Labour Economics for Leaders

LABOUR ECONOMICS FOR LEADERS

NORM SMITH

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This OER, *Labour Economics for Leaders* , is a collection of resources adapted by Norm Smith to meet the needs of students in labour economics courses. In most sections of this OER, updates have been made to the existing content to improve usability and accessibility, incorporate interactive elements and improve the overall student experience. This collection reuses content from the following key resources:

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Terminology & Statistics

It is acknowledged that the terminology used to describe statistics within this textbook may be outdated or harmful; however, it was retained to maintain dataset integrity.

CHAPTER 1 - WELCOME TO ECONOMICS!

Learning Objectives

- What Is Economics, and Why Is It Important?
- Microeconomics and Macroeconomics
- How Economists Use Theories and Models to Understand Economic Issues
- How Economies Can Be Organized: An Overview of Economic Systems

Decisions … Decisions in the Social Media Age

To post or not to post? Every day we are faced with a myriad of decisions, from what to have for breakfast, to which route to take to class, to the more complex—"Should I double major and add possibly another semester of study to my education?" Our response to these choices depends on the information we have available at any given moment. Economists call this "imperfect" because we rarely have all the data we need to make perfect decisions. Despite the lack of perfect information, we still make hundreds of decisions a day.

Now we have another avenue in which to gather information—social media. Outlets like Facebook and Twitter are altering the process by which we make choices, how we spend our time, which movies we see, which products we buy, and more. How many of you chose a university without checking out its Facebook page or Twitter stream first for information and feedback?

As you will see in this course, what happens in economics is affected by how well and how fast information disseminates through a society, such as how quickly information travels through Facebook. "Economists love nothing better than when deep and liquid markets operate under

conditions of perfect information," says Jessica Irvine, National Economics Editor for News Corp Australia.

This leads us to the topic of this chapter, an introduction to the world of making decisions, processing information, and understanding behavior in markets —the world of economics. Each chapter in this book will start with a discussion about current (or sometimes past) events and revisit it at chapter's end—to "bring home" the concepts in play.

What is economics and why should you spend your time learning it? After all, there are other disciplines you could be studying, and other ways you could be spending your time. As the Bring it Home feature just mentioned, making choices is at the heart of what economists study, and your decision to take this course is as much as economic decision as anything else.

Economics is probably not what you think. It is not primarily about money or finance. It is not primarily about business. It is not mathematics. What is it then? It is both a subject area and a way of viewing the world.

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Original Reference

Irvine, Jessica. "Social Networking Sites are Factories of Modern Ideas." *The Sydney Morning Herald*. November 25, 2011.http://www.smh.com.au/federal-politics/society-and-culture/social-networking-sites-are-factories-of-modern-ideas-20111124-1nwy3.html#ixzz2YZhPYeME.

1.1 - WHAT IS ECONOMICS, AND WHY IS IT IMPORTANT?

Learning Objectives

- Discuss the importance of studying economics
- Explain the relationship between production and division of labour
- Evaluate the significance of scarcity

Economics is the study of how humans make decisions in the face of scarcity. These can be individual decisions, family decisions, business decisions or societal decisions. If you look around carefully, you will see that scarcity is a fact of life. **Scarcity** means that human wants for goods, services and resources exceed what is available. Resources, such as labour, tools, land, and raw materials are necessary to produce the goods and services we want but they exist in limited supply. Of course, the ultimate scarce resource is time- everyone, rich or poor, has just 24 expendable hours in the day to earn income to acquire goods and services, for leisure time, or for sleep. At any point in time, there is only a finite amount of resources available.

Think about it this way: In 2015 the labour force in the United States contained over 158 million workers, according to the U.S. Bureau of Labor Statistics. The total land area was 3,794,101 square miles. While these are certainly large numbers, they are not infinite. Because these resources are limited, so are the numbers of goods and services we produce with them. Combine this with the fact that human wants seem to be virtually infinite, and you can see why scarcity is a problem.

Introduction to FRED

Data is very important in economics because it describes and measures the issues and problems that economics seek to understand. A variety of government agencies publish economic and social data. For this

course, we will generally use data from the St. Louis Federal Reserve Bank's FRED database. FRED is very user friendly. It allows you to display data in tables or charts, and you can easily download it into spreadsheet form if you want to use the data for other purposes. The FRED website [New Tab] includes data on nearly 400,000 domestic and international variables over time, in the following broad categories:

- Money, Banking & Finance
- Population, Employment, & Labour Markets (including Income Distribution)
- National Accounts (Gross Domestic Product & its components), Flow of Funds, and International Accounts
- Production & Business Activity (including Business Cycles)
- Prices & Inflation (including the Consumer Price Index, the Producer Price Index, and the Employment Cost Index)
- International Data from other nations
- U.S. Regional Data
- Academic Data (including Penn World Tables & NBER Macrohistory database)

Figure 1.1a. Scarcity of Resources Homeless people are a stark reminder that scarcity of resources is real. Pittsburgh Homeless by daveynin, used under CC BY 2.0 License.

