C
  - Spending by households on goods and services
  - Exception: purchases of new housing
  - Not included: Intermediate goods: Goods used in the production process that are not final goods and services

- Investment, I
  - Spending on capital equipment, inventories, and structures
  - Household purchases of new housing
  - Inventory accumulation

THE COMPONENTS OF GDP

- Government purchases, G
  - Government consumption expenditure and gross investment
  - Spending on goods and services
  - By local, state, and federal governments
  - Does not include transfer payments
- Net exports, NX = Exports - Imports
  - Exports: Spending on domestically produced goods by foreigners
  - Imports: Spending on foreign goods by domestic residents
  - **TRADE DEFICIT**: The excess of imports over exports
  - **TRADE SURPLUS**: The excess of exports over imports

THE COMPONENTS OF GDP

- 2012, GDP of the U.S.: over $15 trillion
- GDP per person = $49,923

	Total (in billions of dollars)	Per Person (in dollars)	Percent of Total
Gross domestic product, *Y*	$15,676	$49,923	100%
Consumption, *C*	11,119	35,411	71
Investment, *I*	2,059	6,557	13
Government purchases, *G*	3,064	9,758	20
Net exports, *NX*	–567	–1,806	–4

Source: U.S. Department of Commerce. Parts may not sum to totals due to rounding.

REAL VERSUS NOMINAL GDP

- Total spending rises from one year to the next
  - Economy - producing a larger output of goods and services (g&s) and/or g&s are being sold at higher prices
- Nominal GDP: Production of g&s valued at current prices
- Real GDP: Production of g&s valued at constant prices
  - Designate one year as base year
  - Not affected by changes in prices
- For the base year: Nominal GDP = Real GDP
- **ECONOMIC GROWTH**: Sustained increases in the real GDP of an economy over a long period of time.

REAL AND NOMINAL GDP

Prices and Quantities

Year	Price of Hot Dogs	Quantity of Hot Dogs	Price of Hamburgers	Quantity of Hamburgers
2013	$1	100	$2	50
2014	$2	150	$3	100
2015	$3	200	$4	150

Calculating Nominal GDP

2013	($1 per hot dog × 100 hot dogs) + ($2 per hamburger × 50 hamburgers)
2014	($2 per hot dog × 150 hot dogs) + ($3 per hamburger × 100 hamburge
2015	($3 per hot dog × 200 hot dogs) + ($4 per hamburger × 150 hamburge

Calculating Real GDP (base year 2013)

2013	($1 per hot dog × 100 hot dogs) + ($2 per hamburger × 50 hamburgers)
2014	($1 per hot dog × 150 hot dogs) + ($2 per hamburger × 100 hamburge
2015	($1 per hot dog × 200 hot dogs) + ($2 per hamburger × 150 hamburge

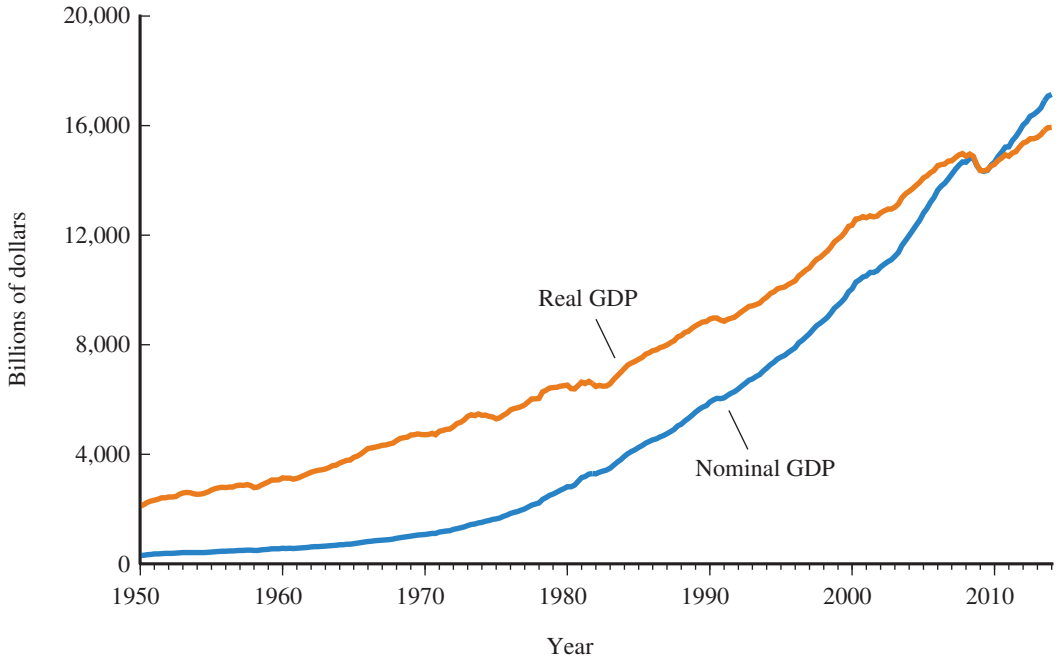
Calculating the GDP Deflator

2013	($200 / $200) × 10
2014	($600 / $350) × 1
2015	($1,200 / $500) × 1

EXAMPLE

A CLOSER EXAMINATION OF NOMINAL AND REAL GDP

This figure plots both real and nominal GDP for the United States in billions of dollars. Real GDP is measured in 2009 dollars.



U.S. Nominal and Real GDP, 1950–2014

MyEconLab Real-time data

CALCULATING INFLATION USING THE GDP DEFLATOR

INFLATION: Economy's overall price level is rising

INFLATION RATE: Percentage change in some measure of the price level from one period to the next

THE GDP DEFLATOR

Measures the current level of prices relative to the level of prices in the base year

- Ratio of nominal GDP to real GDP times 100
- Is 100 for the base year
- Can be used to take inflation out of nominal GDP ("deflate" nominal GDP)

$$\text{Inflation in year 2} = \frac{\text{GDP deflator in year 2-GDP deflator in year 1}}{\text{GDP deflator in year 1}} \times 100$$

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GDP AS A MEASURE OF WELFARE – AN ASSESSMENT

GDP – “the best single measure of the economic well-being of a society”

- Economy’s total income
- Economy’s total expenditure
- Larger GDP
- Good life, better healthcare
- Better educational systems
- Measures our ability to obtain many of the inputs into a worthwhile life

.

GDP AS A MEASURE OF WELFARE – AN ASSESSMENT

GDP – not a perfect measure of well-being

- Doesn't include
  - Leisure
  - Value of almost all activity that takes place outside markets
  - Quality of the environment
- Nothing about distribution of income

.

GDP reflects the factory's production, but not the harm it inflicts on the environment.

GDP AS A MEASURE OF WELFARE – AN ASSESSMENT

Shortcomings of GDP as a Measure of Welfare

HOUSEWORK AND CHILDCARE; LEISURE; UNDERGROUND ECONOMY; POLLUTION

The World Underground Economy, 2002–2003

Region of the World	Underground Economy as Percent of Reported GDP
Africa	41%
Central and South America	41
Asia	30
Transition Economies	38
Europe, United States, and Japan	17
Unweighted Average over 145 Countries	35

SOURCE: Based on estimates by Friedrich Schneider in "The Size of Shadow Economies in 145 Countries from 1999 to 2003" (Unpublished paper, 2005).

INTERNATIONAL DIFFERENCES: GDP & QUALITY OF LIFE

Rich countries - higher GDP per person

- Better…
  - Life expectancy
  - Literacy
  - Internet usage

Poor countries - lower GDP per person

- Worse…
  - Life expectancy
  - Literacy
  - Internet usage

Low GDP per person:

- More infants with low birth weight
- Higher rates of infant mortality
- Higher rates of maternal mortality
- Higher rates of child malnutrition
- Less common access to safe drinking water
- Fewer school-age children are actually in school
- Fewer teachers per student
- Fewer televisions
- Fewer telephones
- Fewer paved roads
- Fewer households with electricity

A PICTURE IS WORTH A THOUSAND STATISTICS (1/3)

The UK is an advanced economy. In 2011, its GDP per person was $36,010. A negligible share of the population lives in extreme poverty, defined here as less than $2 a day. A baby born in the UK can expect a relatively healthy childhood: Only 5 out of 1,000 children die before reaching age 5. Educational attainment is high: Among children of high school age, 98 % are in school.

.

A PICTURE IS WORTH A THOUSAND STATISTICS (2/3)

Mexico is a middle-income country. In 2011, its GDP per person was $15,390. About 5 percent of the population lives on less than $2 a day, and 16 out of 1,000 children die before age 5. Among those of high school age, 71 percent are in school

A PICTURE IS WORTH A THOUSAND STATISTICS (3/3)

Mali is a poor country. In 2011, its GDP per person was only $1,040. Extreme poverty is the norm: More than three-quarters of the population lives on less than $2 per day. Life is often cut short: 176 out of 1,000 children die before age 5. And educational attainment in Mali is low: Among those of high school age, only 31% are in school.

INTERNATIONAL DIFFERENCES: GDP & QUALITY OF LIFE

Country	Real GDP per Person	Life Expectancy	Average Years of Schooling	Satisfied with Water Quality (% of population)
United States	$43,017	79 years	12 years	90
Germany	35,854	80	12	95
Japan	32,295	83	12	88
Russia	14, 561	69	10	53
Mexico	13,245	77	9	68
Brazil	10,162	74	7	83
China	7,746	74	8	73
Indonesia	3,716	69	6	87
India	3,468	65	4	63
Pakistan	2,550	65	5	55
Nigeria	2,069	52	5	47
Bangladesh	1,529	69	5	70

Source: *Human Development Report 2011*, United Nations. Real GDP is for 2011, expressed in 2005 dollars. Average years of schooling is among adults 25 years and older.

7.2 MEASURING THE COST OF LIVING

THE CONSUMER PRICE INDEX

CONSUMER PRICE INDEX (CPI)

- Measure of the overall level of prices
- Measure of the overall cost of goods and services
- Bought by a typical consumer
- Bureau of Labor Statistics

.

CALCULATING CPI

1. Fix the basket
   - Which goods are most important to the typical consumer
   - Different weight
2. Find the prices: At each point in time
3. Compute the basket's cost
   - Same basket of goods
   - Isolate the effects of price changes
4. Chose a base year and compute the CPI
   - Base year = benchmark
   - Price of basket of goods and services in current year
   - Divided by price of basket in base year
   - Times 100
5. Compute the inflation rate

$$\text{Inflation rate in year 2} = \frac{\text{CPI in year 2} - \text{CPI in year 1}}{\text{CPI in year 1}} \times 100$$

CALCULATING THE CONSUMER PRICE INDEX AND THE INFLATION RATE

Step 1: Survey Consumers to Determine a Fixed Basket of Goods

Basket = 4 hot dogs, 2 hamburgers

Step 2: Find the Price of Each Good in Each Year

Year	Price of Hot Dogs	Price of Hamburgers
2013	$1	$2
2014	2	3
2015	3	4

Step 3: Compute the Cost of the Basket of Goods in Each Year

2013	($1 per hot dog × 4 hot dogs) + ($2 per hamburger × 2 hamburgers) = $8 per basket
2014	($2 per hot dog × 4 hot dogs) + ($3 per hamburger × 2 hamburgers) = $14 per basket
2015	($3 per hot dog × 4 hot dogs) + ($4 per hamburger × 2 hamburgers) = $20 per basket

EXAMPLE

CALCULATING THE CONSUMER PRICE INDEX AND THE INFLATION RATE

Step 4: Choose One Year as a Base Year (2013) and Compute the Consumer Price Index in Each Year	
2013	($8 / $8) × 100 = 100
2014	($14 / $8) × 100 = 175
2015	($20 / $8) × 100 = 250

Step 5: Use the Consumer Price Index to Compute the Inflation Rate from Previous Year	
2014	(175 − 100) / 100 × 100 = 75%
2015	(250 − 175) / 175 × 100 = 43%

EXAMPLE

CPI, PPI AND INFLATION

INFLATION RATE

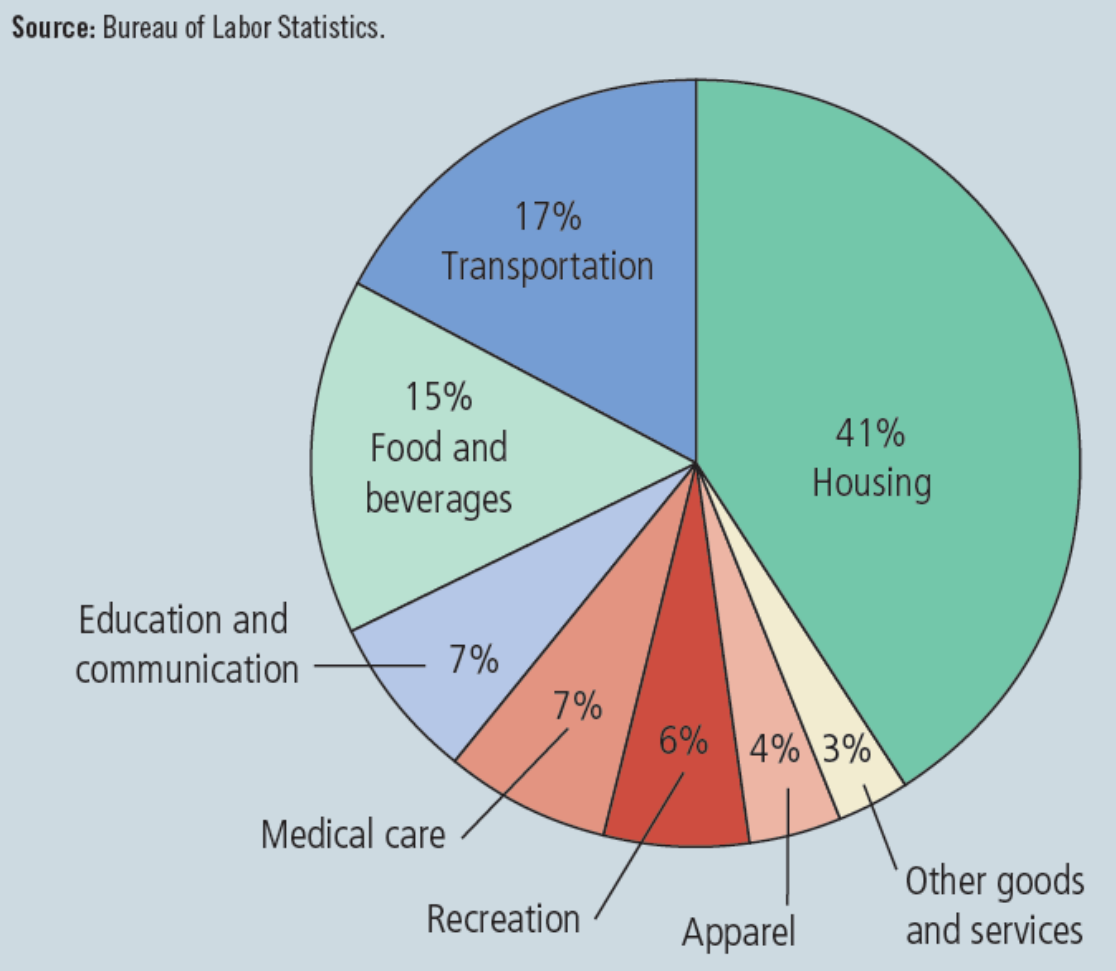
- Percentage change in the price index
- From the preceding period

PRODUCER PRICE INDEX, PPI

- Measure of the cost of a basket of goods and services bought by firms
- Changes in PPI are often thought to be useful in predicting changes in CPI

.