If you still do not believe that scarcity is a problem, consider the following: Does everyone require food to eat? Does everyone need a decent place to live? Does everyone have access to healthcare? In every country in the world, there are people who are hungry, homeless (for example, those who call park benches their beds, as Figure 1.1a shows), and in need of healthcare, just to focus on a few critical goods and services. Why is this the

case? It is because of scarcity. Let's delve into the concept of scarcity a little deeper, because it is crucial to understanding economics.

The Problem of Scarcity

Think about all the things you consume: food, shelter, clothing, transportation, healthcare, and entertainment. How do you acquire those items? You do not produce them yourself. You buy them. How do you afford the things you buy? You work for pay. If you do not, someone else does on your behalf. Yet most of us never have enough income to buy all the things we want. This is because of scarcity. So how do we solve it?

Link It Up

Read How 10 Western Cities Are Dealing with Water Scarcity and Drought [New Tab] (https://stateimpact.npr.org/texas/2013/08/02/how-10-western-cities-are-dealing-with-water-scarcity-and-drought/) to learn more about how the United States is dealing with scarcity in resources.

Every society, at every level, must make choices about how to use its resources. Families must decide whether to spend their money on a new car or a fancy vacation. Towns must choose whether to put more of the budget into police and fire protection or into the school system. Nations must decide whether to devote more funds to national defense or to protecting the environment. In most cases, there just isn't enough money in the budget to do everything. How do we use our limited resources the best way possible, that is, to obtain the most goods and services we can? There are a couple of options. First, we could each produce everything we each consume. Alternatively, we could each produce some of what we want to consume, and "trade" for the rest of what we want. Let's explore these options. Why do we not each just produce all of the things we consume? Think back to pioneer days, when individuals knew how to do so much more than we do today, from building their homes, to growing their crops, to hunting for food, to repairing their equipment. Most of us do not know how to do all—or any—of those things, but it is not because we could not learn. Rather, we do not have to. The reason why is something called *the division and specialization of labour*, a production innovation first put forth by Adam Smith (Figure 1.1b) in his book, *The Wealth of Nations*.

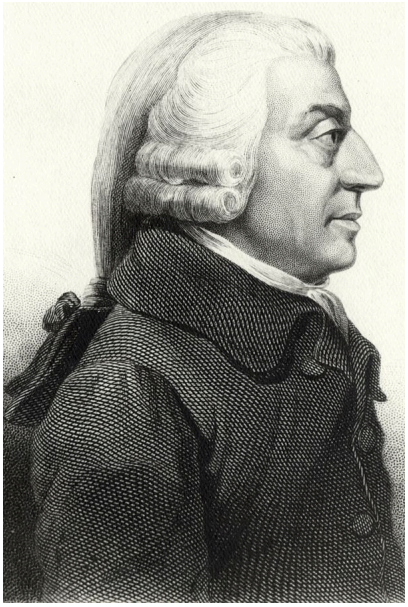

Figure 1.1b. Portrait of Adam Smith (https://commons.wikimedia.org/wiki/File:AdamSmith.jpg) etching created by Cadell & Davies (1811), John Horsburgh (1828) or R.C. Bell (1872), licensed under CC0.

The Division of and Specialization of Labour

The formal study of economics began when Adam Smith (1723–1790) published his famous book *The Wealth of Nations* in 1776. Many authors had written on economics in the centuries before Smith, but he was the first to address the subject in a comprehensive way. In the first chapter, Smith introduces the concept of division of labour, which means that the way one produces a good or service is divided into a number of tasks that different workers perform, instead of all the tasks being done by the same person.

To illustrate division of labour, Smith counted how many tasks went into making a pin: drawing out a piece of wire, cutting it to the right length, straightening it, putting a head on one end and a point on the other, and packaging pins for sale, to name just a few. Smith counted 18 distinct tasks that different people performed—all for a pin, believe it or not!

Modern businesses divide tasks as well. Even a relatively simple business like a restaurant divides the task of serving meals into a range of jobs like top chef, sous chefs, less-skilled kitchen help, servers to wait on the tables, a greeter at the door, janitors to clean up, and a business manager to handle paychecks and bills—not to mention the economic connections a restaurant has with suppliers of food, furniture, kitchen equipment,

and the building where it is located. A complex business like a large manufacturing factory, such as the shoe factory (Figure 1.1c), or a hospital can have hundreds of job classifications.

Figure 1.1c Division of Labour Workers on an assembly line are an example of the divisions of labour. Red Wing Shoes Factory Tour (https://www.flickr.com/photos/94693506@N00/4643862950/in/photolist-85n1EA-85n1Fm-85iS38-85iRV2-85n1oY-85n1KY-85iRXt-85n1wG-85iRY2-85n1Ky-85iS2K-85iRZt-85n1zm-85iRWx-85iRNM-85iRTg-85n1sN-85iRSr-85n1pq-85n1uN-85iS12-85n1DW-2na4tVG-rCifXv-rF2XS7-57MAx5-2ixfqyh-2jtT8Mt-85iS6n-2g68dSS-2j2XqaN-85iRR2-85n1qW-dAtgtJ-2ewZNiy-oF8neX-ddxbsb-2jKB89z-9DzGfv-2h7kVZi-5eWZvZ-fm5CDc-2kiEmMZ-2jtPKsf-2jtRQne-2aqoDbk-kByWAF-2g63cXh-yxSsWo-ETbwFH) by Nina Hale, licensed under CC BY 2.0.

Why the Division of Labour Increases Production

When we divide and subdivide the tasks involved with producing a good or service, workers and businesses can produce a greater quantity of output. In his observations of pin factories, Smith noticed that one worker alone might make 20 pins in a day, but that a small business of 10 workers (some of whom would need to complete two or three of the 18 tasks involved with pin-making), could make 48,000 pins in a day. How can a group of workers, each specializing in certain tasks, produce so much more than the same number of workers who try to produce the entire good or service by themselves? Smith offered three reasons.

First, specialization in a particular small job allows workers to focus on the parts of the production process where they have an advantage. (In later chapters, we will develop this idea by discussing comparative advantage.) People have different skills, talents, and interests, so they will be better at some jobs than at others. The particular advantages may be based on educational choices, which are in turn shaped by interests and

talents. Only those with medical degrees qualify to become doctors, for instance. For some goods, geography affects specialization. For example, it is easier to be a wheat farmer in North Dakota than in Florida, but easier to run a tourist hotel in Florida than in North Dakota. If you live in or near a big city, it is easier to attract enough customers to operate a successful dry cleaning business or movie theater than if you live in a sparsely populated rural area. Whatever the reason, if people specialize in the production of what they do best, they will be more effective than if they produce a combination of things, some of which they are good at and some of which they are not.

Second, workers who specialize in certain tasks often learn to produce more quickly and with higher quality. This pattern holds true for many workers, including assembly line labourers who build cars, stylists who cut hair, and doctors who perform heart surgery. In fact, specialized workers often know their jobs well enough to suggest innovative ways to do their work faster and better.

A similar pattern often operates within businesses. In many cases, a business that focuses on one or a few products (sometimes called its "core competency") is more successful than firms that try to make a wide range of products.

Third, specialization allows businesses to take advantage of economies of scale, which means that for many goods, as the level of production increases, the average cost of producing each individual unit declines. For example, if a factory produces only 100 cars per year, each car will be quite expensive to make on average. However, if a factory produces 50,000 cars each year, then it can set up an assembly line with huge machines and workers performing specialized tasks, and the average cost of production per car will be lower. The ultimate result of workers who can focus on their preferences and talents, learn to do their specialized jobs better, and work in larger organizations is that society as a whole can produce and consume far more than if each person tried to produce all of his or her own goods and services. The division and specialization of labour has been a force against the problem of scarcity.

Trade and Markets

Specialization only makes sense, though, if workers can use the pay they receive for doing their jobs to purchase the other goods and services that they need. In short, specialization requires trade.

You do not have to know anything about electronics or sound systems to play music—you just buy an iPod or MP3 player, download the music, and listen. You do not have to know anything about artificial fibers or the construction of sewing machines if you need a jacket—you just buy the jacket and wear it. You do not need to know anything about internal combustion engines to operate a car—you just get in and drive. Instead of trying to acquire all the knowledge and skills involved in producing all of the goods and services that you wish

to consume, the market allows you to learn a specialized set of skills and then use the pay you receive to buy the goods and services you need or want. This is how our modern society has evolved into a strong economy.

Why Study Economics?

Now that you have an overview on what economics studies, let's quickly discuss why you are right to study it. Economics is not primarily a collection of facts to memorize, although there are plenty of important concepts to learn. Instead, think of economics as a collection of questions to answer or puzzles to work. Most importantly, economics provides the tools to solve those puzzles. If the economics "bug" has not bitten you yet, there are other reasons why you should study economics.

- Virtually every major problem facing the world today, from global warming, to world poverty, to the conflicts in Syria, Afghanistan, and Somalia, has an economic dimension. If you are going to be part of solving those problems, you need to be able to understand them. Economics is crucial.
- It is hard to overstate the importance of economics to good citizenship. You need to be able to vote intelligently on budgets, regulations, and laws in general. When the U.S. government came close to a standstill at the end of 2012 due to the "fiscal cliff," what were the issues? Did you know?
- A basic understanding of economics makes you a well-rounded thinker. When you read articles about economic issues, you will understand and be able to evaluate the writer's argument. When you hear classmates, co-workers, or political candidates talking about economics, you will be able to distinguish between common sense and nonsense. You will find new ways of thinking about current events and about personal and business decisions, as well as current events and politics.

The study of economics does not dictate the answers, but it can illuminate the different choices.

Key Concepts & Summary

Economics seeks to solve the problem of scarcity, which is when human wants for goods and services exceed the available supply. A modern economy displays a division of labour, in which

people earn income by specializing in what they produce and then use that income to purchase the products they need or want. The division of labour allows individuals and firms to specialize and to produce more for several reasons: a) It allows the agents to focus on areas of advantage due to natural factors and skill levels; b) It encourages the agents to learn and invent; c) It allows agents to take advantage of economies of scale. Division and specialization of labour only work when individuals can purchase what they do not produce in markets. Learning about economics helps you understand the major problems facing the world today, prepares you to be a good citizen, and helps you become a well-rounded thinker.