THE TYPICAL BASKET OF GOODS AND SERVICES



This figure shows how the typical consumer divides spending among various categories of goods and services. The Bureau of Labor Statistics calls each percentage the "relative importance" of the category.

PROBLEMS IN MEASURING THE COST OF LIVING

- Substitution bias
  - Prices do not change proportionately
  - Consumers substitute toward goods that have become relatively less expensive
- Introduction of new goods
  - More variety of goods
- Changes in quality remain unmeasured

THE INTRODUCTION OF CELL PHONES AND THE BIAS IN THE CPI

How large is the bias in the CPI due to not immediately incorporating new goods?

Cell phones were introduced in 1983, but not included in the CPI until 1998.

According to Jerry Hausman of MIT, this resulted in an upward bias of the telecommunication component of the CPI of 0.8 to 1.9 percent. The reported increase in telecommunication prices during this period might have actually been a decrease of .8 percent.

Room air conditioners also took 15 years to be included.

Since new products are constantly being introduced, the bias in the CPI can be large.

GDP DEFLATOR VERSUS CPI

GDP deflator

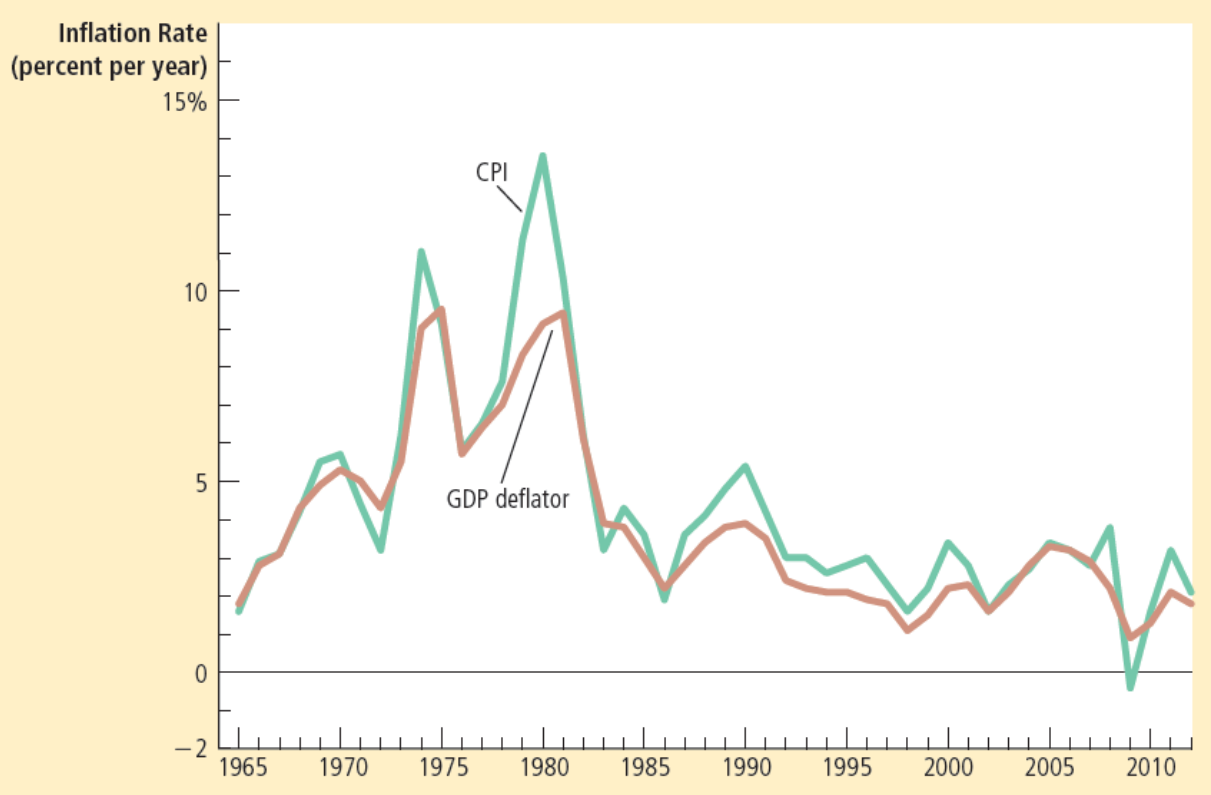
- Ratio of nominal GDP to real GDP
- Reflects prices of all goods & services (g&s) produced domestically
- Compares the price of currently produced g&s to the price of the same g&s in the base year

CPI

- Reflects prices of g&s bought by consumers
- Compares price of a fixed basket of g&s to the price of the basket in the base year

"The price may seem a little high, but you have to remember that's in today's dollars."

TWO MEASURES OF INFLATION



This figure shows the inflation rate—the percentage change in the level of prices— as measured by the GDP deflator and the consumer price index using annual data since 1965.

The two measures of inflation generally move together.

INFLATION

Historical U.S. Inflation Rates

Prices of Selected Goods, 1940s and 2014

Item	1940s Price	2014 Price
Gallon of gasoline	$0.18	$3.07
Loaf of bread	0.08	3.59
Gallon of milk	0.34	3.49
Postage stamp	0.03	0.49
House	6,550	350,000
Car	800	22,000
Haircut in New York City	0.50	50
Movie tickets in New York City	0.25	12.00
Men's tweed sports jacket in New York City	15	189
Snake tattoo on arm	0.25	100.00

SOURCES: Scott Derks, *The Value of a Dollar 1860–1989* (Farmington Hills, MI: Gale Group, 1993) and author's research and estimates.

THE REAL-NOMINAL PRINCIPLE

What matters to people is the real value of money or income—its purchasing power—not its “face” value.

Nominal value:

The face value of an amount of money.

Real value:

The value of an amount of money in terms of what it can buy

CORRECTING ECONOMIC VARIABLES

Dollar figures from different times

$$\text{Amount in today's dollars} =$$

$$= \text{Amount in year T dollars} \times \frac{\text{Price level today}}{\text{Price level in year T}}$$

Indexation

- Automatic correction by law or contract
- Of a dollar amount
- For the effects of inflation
- Cost-of-living adjustments (COLAs): Automatic increases in wages or other payments that are tied to the CPI

REAL AND NOMINAL INTEREST RATES

Nominal interest rate

- Interest rate as usually reported
- Without a correction for the effects of inflation

Real interest rate

- Interest rate corrected for the effects of inflation
- Real interest rate = Nominal interest rate – Inflation rate

Periods of inflation/deflation

- Real interest rate is below/exceeds the nominal interest rate

08

THE REAL ECONOMY

8.1 Production and Growth

8.2 Unemployment

08 IDEA

"Macroeconomics is about growth of the economy and fluctuations in output, employment and the general level of prices. Growth of output is extremely important because it makes higher levels of consumption and living standards possible. Fluctuations in output and prices can retard growth and generate economic hardship. What causes economic fluctuations? What can economic policy do to promote more stability? Why do some countries grow and achieve high levels of income while others remain poor?"

Gwartney et al. (2015) Macroeconomics

08 LEARNING OBJECTIVES

- Explain economic growth
- Calculate economic growth rates
- Explain the determinants of productivity
- Analyze how productivity can be influenced
- Explain the importance of technological progress to economic growth.
- Discuss the sources of technological progress
- Assess the role of government in assisting economic growth
- Define these concepts: the labor force, the labor-force participation rate, unemployment and the unemployment rate
- Distinguish between cyclical, structural, and frictional unemployment
- Describe the costs of unemployment

8.1 PRODUCTION AND GROWTH

MEASURING ECONOMIC GROWTH (1/2)

Real GDP per person

- Living standard; vary widely from country to country

Growth rate

- How rapidly real GDP per person grew in the typical year
- The percentage rate of change from one period to another

$$\text{growth rate} = \frac{(\text{GDP in year 2} - \text{GDP in year 1})}{(\text{GDP in year 1})}$$

$$\text{GDP } [n \text{ years later}] = (1+g)^n(100)$$

MEASURING ECONOMIC GROWTH (2/2)

Rule of 70

- A rule of thumb that says output will double in 70/x years, where x is the percentage rate of growth.

$$\text{years to double} = \frac{70}{(\text{percentage growth rate})}$$

.

THE VARIETY OF GROWTH EXPERIENCES

Country	Period	Real GDP per Person at Beginning of Period[a]	Real GDP per Person at End of Period[a]	Growth Rate (per year)
Japan	1890–2010	$1,517	$34,810	2.65%
Brazil	1900–2010	785	10,980	2.43
Mexico	1900–2010	1,169	14,350	2.31
China	1900–2010	723	7,520	2.15
Germany	1870–2010	2,204	38,410	2.06
Canada	1870–2010	2,397	38,370	2.00
United States	1870–2010	4,044	47,210	1.77
Argentina	1900–2010	2,314	15,470	1.74
India	1900–2010	681	3,330	1.45
United Kingdom	1870–2010	4,853	35,620	1.43
Indonesia	1900–2010	899	4,180	1.41
Pakistan	1900–2010	744	2,760	1.20
Bangladesh	1900–2010	629	1,800	0.96

[a]Real GDP is measured in 2010 dollars.

Source: Robert J. Barro and Xavier Sala-i-Martin, *Economic Growth* (New York: McGraw-Hill, 1995), Tables 10.2 and 10.3; *World Development Indicators* online; and author's calculations.

WHAT IS ECONOMIC GROWTH?

Economic growth means an expanded production possibilities curve (PPC)

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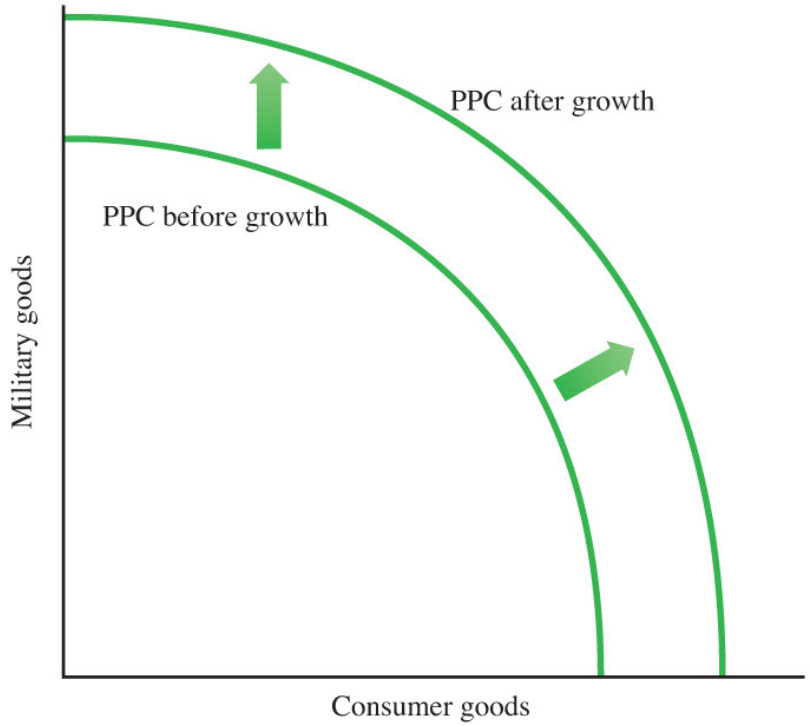


FARMING LAND (BLACK FOREST) NEEDED FOR 1 BREAD

Medieval times

Today

PRODUCTIVITY

PRODUCTIVITY: The quantity of goods and services produced from each unit of labor input

Why productivity is so important

- Key determinant of living standards
- Growth in productivity is the key determinant of growth in living standards
- An economy's income is the economy's output

Determinants of productivity

- Physical capital per worker
- Human capital per worker
- Natural resources per worker
- Technological knowledge

PRODUCTIVITY

Physical capital

- Stock of equipment and structures
- Used to produce goods and services

Human capital

- Knowledge and skills that workers acquire through education, training, and experience

Natural resources

- Inputs into the production of goods and services
- Provided by nature, such as land, rivers, and mineral deposits

Technological knowledge

- Society's understanding of the best ways to produce goods and services

ARE NATURAL RESOURCES A LIMIT TO GROWTH?

Argument

- Natural resources - will eventually limit how much the world's economies can grow
- Fixed supply of nonrenewable natural resources – will run out
- Stop economic growth and force living standards to fall

Technological progress

- Often yields ways to avoid these limits
- Improved use of natural resources over time
- Recycling
- New materials

Are these efforts enough to permit continued economic growth?

ARE NATURAL RESOURCES A LIMIT TO GROWTH?

Prices of natural resources

- Scarcity - reflected in market prices
- Natural resource prices
  - Substantial short-run fluctuations
  - Stable or falling - over long spans of time
- Our ability to conserve these resources
  - Growing more rapidly than their supplies are dwindling

.