Attributions

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1.2 - MICROECONOMICS AND MACROECONOMICS

Learning Objectives

- Describe microeconomics
- Describe macroeconomics
- Contrast monetary policy and fiscal policy

Economics is concerned with the well-being of *all* people, including those with jobs and those without jobs, as well as those with high incomes and those with low incomes. Economics acknowledges that production of useful goods and services can create problems of environmental pollution. It explores the question of how investing in education helps to develop workers' skills. It probes questions like how to tell when big businesses or big labour unions are operating in a way that benefits society as a whole and when they are operating in a way that benefits their owners or members at the expense of others. It looks at how government spending, taxes, and regulations affect decisions about production and consumption.

It should be clear by now that economics covers considerable ground. We can divide that ground into two parts: **Microeconomics** focuses on the actions of individual agents within the economy, like households, workers, and businesses. **Macroeconomics** looks at the economy as a whole. It focuses on broad issues such as growth of production, the number of unemployed people, the inflationary increase in prices, government deficits, and levels of exports and imports. Microeconomics and macroeconomics are not separate subjects, but rather complementary perspectives on the overall subject of the economy.

To understand why both microeconomic and macroeconomic perspectives are useful, consider the problem of studying a biological ecosystem like a lake. One person who sets out to study the lake might focus on specific topics: certain kinds of algae or plant life; the characteristics of particular fish or snails; or the trees surrounding the lake. Another person might take an overall view and instead consider the lake's ecosystem

from top to bottom; what eats what, how the system stays in a rough balance, and what environmental stresses affect this balance. Both approaches are useful, and both examine the same lake, but the viewpoints are different. In a similar way, both microeconomics and macroeconomics study the same economy, but each has a different viewpoint.

Whether you are scrutinizing lakes or economics, the micro and the macro insights should blend with each other. In studying a lake, the micro insights about particular plants and animals help to understand the overall food chain, while the macro insights about the overall food chain help to explain the environment in which individual plants and animals live.

In economics, the micro decisions of individual businesses are influenced by whether the macroeconomy is healthy. For example, firms will be more likely to hire workers if the overall economy is growing. In turn, macroeconomy's performance ultimately depends on the microeconomic decisions that individual households and businesses make.

Microeconomics

What determines how households and individuals spend their budgets? What combination of goods and services will best fit their needs and wants, given the budget they have to spend? How do people decide whether to work, and if so, whether to work full time or part time? How do people decide how much to save for the future, or whether they should borrow to spend beyond their current means?

What determines the products, and how many of each, a firm will produce and sell? What determines the prices a firm will charge? What determines how a firm will produce its products? What determines how many workers it will hire? How will a firm finance its business? When will a firm decide to expand, downsize, or even close? In the microeconomics part of this book, we will learn about the theory of consumer behavior, the theory of the firm, how markets for labour and other resources work, and how markets sometimes fail to work properly.

Macroeconomics

What determines the level of economic activity in a society? In other words, what determines how many goods and services a nation actually produces? What determines how many jobs are available in an economy? What determines a nation's standard of living? What causes the economy to speed up or slow down? What causes firms to hire more workers or to lay them off? Finally, what causes the economy to grow over the long term?

We can determine an economy's macroeconomic health by examining a number of goals: growth in the

standard of living, low unemployment, and low inflation, to name the most important. How can we use government macroeconomic policy to pursue these goals? A nation's central bank conducts **monetary policy**, which involves policies that affect bank lending, interest rates, and financial capital markets. For the United States, this is the Federal Reserve. A nation's legislative body determines **fiscal policy**, which involves government spending and taxes. For the United States, this is the Congress and the executive branch, which originates the federal budget. These are the government's main tools. Americans tend to expect that government can fix whatever economic problems we encounter, but to what extent is that expectation realistic? These are just some of the issues that we will explore in the macroeconomic chapters of this book.

Key Concepts & Summary

Microeconomics and macroeconomics are two different perspectives on the economy. The microeconomic perspective focuses on parts of the economy: individuals, firms, and industries. The macroeconomic perspective looks at the economy as a whole, focusing on goals like growth in the standard of living, unemployment, and inflation. Macroeconomics has two types of policies for pursuing these goals: monetary policy and fiscal policy.

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1.3 - HOW ECONOMISTS USE THEORIES AND MODELS TO UNDERSTAND ECONOMIC ISSUES

Learning Objectives

- Interpret a circular flow diagram
- Explain the importance of economic theories and models
- Describe goods and services markets and labour markets

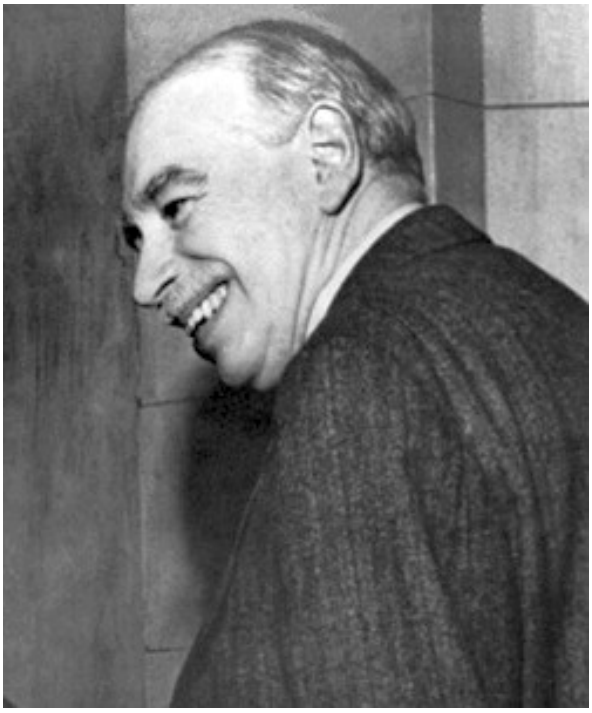

Figure 1.3a John Maynard Keynes. One of the most influential economists in modern times was John Maynard Keynes. John Maynard Keynes (https://commons.wikimedia.org/wiki/File:John_Maynard_Keynes.jpg) by IMF, licensed under CC0. Adapted (cropped) from White and Keynes by IMF, licensed under CC0.

John Maynard Keynes (1883–1946), one of the greatest economists of the twentieth century, pointed out that economics is not just a subject area but also a way of thinking. Keynes (Figure 1.3a) famously wrote in the introduction to a fellow economist's book: "[Economics] is a method rather than a doctrine, an apparatus of the mind, a technique of thinking, which helps its possessor to draw correct conclusions." In other words, economics teaches you how to think, not what to think.

Link It Up

The video Robert Skidelsky on Keynesian Economics – It's All About Spending [New Tab] (https://www.youtube.com/watch?v=ZRvaxUNDTKY) talk about John Maynard Keynes and his influence on economics.

Economists see the world through a different lens than anthropologists, biologists, classicists, or practitioners

of any other discipline. They analyze issues and problems using economic theories that are based on particular assumptions about human behavior. These assumptions tend to be different than the assumptions an anthropologist or psychologist might use. A **theory** is a simplified representation of how two or more variables interact with each other. The purpose of a theory is to take a complex, real-world issue and simplify it down to its essentials. If done well, this enables the analyst to understand the issue and any problems around it. A good theory is simple enough to understand, while complex enough to capture the key features of the object or situation you are studying.

Sometimes economists use the term **model** instead of theory. Strictly speaking, a theory is a more abstract representation, while a model is a more applied or empirical representation. We use models to test theories, but for this course we will use the terms interchangeably.

For example, an architect who is planning a major office building will often build a physical model that sits on a tabletop to show how the entire city block will look after the new building is constructed. Companies often build models of their new products, which are more rough and unfinished than the final product, but can still demonstrate how the new product will work.

A good model to start with in economics is the **circular flow diagram** (Figure 1.3b). It pictures the economy as consisting of two groups—households and firms—that interact in two markets: the **goods and services market** in which firms sell and households buy and the **labour market** in which households sell labour to business firms or other employees.

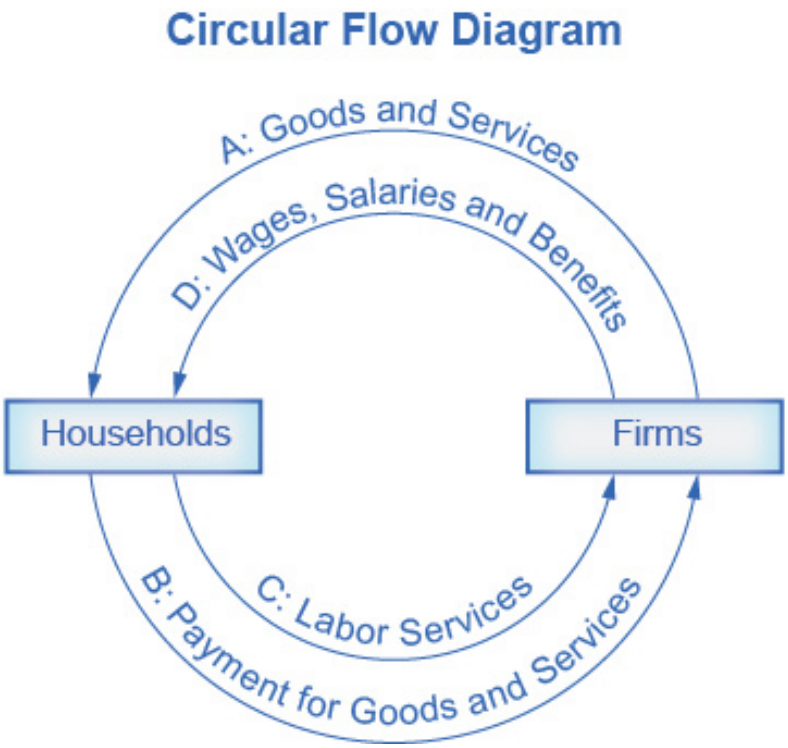

Figure 1.3b The Circular Flow Diagram. The flow diagram showing how households and firms interact in the goods and services market, and in the labour market. The direction of the arrows shows that in the goods and services market, households receive goods and services and pay firms for them. In the labour market, households provide labour and receive payment from firms through wages, salaries, and benefits. The circular flow diagram's outer arrows represent a goods and services market, and the inner arrows represent a labour market. The Circular Flow Diagram by Steven A. Greenlaw & David Shapiro (OpenStax), licensed under CC BY 4.0.