DIMINISHING RETURNS

Higher savings rate

- Fewer resources – used to make consumption goods
- More resources – to make capital goods
- Capital stock increases
- Rising productivity, more rapid growth in GDP

Diminishing returns

- Benefit from an extra unit of an input declines as the quantity of the input increases

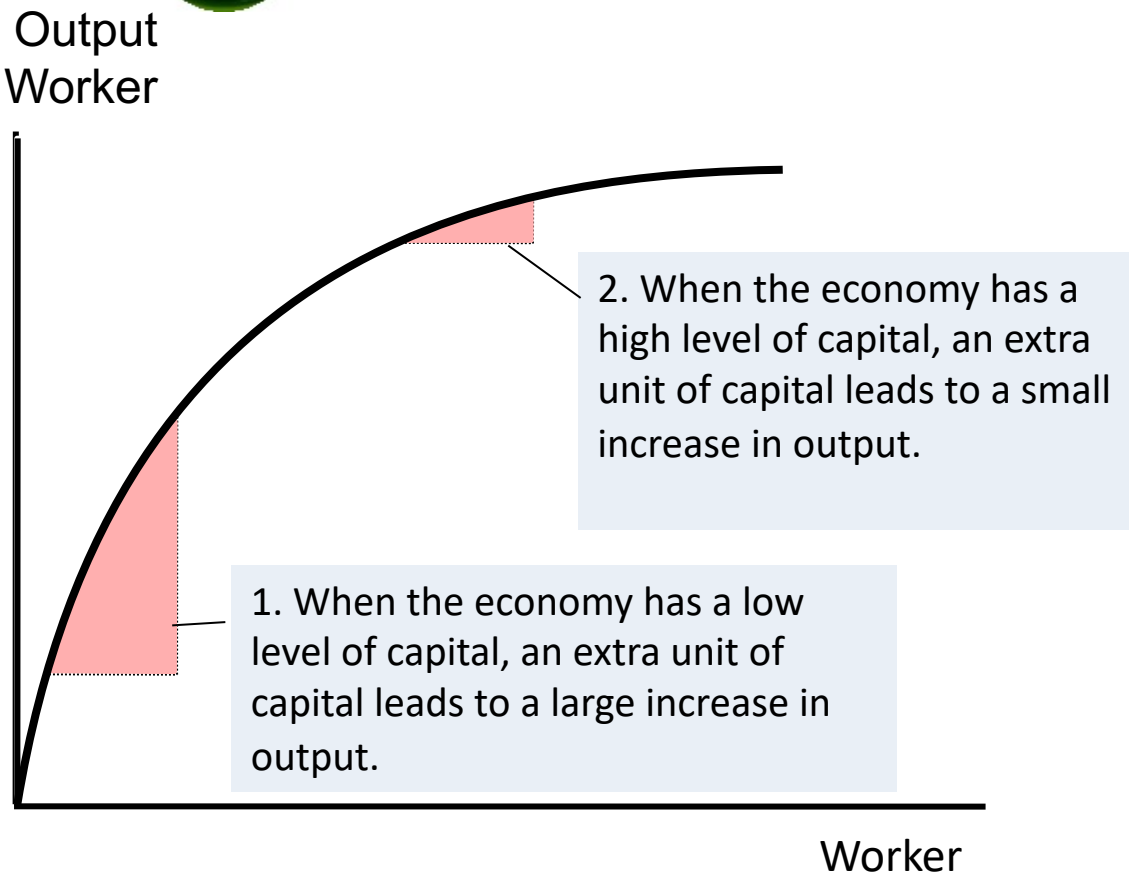
In the long run, higher savings rate

- Higher level of productivity
- Higher level of income
- Not higher growth in productivity or income

DIMINISHING RETURNS

#2

Illustrating the Production Function: This figure shows how the amount of capital per worker influences the amount of output per worker. Other determinants of output, including human capital, natural resources, and technology, are held constant. The curve becomes flatter as the amount of capital increases because of diminishing returns to capital.



DIMINISHING RETURNS

Poor countries

- Low productivity
- Even small amounts of capital investment increase workers' productivity substantially
- Tend to grow faster than rich countries

Catch-up effect

- Countries that start off poor tend to grow more rapidly than countries that start off rich

Rich countries

- High productivity
- Additional capital investment has a small effect on productivity

BEHAVIORAL INCENTIVES IN DEVELOPMENT

How can we persuade very poor people in developing countries to immunize their children?

- Public health officials in India noticed that parents typically would begin to get vaccines for their children, but often failed to finish the entire sequence of vaccines. Were their incentives that might work?
- Duflo/Banerjee of MIT persuaded a group trying to increase immunizations to experiment with economic incentives.
- In the experiment, parents would receive some dal (a common Indian food) after each shot for their children. When they completed the entire sequence of shots, they would receive a set of cooking pans.
- The incentive worked extremely well in increasing the success rate for immunizations.

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EXAMPLE

PROPERTY RIGHTS, POLITICAL STABILITY

To foster economic growth

- Protect property rights: Ability of people to exercise authority over the resources they own
- Courts – enforce property rights

Property rights

- Prerequisite for the price system to work
- Promotes political stability

.

PROPERTY RIGHTS, POLITICAL STABILITY

- Lack of property rights
  - Major problem
  - Contracts are hard to enforce
  - Fraud goes unpunished
  - Corruption: Impedes the coordinating power of markets, discourages domestic saving and investment from abroad
- Political instability
  - A threat to property rights
  - Revolutions and coups
  - Revolutionary government might confiscate the capital of some businesses
  - Domestic residents - less incentive to save, invest, and start new businesses
  - Foreigners - less incentive to invest

LACK OF PROPERTY RIGHTS HINDERS GROWTH IN PERU

Why are clear property rights important for economic growth in developing countries?

Throughout the developing world, property is often not held with clear title. Without clear title, property cannot be used as collateral for loans.

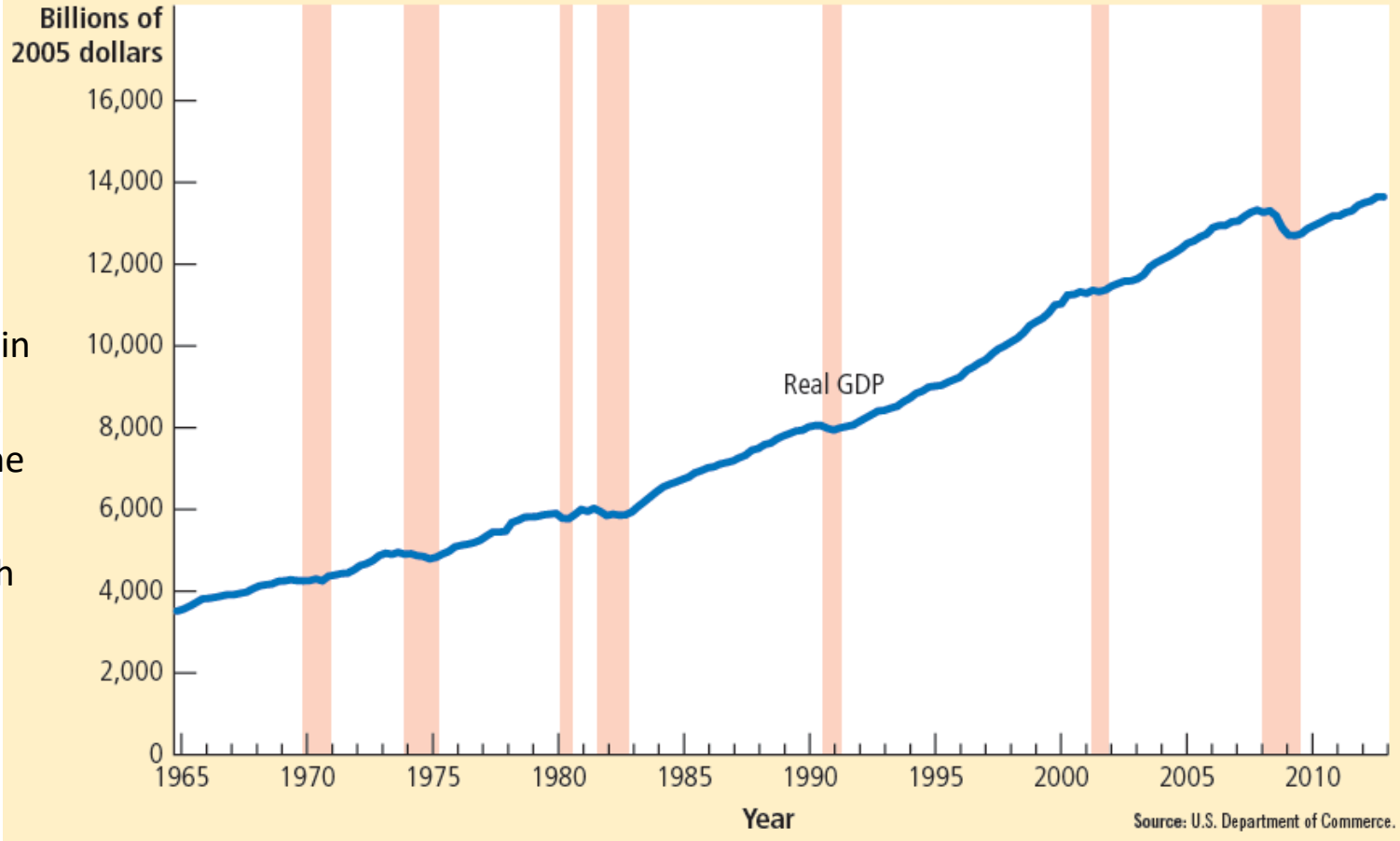
- Result: The poor living on very valuable land may be unable to borrow against that land to start a new business.
- Producing palm oil in Peru is very profitable, but it depends upon the ability to borrow funds.
- Production of coca paste—an ingredient to cocaine—does not take as much time and does not depend on finance.
- Switching farmers away from production of coca paste to palm oil also requires improvements in finance, which are very difficult without clear property rights.

CASE STUDY

ECONOMIC FLUCTUATIONS

ECONOMIC FLUCTUATIONS OR BUSINESS CYCLES

Short-run changes in the growth of GDP.
We can examine the business cycle by comparing the path of real GDP to a trend line



The US GDP data: real GDP grows over time: average 3% per year since 1965; growth is not steady; GDP growth interrupted by recessions

ECONOMIC FLUCTUATIONS

RECESSION: Commonly defined as six consecutive months (two consecutive quarters) of declining real GDP

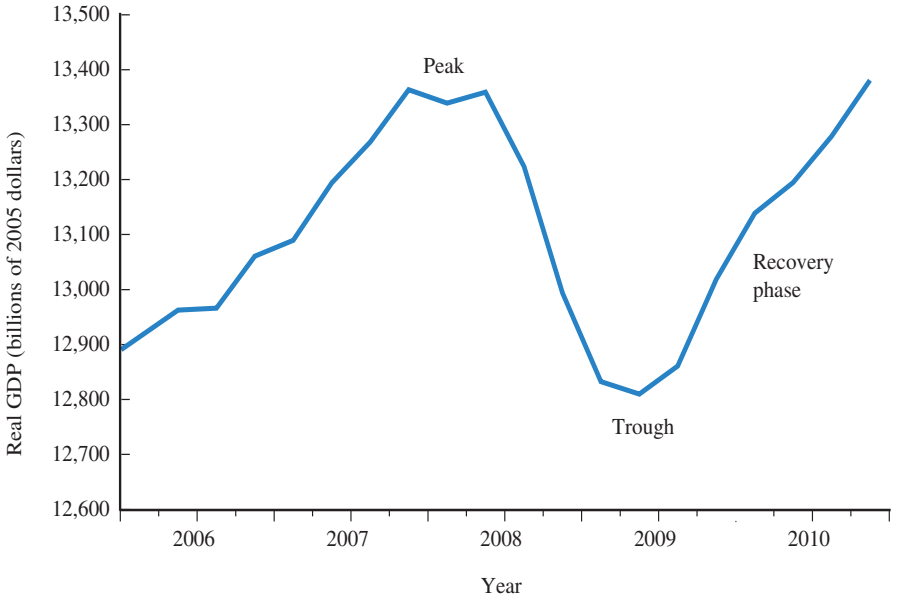
- Real GDP declines
- Lower income
- Rising unemployment
- Falling profits
- Increased bankruptcies

PEAK: The date at which a recession starts.

TROUGH: The date at which output stops falling in a recession.

EXPANSION: The period after a trough in the business cycle during which the economy recovers.