Firms produce and sell goods and services to households in the market for goods and services (or product market), indicated by Arrow A. Households pay for goods and services, which becomes the revenues to firms, indicated by Arrow B. Arrows A and B represent the two sides of the product market. Where do households obtain the income to buy goods and services? They provide the labour and other resources (e.g. land, capital, raw materials) firms need to produce goods and services in the market for inputs (or factors of production), indicated by Arrow C. In return, firms pay for the inputs (or resources) they use in the form of wages and other factor payments, indicated by Arrow D. Arrows C and D represent the two sides of the factor market.

Of course, in the real world, there are many different markets for goods and services and markets for many different types of labour. The circular flow diagram simplifies this to make the picture easier to grasp. In the diagram, firms produce goods and services, which they sell to households in return for revenues. The outer circle shows this, and represents the two sides of the product market (for example, the market for goods and services) in which households demand and firms supply. Households sell their labour as workers to firms in

return for wages, salaries, and benefits. The inner circle shows this and represents the two sides of the labour market in which households supply and firms demand.

This version of the circular flow model is stripped down to the essentials, but it has enough features to explain how the product and labour markets work in the economy. We could easily add details to this basic model if we wanted to introduce more real-world elements, like financial markets, governments, and interactions with the rest of the globe (imports and exports).

Economists carry a set of theories in their heads like a carpenter carries around a toolkit. When they see an economic issue or problem, they go through the theories they know to see if they can find one that fits. Then they use the theory to derive insights about the issue or problem. Economists express theories as diagrams, graphs, or even as mathematical equations. (Do not worry. In this course, we will mostly use graphs.) Economists do not figure out the answer to the problem first and then draw the graph to illustrate. Rather, they use the graph of the theory to help them figure out the answer. Although at the introductory level, you can sometimes figure out the right answer without applying a model, if you keep studying economics, before too long you will run into issues and problems that you will need to graph to solve. We explain both micro and macroeconomics in terms of theories and models. The most well-known theories are probably those of supply and demand, but you will learn a number of others.

Key Concepts & Summary

Economists analyze problems differently than do other disciplinary experts. The main tools economists use are economic theories or models. A theory is not an illustration of the answer to a problem. Rather, a theory is a tool for determining the answer.

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1.4 - HOW TO ORGANIZE ECONOMIES: AN OVERVIEW OF ECONOMIC SYSTEMS

Learning Objectives

- Contrast traditional economies, command economies, and market economies
- Explain gross domestic product (GDP)
- Assess the importance and effects of globalization

Think about what a complex system a modern economy is. It includes all production of goods and services, all buying and selling, all employment. The economic life of every individual is interrelated, at least to a small extent, with the economic lives of thousands or even millions of other individuals. Who organizes and coordinates this system? Who ensures that, for example, the number of televisions a society provides is the same as the amount it needs and wants? Who ensures that the right number of employees work in the electronics industry? Who ensures that televisions are produced in the best way possible? How does it all get done?

There are at least three ways that societies organize an economy. The first is the **traditional economy**, which is the oldest economic system and is used in parts of Asia, Africa, and South America. Traditional economies organize their economic affairs the way they have always done (i.e., tradition). Occupations stay in the family. Most families are farmers who grow the crops using traditional methods. What you produce is what you consume. Because tradition drives the way of life, there is little economic progress or development.

Figure 1.4a. A Command Economy Ancient Egypt and was an example of a command economy. Pyramids at Giza (https://www.flickr.com/photos/jaybergesen/3335698859) by Jay Bergesen, licensed under CC BY.

Command economies are very different. In a **command economy**, economic effort is devoted to goals passed down from a ruler or ruling class. Ancient Egypt was a good example: a large part of economic life was devoted to building pyramids, like those in Figure 1.4a, for the pharaohs. Medieval manor life is another example: the lord provided the land for growing crops and protection in the event of war. In return, vassals provided labour and soldiers to do the lord's bidding. In the last century, communism emphasized command economies.

In a command economy, the government decides what goods and services will be produced and what prices it will charge for them. The government decides what methods of production to use and sets wages for workers. The government provides many necessities like healthcare and education for free. Currently, Cuba and North Korea have command economies.

Figure 1.4b A Market Economy. Nothing says "market" more than The New York Stock Exchange. New York Stock Exchange (https://www.flickr.com/photos/edrost88/6279266131/) by Erik Drost, licensed under CC BY.

Although command economies have a very centralized structure for economic decisions, market economies have a very decentralized structure. A **market** is an institution that brings together buyers and sellers of goods or services, who may be either individuals or businesses. The New York Stock Exchange (Figure 1.4b) is a prime example of a market which brings buyers and sellers together. In a **market economy**, decision-making is decentralized. Market economies are based on **private enterprise**: the private individuals or groups of private individuals own and operate the means of production (resources and businesses). Businesses supply goods and services based on demand. (In a command economy, by contrast, the government owns resources and businesses.) Supply of goods and services depends on what the demands are. A person's income is based on his or her ability to convert resources (especially labour) into something that society values. The more society values the person's output, the higher the income (think Lady Gaga or LeBron James). In this scenario, market forces, not governments, determine economic decisions.

Most economies in the real world are mixed. They combine elements of command and market (and even traditional) systems. The U.S. economy is positioned toward the market-oriented end of the spectrum. Many countries in Europe and Latin America, while primarily market-oriented, have a greater degree of government involvement in economic decisions than the U.S. economy. China and Russia, while over the past several decades have moved more in the direction of having a market-oriented system, remain closer to the command

economy end of the spectrum. The Heritage Foundation provides perspective on countries' economic freedom, as the following Clear It Up feature discusses.

Clear It UP

What countries are considered economically free?

Who is in control of economic decisions? Are people free to do what they want and to work where they want? Are businesses free to produce when they want and what they choose, and to hire and fire as they wish? Are banks free to choose who will receive loans, or does the government control these kinds of choices? Each year, researchers at the Heritage Foundation and the *Wall Street Journal* look at 50 different categories of economic freedom for countries around the world. They give each nation a score based on the extent of economic freedom in each category. Note that while the Heritage Foundation/WSJ index is widely cited by an array of scholars and publications, it should be regarded as only one viewpoint. Some experts indicate that the index's category choices and scores are politically biased. However, the index and others like it provide a useful resource for critical discussion of economic freedom.

The 2016 Heritage Foundation's Index of Economic Freedom report ranked 178 countries around the world: Table 1.4a lists some examples of the most free and the least free countries. Although technically not a separate country, Hong Kong has been granted a degree of autonomy such that, for purposes of measuring economic statistics, it is often treated as a separate country. Several additional countries were not ranked because of extreme instability that made judgments about economic freedom impossible. These countries include Afghanistan, Iraq, Libya, Syria, Somalia, and Yemen.

The assigned rankings are inevitably based on estimates, yet even these rough measures can be useful for discerning trends. In 2015, 101 of the 178 included countries shifted toward greater economic freedom, although 77 of the countries shifted toward less economic freedom. In recent decades, the overall trend has been a *higher level of economic freedom around the world*.

Table 1.4a Economic Freedoms, 2016 (The Heritage Foundation, 2016)

Most Economic Freedom	Least Economic Freedom
1. Hong Kong	167. Timor-Leste
2. Singapore	168. Democratic Republic of Congo
3. New Zealand	169. Argentina
4. Switzerland	170. Equatorial Guinea
5. Australia	171. Iran
6. Canada	172. Republic of Congo
7. Chile	173. Eritrea
8. Ireland	74. Turkmenistan
9. Estonia	175. Zimbabwe
10. United Kingdom	176. Venezuela
11. United States	177. Cuba
12. Denmark	178. North Korea

Regulations: The Rules of the Game

Markets and government regulations are always entangled. There is no such thing as an absolutely free market. Regulations always define the "rules of the game" in the economy. Economies that are primarily market-oriented have fewer regulations—ideally just enough to maintain an even playing field for participants. At a minimum, these laws govern matters like safeguarding private property against theft, protecting people from violence, enforcing legal contracts, preventing fraud, and collecting taxes. Conversely, even the most command-oriented economies operate using markets. How else would buying and selling occur? The government heavily regulates decisions of what to produce and prices to charge. Heavily regulated economies often have **underground economies** (or black markets), which are markets where the buyers and sellers make transactions without the government's approval.The question of how to organize economic institutions is typically not a black-or-white choice between all market or all government, but instead involves a balancing act over the appropriate combination of market freedom and government rules.

Figure 1.4c. Globalization Cargo. Ships are one mode of transportation for shipping goods in the global economy. Cargo Ship (https://www.flickr.com/photos/ducatistaraul/4130178584/) by Raul valdez, licensed under CC BY 2.0.

The Rise of Globalization

Recent decades have seen a trend toward **globalization**, which is the expanding cultural, political, and economic connections between people around the world. One measure of this is the increased buying and selling of goods, services, and assets across national borders—in other words, international trade and financial capital flows.

Globalization has occurred for a number of reasons. Improvements in shipping, as illustrated by the container ship in Figure 1.4c, and air cargo have driven down transportation costs. Innovations in computing and telecommunications have made it easier and cheaper to manage long-distance economic connections of production and sales. Many valuable products and services in the modern economy can take the form of information—for example: computer software; financial advice; travel planning; music, books and movies; and blueprints for designing a building. These products and many others can be transported over telephones and computer networks at ever-lower costs. Finally, international agreements and treaties between countries have encouraged greater trade.

Table 1.4b. presents one measure of globalization. It shows the percentage of domestic economic production that was exported for a selection of countries from 2010 to 2015, according to an entity known as The World Bank. **Exports** are the goods and services that one produces domestically and sells abroad. **Imports** are the goods and services that one produces abroad and then sells domestically. **Gross domestic product (GDP)**

measures the size of total production in an economy. Thus, the ratio of exports divided by GDP measures what share of a country's total economic production is sold in other countries.