DEPRESSION: The common name for a severe recession



ECONOMIC FLUCTUATIONS

TABLE 5.5 Eleven Postwar Recessions

Peak	Trough	Percent Decline in Real GDP	Length of Recession (months)
November 1948	October 1949	−1.5	11
July 1953	May 1954	−3.2	10
August 1957	April 1958	−3.3	8
April 1960	February 1961	−1.2	10
December 1969	November 1970	−1.0	11
November 1973	March 1975	−4.1	16
January 1980	July 1980	−2.5	6
July 1981	November 1982	−3.0	16
July 1990	March 1991	−1.4	8
March 2001	November 2001	−0.6	8
December 2007	June 2009	−4.1	18

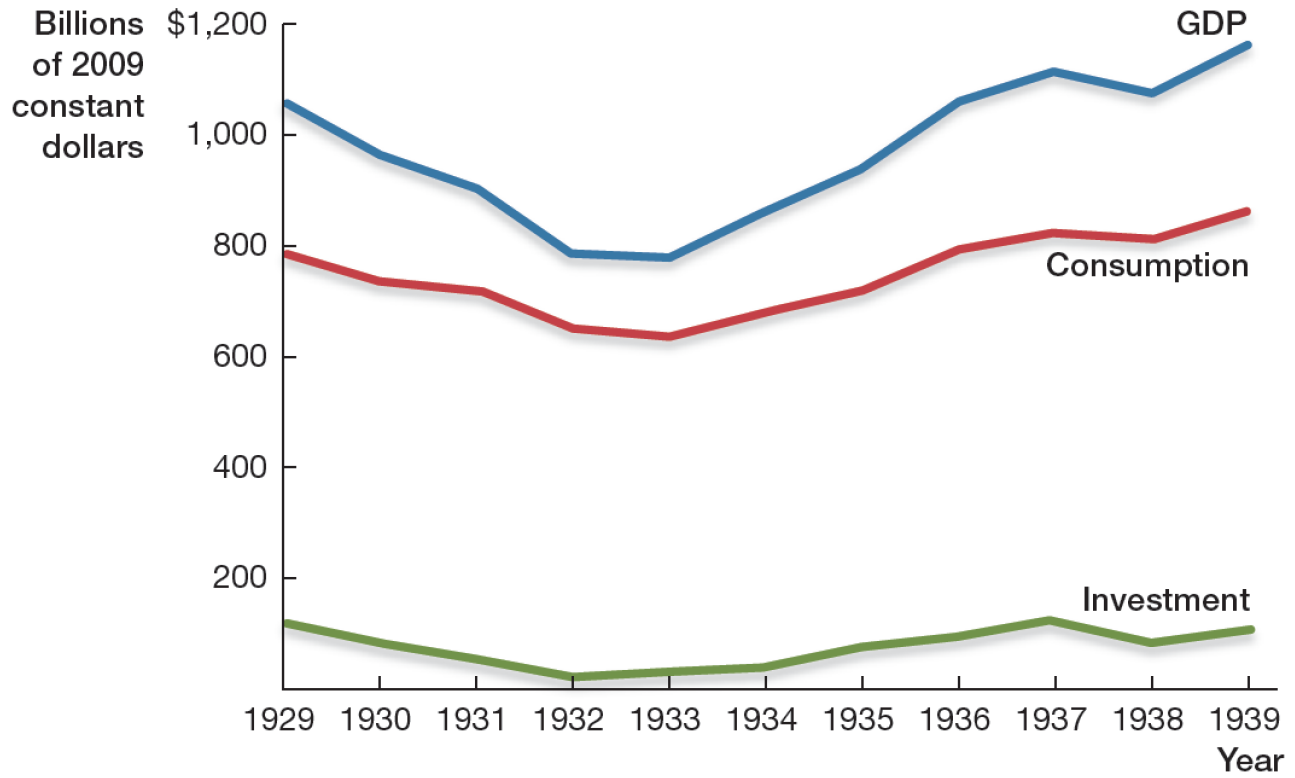
SOURCE: National Bureau of Economic Research, "Business Cycle Expansions and Contractions," www.nber.org/cycles/cyclesmain.html.

ECONOMIC FLUCTUATIONS HAVE THREE KEY FEATURES

FRANKFURT UNIVERSITY OF APPLIED SCIENCES

1. Co-movement
   - Many aggregate macroeconomic variables grow or contract together during booms and busts
   - Variables such as real consumption, real investment, and employment move positively (or together) with real GDP
   - Variables such as unemployment move negatively real GDP
2. Limited predictability
   - Recessions/expansion do not follow a repetitive, easily predictable pattern
   - It is impossible to forecast when the expansion/recession will end
3. Persistence
   - Even though the beginnings and ends of recessions are somewhat unpredictable, economic growth is not random but persistent
   - When the economy is growing/contracting, it will probably keep growing/contracting the following quarter

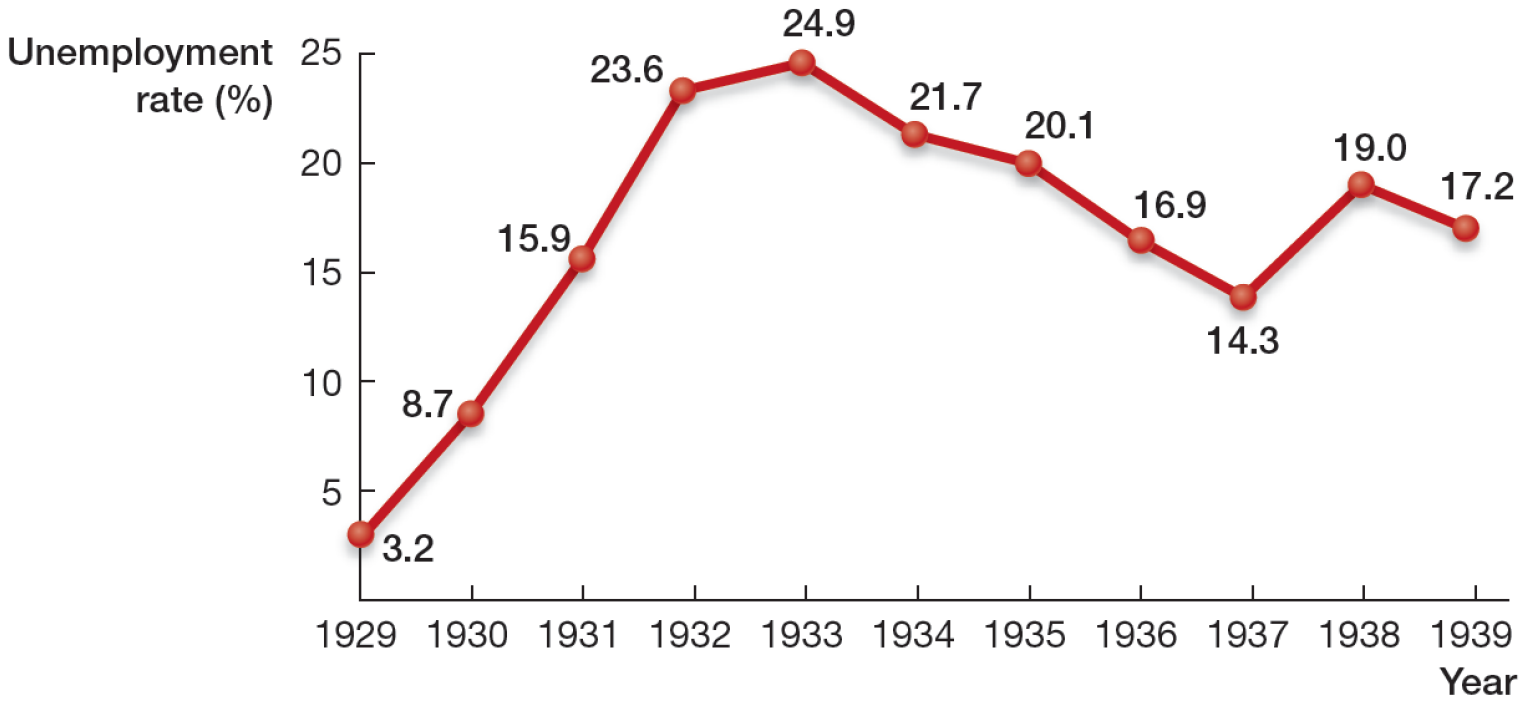
ECONOMIC FLUCTUATIONS - THE GREAT DEPRESSION OF 1929–1933



(a) Real GDP, real consumption, and real investment from 1920 to 1939

CASE STUDY

ECONOMIC FLUCTUATIONS - THE GREAT DEPRESSION OF 1929–1933



(b) Unemployment rate from 1929 to 1939

CASE STUDY

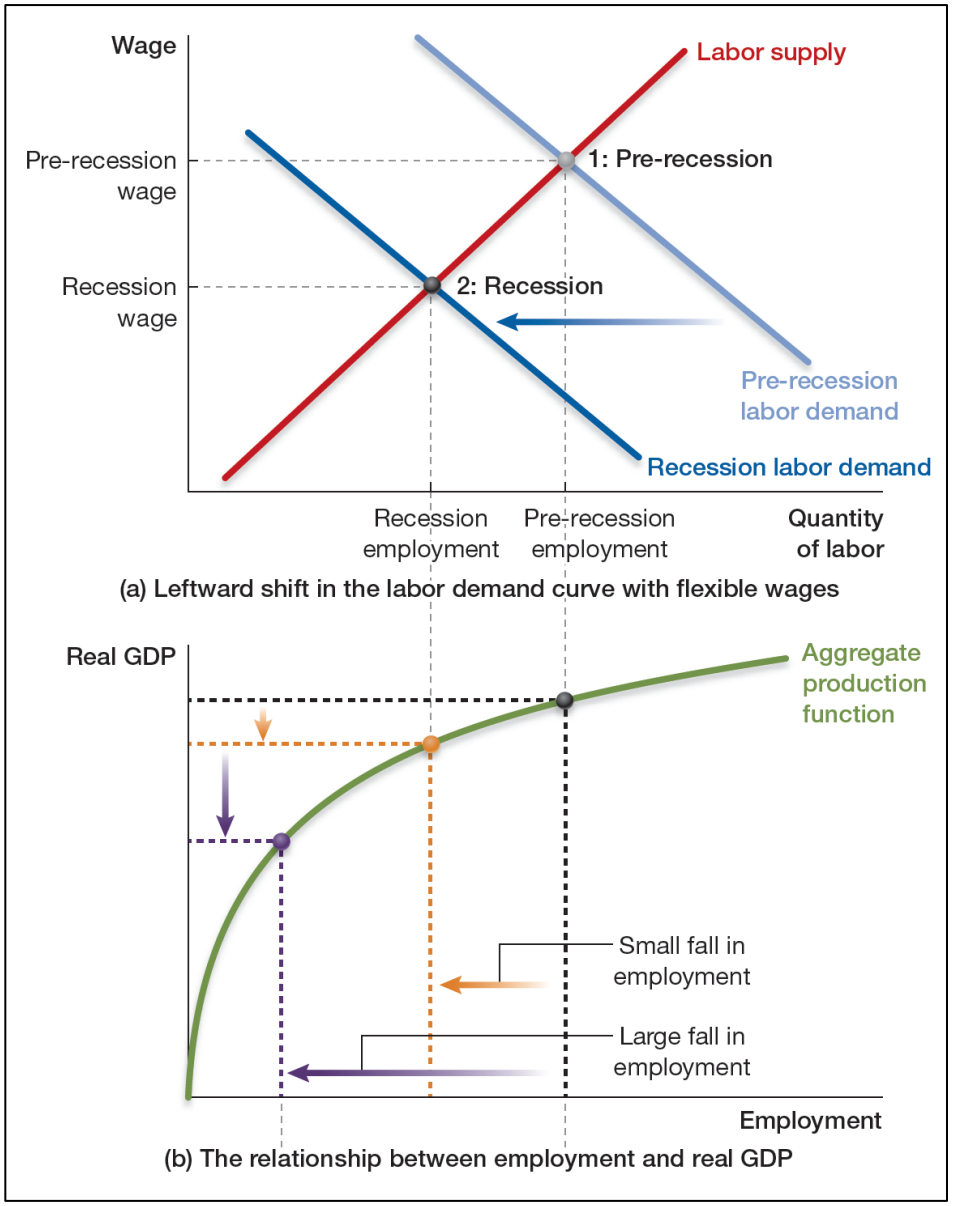
ECONOMIC FLUCTUATIONS - THE GREAT DEPRESSION OF 1929–1933

(c) Dow Jones Industrial average from 1920 to 1939

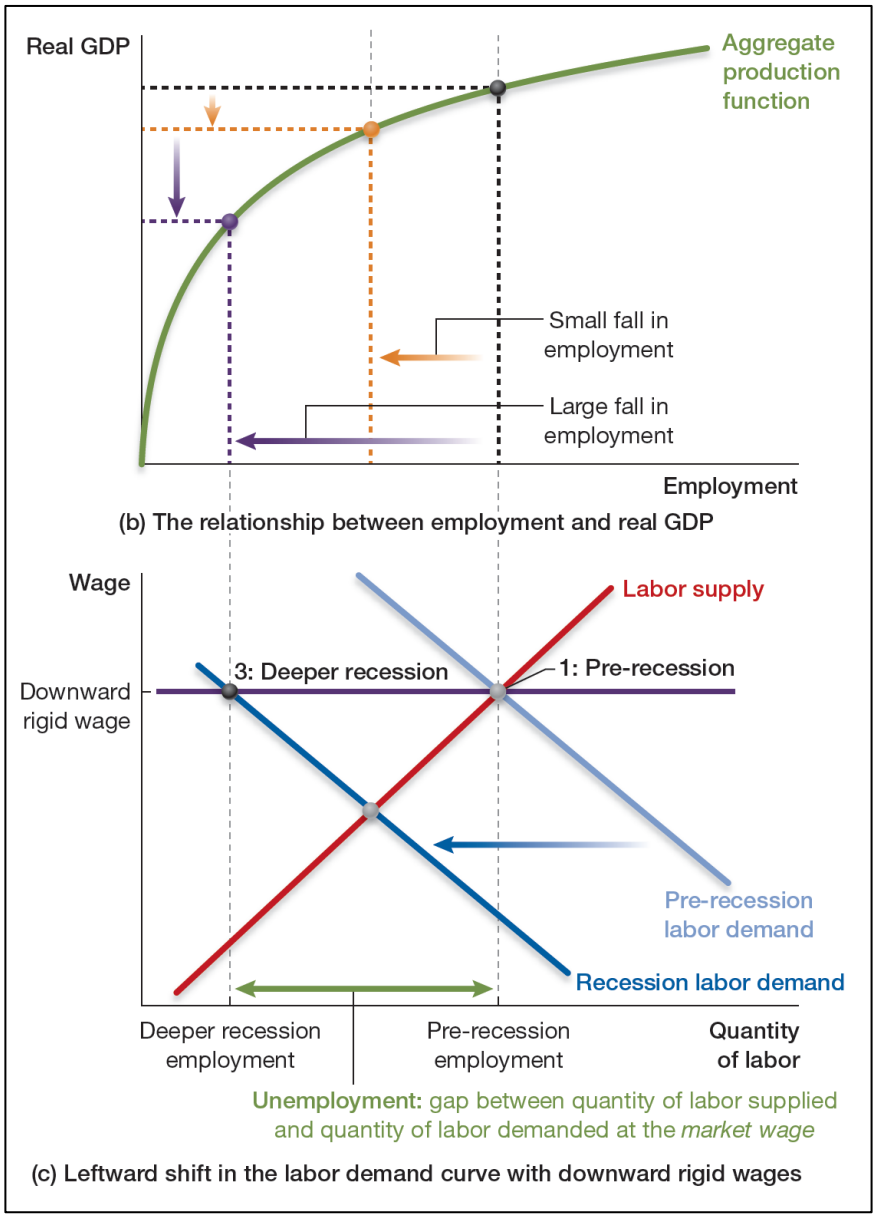
CASE STUDY

WHY ARE THERE ECONOMIC FLUCTUATIONS?

- Economic fluctuations occur because of technology shocks, changing sentiments, and monetary/financial factors
- At the beginning of a recession, the labor demand curve shifts to the left due to:
  - A fall in output prices
  - A decrease in output demand
  - A decrease in labor productivity
  - A rise in input prices
- In the case of a recession, if wages are flexible, the leftward shift in the labor demand curve will lead to a fall in wages and a decrease in the quantity of labor
- As a result, real GDP will decrease



MACROECONOMIC EQUILIBRIUM AND ECONOMIC FLUCTUATIONS #1



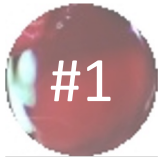
MACROECONOMIC EQUILIBRIUM AND ECONOMIC FLUCTUATIONS #2

If wages are downward rigid, the leftward shift in the labor demand curve will lead to no change in the wage rate and a larger decrease in the quantity of labor.

As a result, output will decrease more under downward rigid wages than under flexible wages.

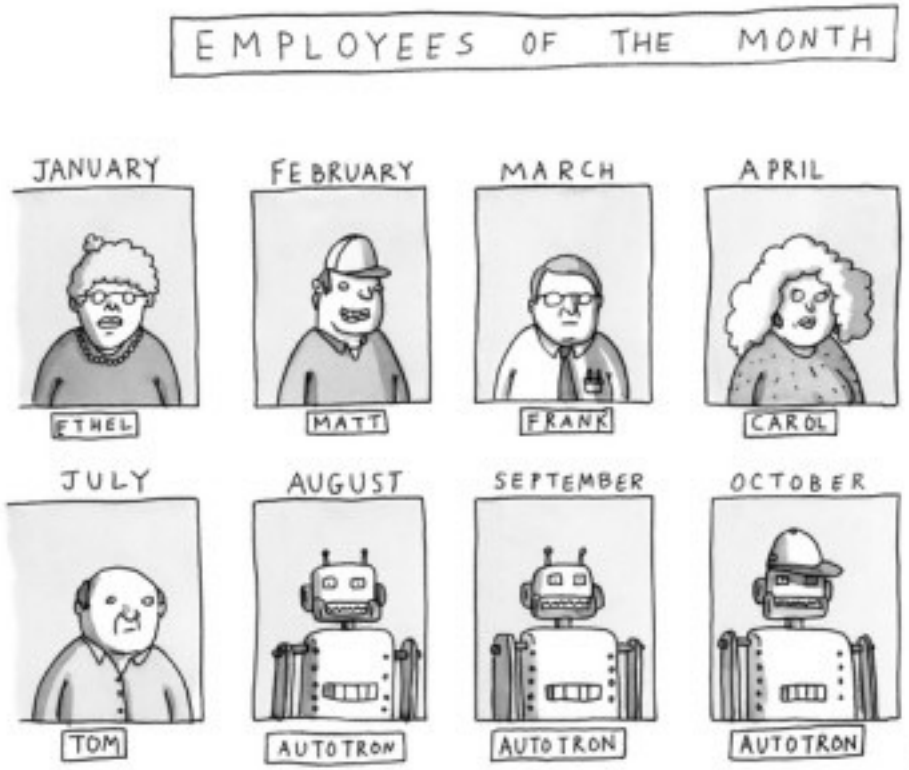
8.2 UNEMPLOYMENT

IDENTIFYING UNEMPLOYMENT

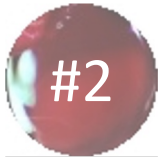


Employed

- Those who worked
- Paid employees
- In their own business
- Unpaid workers in a family member's business
- Full-time and part-time workers
- Temporarily absent
- Vacation, illness, bad weather



IDENTIFYING UNEMPLOYMENT



Unemployed

Individuals who do not currently have a job but are actively looking for work.

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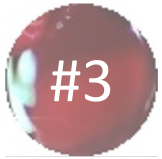
- Those who are not employed
- Available for work
- Actively looking is critical

IDENTIFYING UNEMPLOYMENT



Non-active population (not in the “labor-force”)

- Not employed and not unemployed
- Full-time students
- Homemakers
- Retirees

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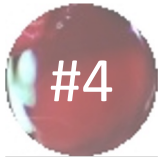
“I can’t afford to retire.”

S. GROSS

IDENTIFYING UNEMPLOYMENT



The ILO Labour Force Concept[1]

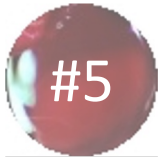
Active population		Non-active population
Employed	**Unemployed**	
▪ **15 – 74 years old** and ▪ **worked for at least one hour during per week** or ▪ **with a job-contract, but not at work** or ▪ **self-employed** or ▪ **unpaid familiy worker**	▪ **15 – 74 years old** ▪ **without work** (or less than one hour) and ▪ **actively seeking job in the last four weeks** and ▪ currently **available for work** (2 weeks)	▪ **not employed** and ▪ **not unemployed**

[1] As implemented in the EU Labour Force Survey.

The ILO Labour Force Concept* differs from the national unemployment statistics

*Erwerbspersonen= Erwerbstätige+Erwerbslose <-> Nichterwerbspersonen

IDENTIFYING UNEMPLOYMENT



Labor force

- Total number of workers, employed and unemployed = active population
- = Number of employed + Number of unemployed

Unemployment rate

- Percentage of labor force that is unemployed

$$\text{Unemployment rate} = \frac{\text{Number of unemployed}}{\text{Labor force}} \times 100$$

CATEGORIES OF UNEMPLOYMENT (1/3)

- **NATURAL RATE OF UNEMPLOYMENT**
  - The level of unemployment at which there is no cyclical unemployment
  - Consists of only frictional, seasonal and structural unemployment
  - The economist's notion of what the rate of unemployment should be when there is full employment

- **FULL EMPLOYMENT**
  - The level of unemployment that occurs when the unemployment rate is at the natural rate

.

CATEGORIES OF UNEMPLOYMENT (2/3)

- **FRICTIONAL UNEMPLOYMENT**: Unemployment that occurs with the normal workings of the economy, such as workers taking time to search for suitable jobs and firms taking time to search for qualified employees
- **STRUCTURAL UNEMPLOYMENT**: Unemployment that occurs when there is a mismatch of skills and jobs
- **SEASONAL UNEMPLOYMENT: T**he component of unemployment attributed to seasonal factors
- **CYCLICAL UNEMPLOYMENT**: Unemployment that occurs during fluctuations in real GDP

CATEGORIES OF UNEMPLOYMENT (3/3)

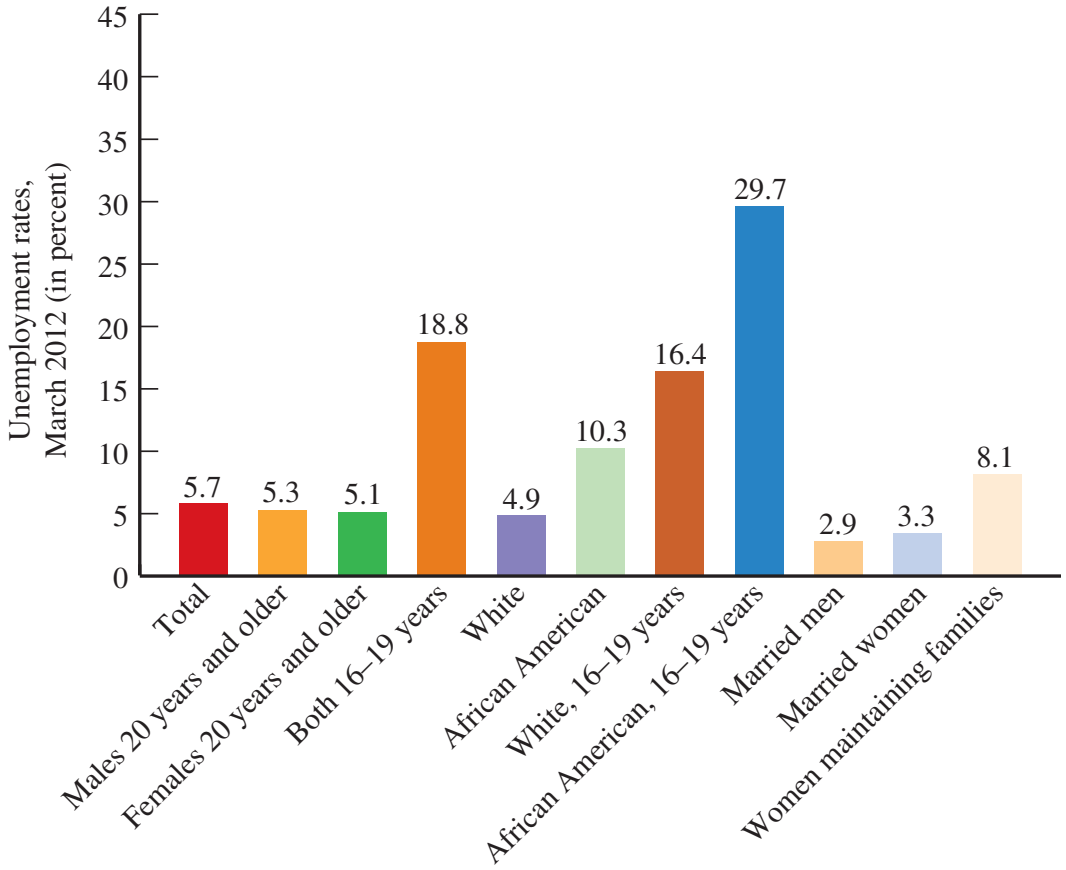
Type of Unemploy-ment	Healthy/ Unhealthy	Problem that Needs Addressing?	Cause
Frictional	Healthy	No	Normal, healthy market adjustments of demand and supply
Structural	Healthy	Yes (worker retraining)	Technological change, inter-national competition, resource depletion
Seasonal	Neutral	No	Weather and seasons
Cyclical	Unhealthy	Yes (fiscal or monetary policy)	Business cycles

THE LABOR-MARKET EXPERIENCES OF VARIOUS DEMOGRAPHIC GROUPS

#1

Who Are the Unemployed?

The incidence of un-employment differs sharply among demographic groups



SOURCE: Bureau of Labor Statistics, U.S. Department of Labor, 2015

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THE LABOR-MARKET EXPERIENCES OF VARIOUS DEMOGRAPHIC GROUPS

Unemployment/labor-force participation rate of the U.S. population 2012

Demographic Group	Unemployment Rate	Labor-Force Participation Rate
Adults of Prime Working Age (ages 25–54)		
White, male	6.2%	90.0%
White, female	6.4	74.7
Black, male	12.7	80.5
Black, female	11.3	76.2
Teenagers (ages 16–19)		
White, male	24.5	36.7
White, female	18.4	37.1
Black, male	41.3	25.6
Black, female	35.6	28.2

Source: Bureau of Labor Statistics.

SOCIAL NORMS, UNEMPLOYMENT, AND PERCEIVED HAPPINESS

Are you less upset about being unemployed if unemployment is common in your peer group?

Individuals do not like to become unemployed. A seven year British study showed that:

- Well-being declines when we become unemployed
- If employed, having peers lose their job also decreases happiness
- Interestingly, losing one's job causes less of a decrease in well-being if peers were also unemployed: In other words, misery loves company

Why is this significant?

- The more unhappy an unemployed person is, the more aggressive they are about finding another job
- If your peer group is unemployed, you may be less aggressive about trying to find another job

CASE STUDY

LESS UNEMPLOYMENT INSURANCE, MORE EMPLOYMENT?

Did reductions in unemployment insurance lead to more rapid growth in employment in 2014?

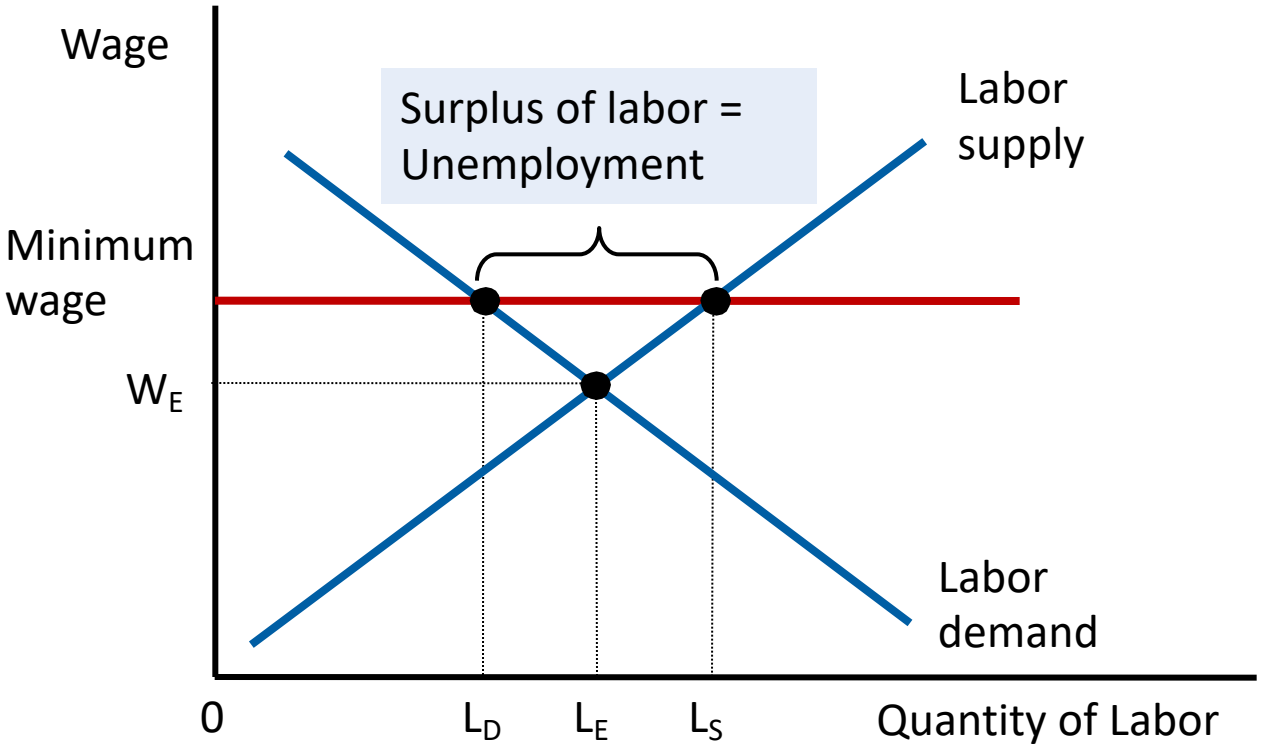
- Higher unemployment benefits do reduce the incentive to search for new jobs and increase unemployment.
- Economists Marcus Hagedorn, Kurt Mitman, and Lourii Manovskii used a sudden policy change to address this issue.
- The federal government had provided subsidies to states to extend the number of weeks of unemployment, but after December 2013, almost all states reduced the benefits to 26 weeks.
- They compared employment growth in high and low benefit states before and after the change. They found that the states that had reduced benefits the most grew faster.

CASE STUDY

MINIMUM-WAGE LAWS

- Structural unemployment
  - Number of jobs – insufficient
- Minimum-wage laws
  - Can cause unemployment
  - Forces the wage to remain above the equilibrium level
    - Higher quantity of labor supplied
    - Smaller quantity of labor demanded
    - Surplus of labor = unemployment

UNEMPLOYMENT FROM A WAGE ABOVE THE EQUILIBRIUM LEVEL



The wage at which supply and demand balance is WE. Here, the quantity of labor supplied and the quantity of labor demanded both equal LE. By contrast, if the wage is forced to remain above the equilibrium level, (eg minimum-wage law), the quantity of labor supplied rises to LS, and the quantity of labor demanded falls to LD. The resulting surplus of labor, LS – LD, represents unemployment.

UNIONS & COLLECTIVE BARGAINING

- Union
  - Worker association
  - Bargains with employers over wages, benefits, and working conditions
  - Raises the wage above the equilibrium level
- Collective bargaining: Process by which unions and firms agree on the terms of employment
- Strike
  - Organized withdrawal of labor from a firm by a union
  - Reduces production, sales, and profit
- Union workers in the US: Earn 10-20% more than similar workers who do not belong to unions

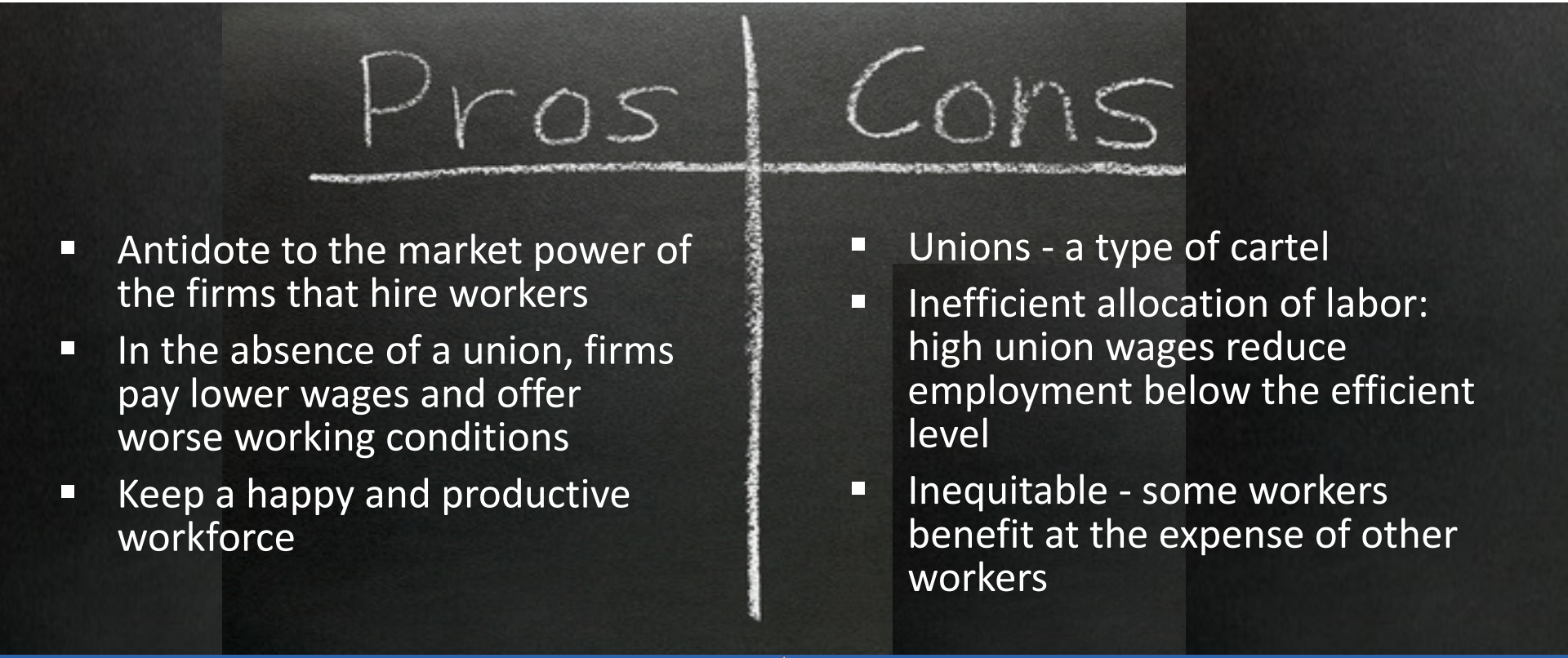
INSIDER-OUTSIDER THEORY

INSIDER-OUTSIDER THEORY

- Insiders get market power, use that power and their activities affect the outsiders
- "Insiders“: Incumbent employees whose jobs are protected by various labor turnover costs
- “Outsiders“: Are either unemployed or work in the informal sector
- Due to insiders’ actions (reap the benefit), outsiders bear some of the cost and may stay unemployed or take jobs in firms that are not unionized

UNIONS & COLLECTIVE BARGAINING

Are unions good or bad for the economy?



- Antidote to the market power of the firms that hire workers
- In the absence of a union, firms pay lower wages and offer worse working conditions
- Keep a happy and productive workforce

- Unions - a type of cartel
- Inefficient allocation of labor: high union wages reduce employment below the efficient level
- Inequitable - some workers benefit at the expense of other workers

THEORY OF EFFICIENCY WAGES

EFFICIENCY WAGES: Above-equilibrium wages paid by firms

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THEORY OF EFFICIENCY WAGES

Worker health

- Better paid workers
- Eat a more nutritious diet
- Healthier and more productive

Worker turnover

- Firm can reduce turnover among its workers

Worker quality

- Attracts a better pool of workers
- Increases the quality of its workforce

Worker effort

- High wages make workers more eager to keep their jobs
- Give workers an incentive to put forward their best effort

FORD'S EFFICIENCY WAGE

Production

- Model T Ford
- Introduced modern techniques of production, built cars on assembly lines
- Unskilled workers were taught to perform the same simple tasks over and over again

Henry Ford and the very generous $5-a-day wage

- 1914, Ford: the $5 workday
  - Ford's high-wage policy: efficiency wage
  - Twice the going wage
- Long lines of job seekers

CASE STUDY

FORD'S EFFICIENCY WAGE

Consequences

- High worker effort; Ford's use of the assembly line - highly interdependent workers
- Turnover fell
- Absenteeism fell
- Productivity rose
- Workers – so much more efficient; Ford's production costs were lower despite higher wages
- Profitable for the firm

CASE STUDY

09

MONEY AND PRICES

9.1 The Monetary System

9.2 International Finance

09 IDEA

What roles do commercial banks and the central bank play in the process of money creation and implementation of monetary policies? What impact has the financial international environment on the firm' performance?

An understanding of the financial impact of forces in the global economic environment on businesses and industries is necessary for managers to make strategic decisions and assess risk.

09 LEARNING OBJECTIVES

- Explain the three properties of money
- Recall the different money aggregates
- Explain where the money comes from and where it goes
- Discuss how the money multiplier works
- Evaluate the reasons of banks holding excess reserves
- Discuss how the price of foreign exchange is determined by demand and supply
- Distinguish between the nominal and real exchange rate
- Evaluate consequences of appreciation/depreciation of a currency

9.1 THE MONETARY SYSTEM

WHAT IS MONEY?

Three Properties of Money

1. MONEY SERVES AS A MEDIUM OF EXCHANGE

- Medium of exchange: Any item that buyers give to sellers when they purchase goods and services.
- Barter: The exchange of one good or service for another.
- Double coincidence of wants: The problem in a system of barter that one person may not have what the other desires.

PRINCIPLE OF VOLUNTARY EXCHANGE

A voluntary exchange between two people makes both people better off.

WHAT IS MONEY?

Three Properties of Money

2. MONEY SERVES AS A UNIT OF ACCOUNT

- Unit of account

A standard unit in which prices can be stated and the value of goods and services can be compared.

3. MONEY SERVES AS A STORE OF VALUE

- Store of value

The property of money that holds that money preserves value until it is used in an exchange.

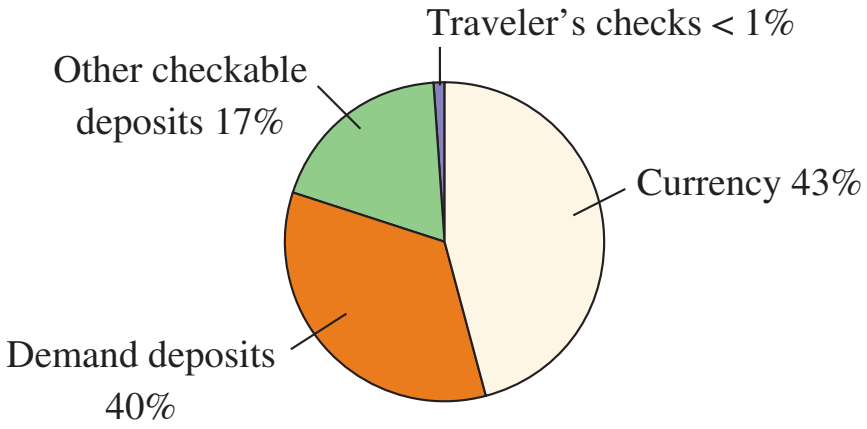
WHAT IS MONEY?

Measuring Money in the U.S. Economy

M1: The sum of **currency** in the hands of the public, **demand deposits, other checkable deposits**, and **traveler's checks**.

Currency is the largest component of M1, the most basic measure of money.

Demand and other checkable deposits are the next largest components.



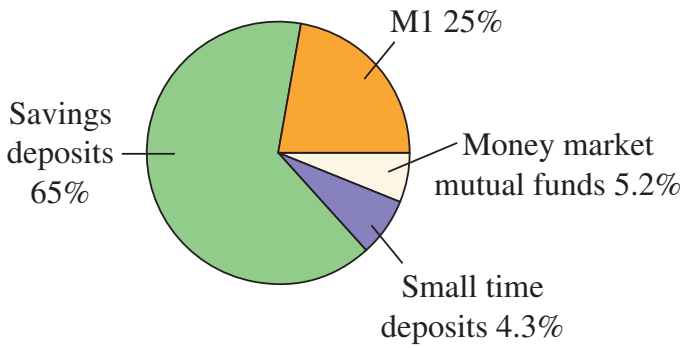
Components of M1, February 2015	
Currency held by the public	$1,272 billion
Demand deposits	1210 billion
Other checkable deposits	503 billion
Traveler's checks	3 billion
Total of M1	2,988 billion

WHAT IS MONEY?

Measuring Money in the U.S. Economy

M2: **M1** plus other assets, including **deposits in savings** and loans accounts and **money market mutual funds**.

Savings deposits are the largest component of M2, followed by M1, small time deposits, and money market mutual funds.



Components of M2 in the United States

WHERE IS ALL THE CURRENCY?

January 2013: $1.1 trillion currency outstanding

- Implies the average adult holds about $4,490 of currency
- Much of the currency is held abroad
- Much of the currency is held by drug dealers, tax evaders, and other criminals

Currency is not a particularly good way to hold wealth

- Can be lost or stolen; doesn't earn interest

CASH AS A SIGN OF TRUST

Why did Greek citizens start holding large amounts of cash in 2015?

There are many reasons to hold some part of your wealth in cash such as for convenience, when making small purchases. But in the case of Greece, increased holding of cash occurred because of widespread fear of a major financial catastrophe.

In early 2015, residents began withdrawing funds for fear the country would be forced to abandon the currency, the euro and return to the old currency, the drachma, but at a reduced value.

They feared the banks would simply convert their accounts to the drachma and they would lose value. By withdrawing cash and storing it, they could later use it in other parts of Europe or convert it back to larger amounts of the local currency. Holding cash was a sign of lack of trust in the overall financial system.

CASE STUDY

A BANK'S BALANCE SHEET: WHERE THE MONEY COMES FROM AND WHERE IT GOES

The figure shows a hypothetical balance sheet for a bank holding 10 percent in required reserves, $200. Banks don't earn interest on their reserves, so they will usually want to loan out any excess of the amounts they are required to hold. This bank has loaned out all of its excess reserves, $2,000.

Assets	Liabilities
$ 200 Reserves	$2,000 Deposits
$2,000 Loans	$ 200 Owners' equity
Total: $2,200	Total: $2,200

A BANK'S BALANCE SHEET: WHERE THE MONEY COMES FROM AND WHERE IT GOES

- **RESERVES**

  The portion of banks' deposits set aside in either vault cash or as deposits at the Federal Reserve.

- **REQUIRED RESERVES**

  The specific fraction of their deposits that banks are required by law to hold as reserves.

- **EXCESS RESERVES**

  Any additional reserves that a bank holds above required reserves.

  .

FRACTIONAL-RESERVE BANKING

Banks hold only a fraction of deposits in reserve

- Banks create money
  - Assets
  - Liabilities
- Increase in money supply
- Does not create wealth

The simple case of 100% reserve banking

- All deposits are held as reserves
- Banks do not influence the supply of money

First National Bank

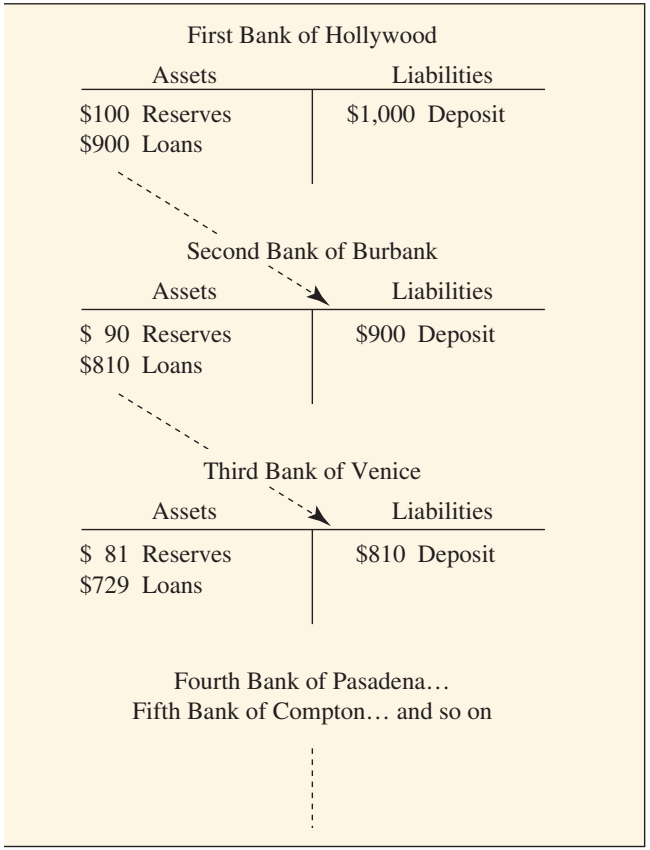
Assets		Liabilities	
Reserves	$100.00	Deposits	$100.00

HOW BANKS CREATE MONEY

RESERVE RATIO: The ratio of reserves to deposits

The figure shows how an initial deposit of $1,000 can expand the money supply. The first three banks in the figure loaned out all their excess reserves and the borrowers deposited the full sum of their loans.

In the real world, though, people hold part of their loans as cash and banks don't necessarily loan out every last dime of their excess reserves. Consequently, a smaller amount of money will be created than what's shown here.



Process of Deposit Creation: Changes in Balance Sheets

HOW BANKS CREATE MONEY

How the Money Multiplier Works

MONEY MULTIPLIER: Amount of money the banking system generates with each dollar of reserves

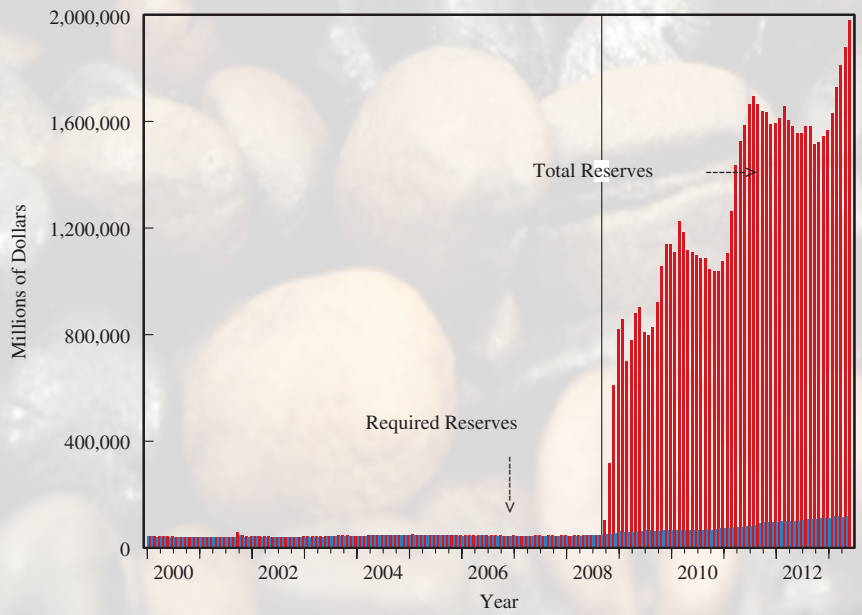
Reciprocal of the reserve ratio = 1/R (The higher the reserve ratio, the smaller the money multiplier)

$$\text{total increase in checking account balance throughout all banks} = (\text{initial cash deposit}) \times \frac{1}{(\text{reserve ratio})}$$

How the Money Multiplier Works in Reverse: The money multiplier working in reverse decreases the money supply.

THE GROWTH IN EXCESS RESERVES

Why have banks recently started to hold vast amounts of excess reserves?



Required and Total Reserves of Banks

Until September of 2008, banks held few excess reserves so total reserves (in red) were very close to required reserves (in purple).

In response to the financial crisis of 2008, the Fed injected large amounts of reserves into the system and began paying interest on reserves in October.

As a result, excess reserves rose and total reserves now exceed required reserves.

CASE STUDY

THE CENTRAL BANK

The central bank is the government institution that:

- Monitors financial institutions
- Controls certain key interest rates
- Indirectly controls the money supply

These activities are known as **MONETARY POLICY**

Find examples of monetary policy in recent history. What was the purpose?

9.2 INTERNATIONAL FINANCE

EXCHANGE RATES

- **NOMINAL EXCHANGE RATE:** is the rate at which one country's currency can be exchanged for the currency of another country
  - The nominal exchange rate is the price of one (domestic) country's currency in units of another (foreign) country's currency:

$$e = \frac{\text{Units of foreign currency}}{\text{1 Unit of domestic currency}}$$

  - Can be written as the price of another (foreign) country's currency in units of one (domestic) country's currency

$$\frac{1}{e} = \frac{\text{Units of domestic currency}}{\text{1 Unit of foreign currency}}$$

EXCHANGE RATES

- An increase in the value of a currency relative to the currency of another nation is called an **APPRECIATION** *of a* currency.
- When a nominal exchange rate rises, we say that the domestic currency is appreciating.

$$e = \frac{\text{Units of foreign currency}}{1 \text{ Unit of domestic currency}}$$

- A decrease in the value of a currency relative to the currency of another nation is called a **DEPRECIATION** *of a* currency.
- When a nominal exchange rate falls, we say that the domestic currency is depreciating.

EXCHANGE RATES

There is a nominal exchange rate for each currency pair.

	British Pound Versus Dollar	Euro Versus Dollar	Mexican New Peso Versus Dollar	Swiss Franc Versus Dollar	Yuan Versus Dollar
e	0.61	0.73	13.12	0.90	6.05
1/*e*	1.64	1.37	0.08	1.11	0.17

The Nominal Exchange Rates *e* and 1/*e* on January 2, 2014

EXCHANGE RATES

A country can adopt one of the following:

- Flexible exchange rate: The government does not intervene in the foreign exchange market
- Fixed exchange rate: The government fixes a value and intervenes to maintain that value
- Managed exchange rate: A system between the flexible and fixed exchange rates.

THE FOREIGN EXCHANGE MARKET

The foreign exchange market is the global financial market in which currencies are traded and nominal exchange rates are determined.

- The foreign exchange market can be analyzed using the supply and demand model
- The price is the exchange rate e (yuan per dollar)
- The quantity is the amount of dollars traded in the foreign exchange market

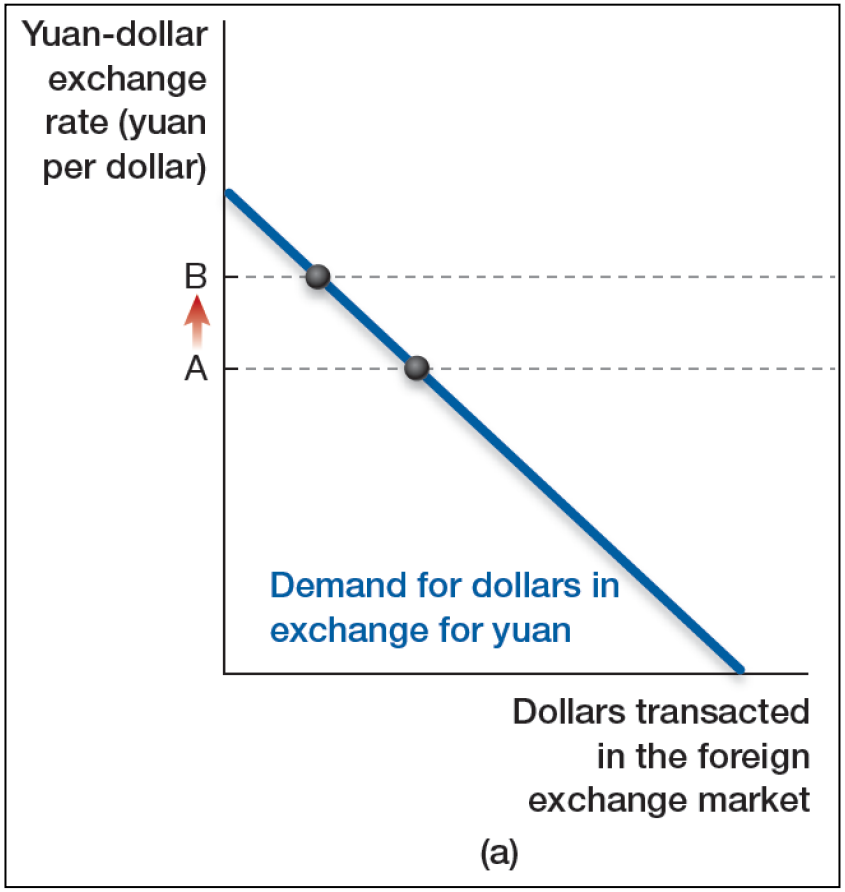
THE FOREIGN EXCHANGE MARKET

The demand curve represents traders who are trying to buy dollars in the foreign exchange market with Chinese yuan

Question: Who is part of the demand curve?

- Air China buying a U.S. Boeing Dreamliner
- ~~Apple buying parts from Chinese Foxconn~~
- Chinese government buying U.S. treasury bonds
- ~~U.S. investor buying Chinese Alibaba stock~~

THE FOREIGN EXCHANGE MARKET



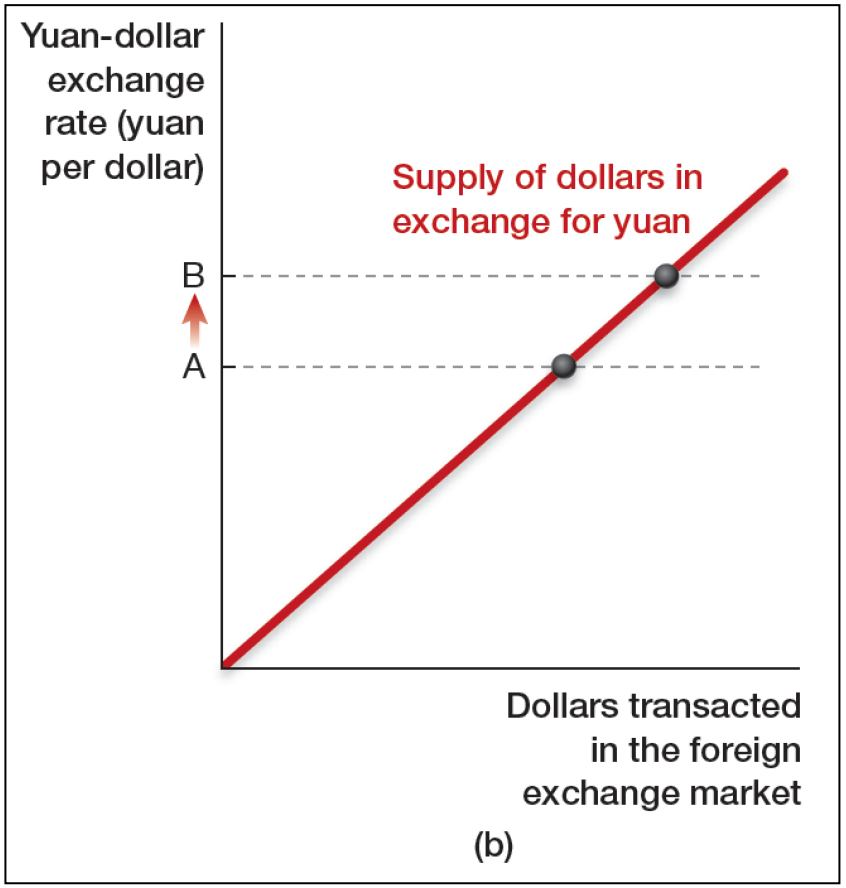
THE FOREIGN EXCHANGE MARKET

The supply curve represents traders who are trying to obtain Chinese yuan by selling dollars in the foreign exchange market.

Question: Who is part of the supply curve?

- ~~Air China buying a U.S. Boeing Dreamliner~~
- Apple buying parts from Chinese Foxconn
- ~~Chinese government buying U.S. treasury bonds~~
- U.S. investor buying Chinese Alibaba stock

THE FOREIGN EXCHANGE MARKET



HOW EXCHANGE RATES ARE DETERMINED (1 OF 4)

In a flexible exchange rate system, the nominal exchange rate is determined by supply and demand in the foreign exchange market.

Market equilibrium occurs where the demand for U.S. dollars equals the supply.

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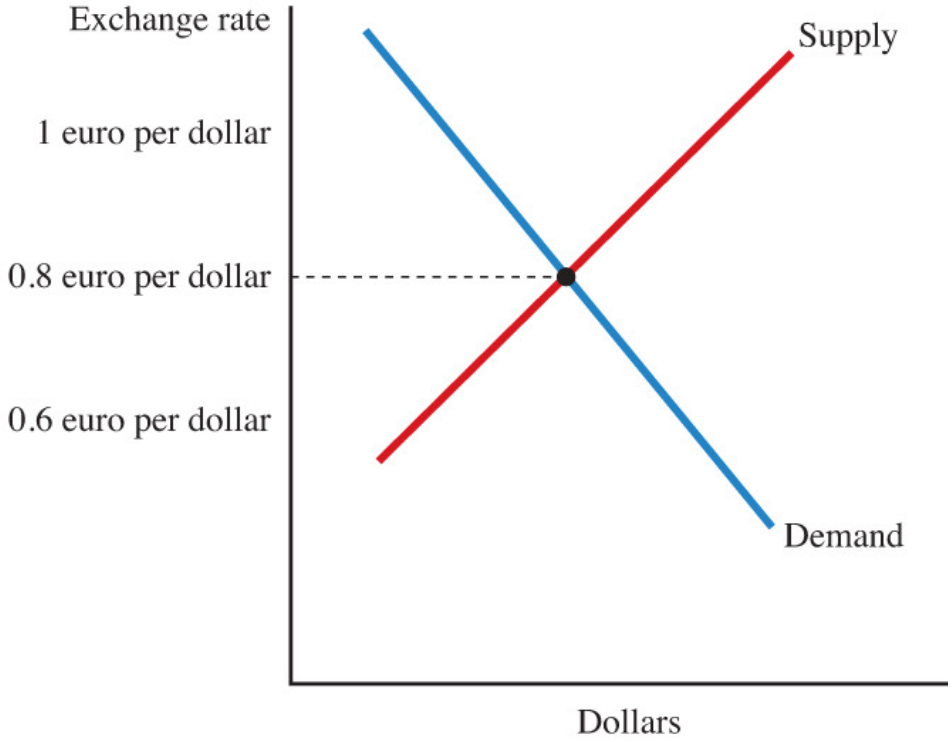

HOW EXCHANGE RATES ARE DETERMINED (2 OF 4)

Changes in Demand or Supply

An increase in the demand for dollars will increase (appreciate) the dollar's exchange rate.

Higher U.S. interest rates or lower U.S. prices will increase the demand for dollars.

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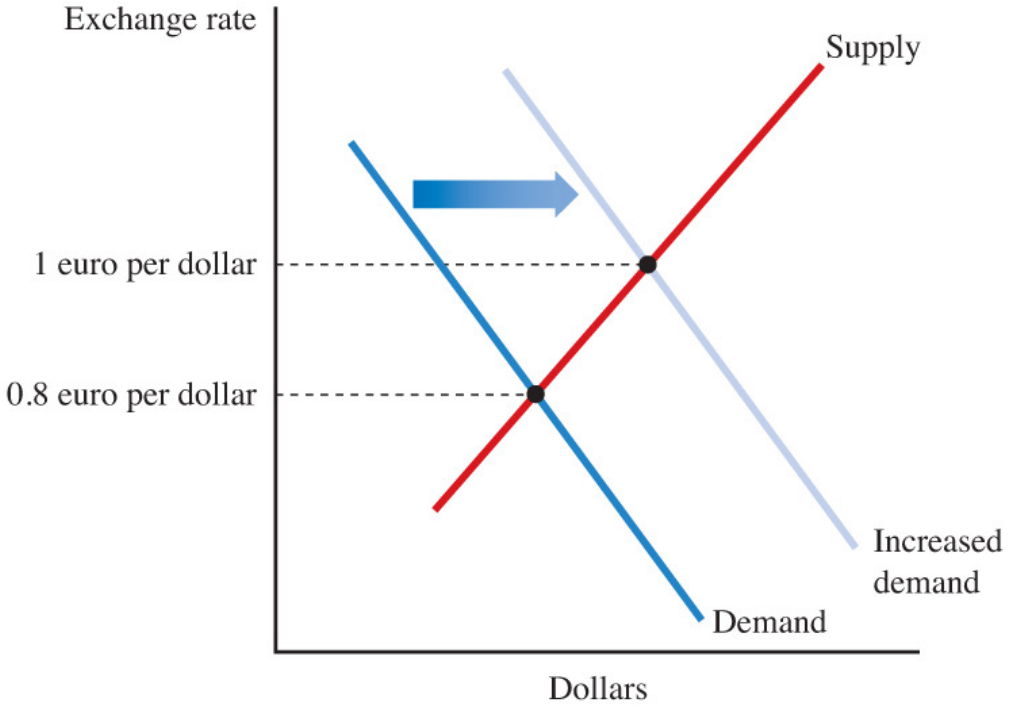
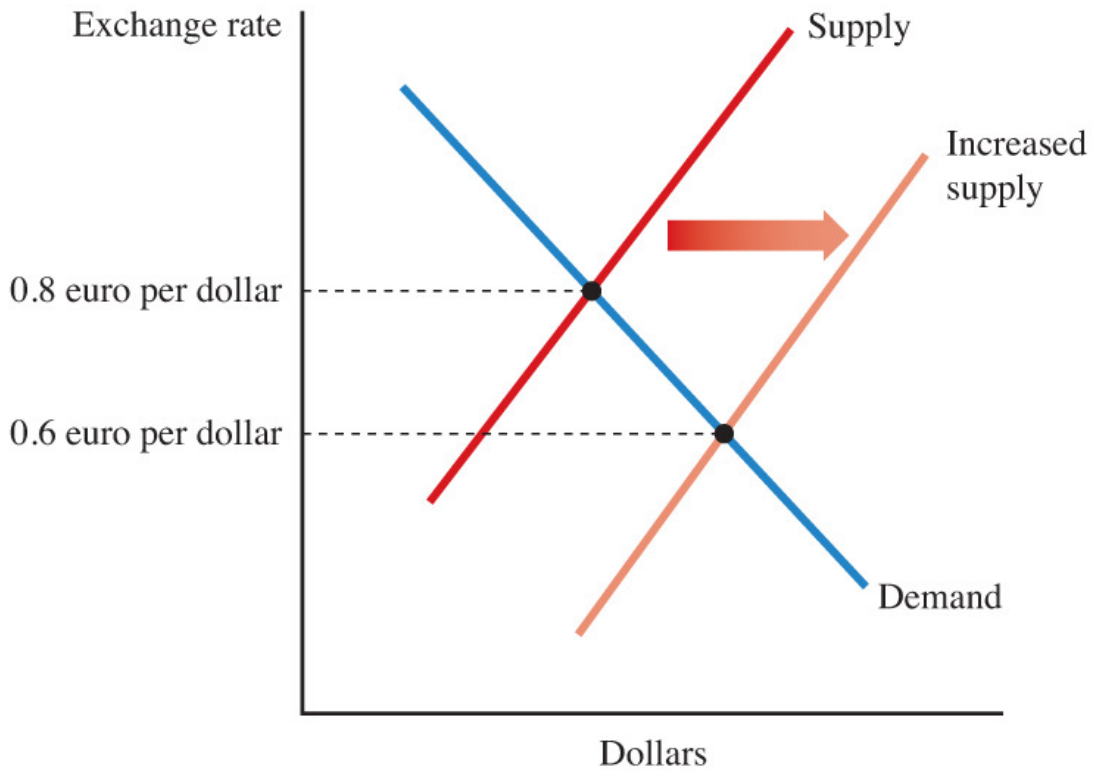


HOW EXCHANGE RATES ARE DETERMINED (3 OF 4)

Changes in Demand or Supply

An increase in the supply of dollars will decrease (depreciate) the dollar exchange rate.

Higher European interest rates or lower European prices will increase the supply of dollars.



HOW EXCHANGE RATES ARE DETERMINED (4 OF 4)

Let's summarize the key facts about the foreign exchange market, using euros as our example:

The demand curve for dollars represents the demand for dollars in exchange for euros. The curve slopes downward. As the dollar depreciates, there will be an increase in the quantity of dollars demanded in exchange for euros.

The supply curve for dollars is the supply of dollars in exchange for euros. The curve slopes upward. As the dollar appreciates, there will be an increase in the quantity of dollars supplied in exchange for euros.

Increases in U.S. interest rates and decreases in U.S. prices will increase the demand for dollars, leading to an appreciation of the dollar.

Increases in European interest rates and decreases in European prices will increase the supply of dollars in exchange for euros, leading to a depreciation of the dollar.

A TROUBLED EURO

What are the fundamental causes for the problems with the Euro?

When the euro was launched in 1999, the vision of its founders was to use the monetary union to further unify Europe economically and politically. They envisioned a large economic market, comparable to the United States. They believed that by moving to a single currency with agreements on a number of fiscal rules that they could achieve economic stability and growth.

Unfortunately, this vision proved to be naïve. Under the umbrella of the euro, financial investors throughout the world poured funds into Spain and Ireland fueling an unsustainable housing boom and also lending excessive amounts to the governments of Greece, Italy, and Portugal that faced severe budget challenges.

When the housing boom collapsed and the worldwide recession of 2007 increased budgetary pressures, it became clear that the banks and governments of these countries could not easily pay their debts. Moreover, with a single currency for the euro area, countries could not make adjustments through depreciation of their currency. The options facing Europe were bleak: either large-scale financial transfers from Germany and other successful countries, or sharp cutbacks in budgets and prolonged unemployment to reduce wage levels.

What became apparent was that the United States did not just have a single currency; it also had a unified fiscal system that provided transfers to states and regions in economic distress. Monetary union without a corresponding fiscal system cannot be easily sustained.

CASE STUDY

EXCHANGE RATES

- **REAL EXCHANGE RATE:** is the ratio of the prices (for example, all converted to dollars) of a basket of goods and services in two countries and thus influences net exports from one country to the other
  - U.S. importers like Walmart compare the cost of a good from China and from the United States in the same currency

$$\frac{\text{Dollar price of U.S. toy}}{\text{Dollar price of Chinese toy}}$$

$$\frac{\text{Dollar price of U.S. toy}}{(\text{Yuan price of Chinese toy}) \times \frac{1}{e}} = \frac{\text{Dollar price of U.S. toy} \times e}{\text{Yuan price of Chinese toy}}$$

$$E = \frac{\text{Dollar price of U.S. basket} \times e}{\text{Yuan price of Chinese basket}}$$

THE REAL EXCHANGE RATE AND EXPORTS

- Question: What happens to U.S. exports to China and Chinese exports to the United States when the real exchange rate goes up?
- Question: What happens to U.S. exports to China and Chinese exports to the United States when the real exchange rate goes down?

Yuan-Dollar Real Exchange Rate	China	United States
Goes up (dollar appreciates and the yuan depreciates)	Import less from United States Export more to United States	Export less to China Import more from China
Goes down (dollar depreciates and the yuan appreciates)	Import more from United States Export less to United States	Export more to China Import less from China

The Relationship Between the Real Exchange Rate and Trade Flows

CASE STUDY

THE REAL EXCHANGE RATE AND EXPORTS

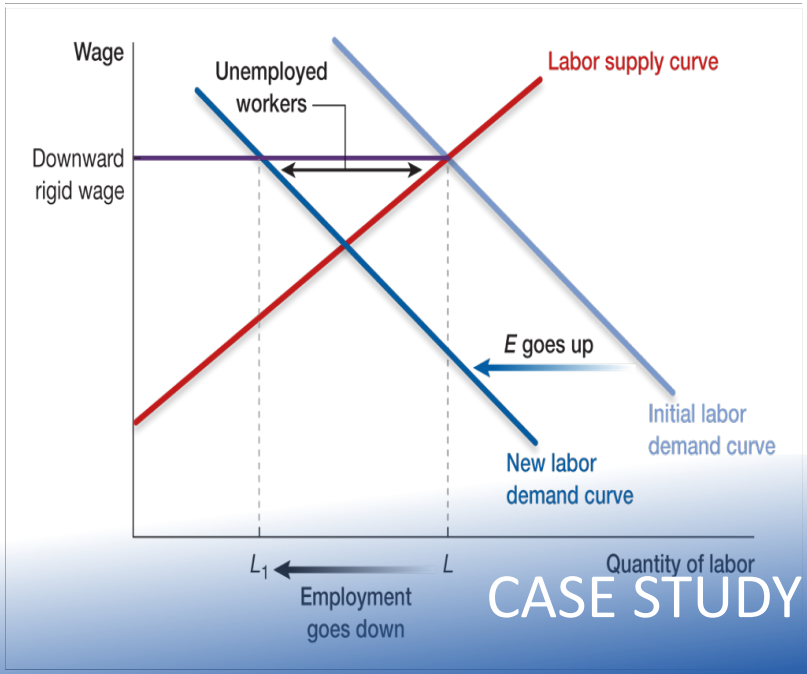
What if the Chinese government keeps the yuan undervalued?

- A weaker yuan leads to an overvalued yuan–dollar real exchange rate E
- An increase in E leads to a trade deficit in the United States ($X^{U.S.} < M^{U.S.}$) and therefore a trade surplus in China ($X^{China} > M^{China.}$)

- National income accounting identity:

$$Y = C + I + G + X - M$$

- What is the impact of a U.S. trade deficit for U.S. employment? Employment falls when the Real exchange rate appreciates

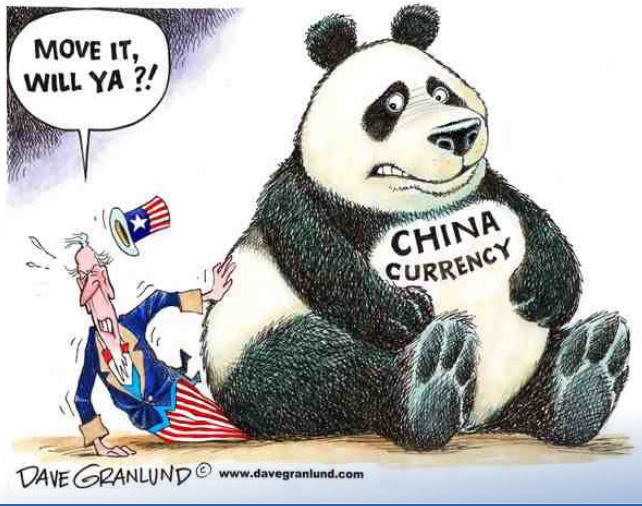


CASE STUDY

THE REAL EXCHANGE RATE AND EXPORTS

What if the Chinese government keeps the yuan undervalued?

- Can U.S. monetary policy respond to the appreciation of the real exchange rate? The U.S. Fed can pursue an expansionary monetary policy to decrease the real exchange rate



- An expansionary monetary policy lowers U.S. interest rates
- Chinese investors reduce their holdings of U.S. assets, which decreases the demand for U.S. dollars in the foreign exchange market
- This will cause the real yuan–dollar exchange rate E to fall and thus U.S. net exports to increase

CASE STUDY

End