Table 1.4b. The Extent of Globalization (exports/GDP) (The World Bank, n.d.)

Country	2010	2011	2012	2013	2014	2015
Higher Income Countries						
United States	12.4	13.6	13.6	13.5	13.5	12.6
Belgium	76.2	81.4	82.2	82.8	84.0	84.4
Canada	29.1	30.7	30.0	30.1	31.7	31.5
France	26.0	27.8	28.1	28.3	29.0	30.0
Middle Income Countries						
Brazil	10.9	11.9	12.6	12.6	11.2	13.0
Mexico	29.9	31.2	32.6	31.7	32.3	35.3
South Korea	49.4	55.7	56.3	53.9	50.3	45.9
Lower Income Countries						
Chad	36.8	38.9	36.9	32.2	34.2	29.8
China	29.4	28.5	27.3	26.4	23.9	22.4
India	22.0	23.9	24.0	24.8	22.9	–
Nigeria	25.3	31.3	31.4	18.0	18.4	–

In recent decades, the export/GDP ratio has generally risen, both worldwide and for the U.S. economy.Interestingly, the share of U.S. exports in proportion to the U.S. economy is well below the global average, in part because large economies like the United States can contain more of the **division of labour** inside their national borders.However, smaller economies like Belgium, Korea, and Canada need to trade across their borders with other countries to take full advantage of division of labour, **specialization**, and **economies of scale**. In this sense, the enormous U.S. economy is less affected by globalization than most other countries.

Table 1.4b indicates that many medium and low income countries around the world, like Mexico and China, have also experienced a surge of globalization in recent decades. If an astronaut in orbit could put on special glasses that make all economic transactions visible as brightly colored lines and look down at Earth, the astronaut would see the planet covered with connections.

Despite the rise in globalization over the last few decades, in recent years we've seen significant pushback

against globalization from people across the world concerned about loss of jobs, loss of political sovereignty, and increased economic inequality. Prominent examples of this pushback include the 2016 vote in Great Britain to exit the European Union (i.e. Brexit), and the election of Donald J. Trump for President of the United States.

Bring It Home

Decisions in the Social Media Age

The world we live in today provides nearly instant access to a wealth of information. Consider that as recently as the late 1970s, the *Farmer's Almanac*, along with the Weather Bureau of the U.S. Department of Agriculture, were the primary sources American farmers used to determine when to plant and harvest their crops. Today, farmers are more likely to access, online, weather forecasts from the National Oceanic and Atmospheric Administration or watch the Weather Channel. After all, knowing the upcoming forecast could drive when to harvest crops. Consequently, knowing the upcoming weather could change the amount of crop harvested.

Some relatively new information forums, such as Facebook, are rapidly changing how information is distributed; hence, influencing decision making. In 2014, the Pew Research Center reported that 71% of online adults use Facebook. This social media forum posts topics ranging from the National Basketball Association, to celebrity singers and performers, to farmers.

Information helps us make decisions as simple as what to wear today to how many reporters the media should send to cover a crash. Each of these decisions is an economic decision. After all, resources are scarce. If the media send ten reporters to cover an accident, they are not available to cover other stories or complete other tasks. Information provides the necessary knowledge to make the best possible decisions on how to utilize scarce resources. Welcome to the world of economics!

Key Concepts & Summary

We can organize societies as traditional, command, or market-oriented economies. Most societies are a mix. The last few decades have seen globalization evolve as a result of growth in commercial

and financial networks that cross national borders, making businesses and workers from different economies increasingly interdependent.

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1.5 - DEMAND AND SUPPLY IN FINANCIAL MARKETS

Learning Objectives

- Identify the demanders and suppliers in a financial market
- Explain how interest rates can affect supply and demand
- Analyze the economic effects of U.S. debt in terms of domestic financial markets
- Explain the role of price ceilings and usury laws in the U.S.

United States' households, institutions, and domestic businesses saved almost $1.3 trillion in 2015. Where did that savings go and how was it used? Some of the savings ended up in banks, which in turn loaned the money to individuals or businesses that wanted to borrow money. Some was invested in private companies or loaned to government agencies that wanted to borrow money to raise funds for purposes like building roads or mass transit. Some firms reinvested their savings in their own businesses.

In this section, we will determine how the demand and supply model links those who wish to supply financial capital (i.e., savings) with those who demand financial capital (i.e., borrowing). Those who save money (or make financial investments, which is the same thing), whether individuals or businesses, are on the supply side of the financial market. Those who borrow money are on the demand side of the financial market.

Who Demands and Who Supplies in Financial Markets?

In any market, the price is what suppliers receive and what demanders pay. In financial markets, those who supply financial capital through saving expect to receive a rate of return, while those who demand financial capital by receiving funds expect to pay a rate of return. This rate of return can come in a variety of forms, depending on the type of investment.

The simplest example of a rate of return is the **interest rate**. For example, when you supply money into a savings account at a bank, you receive interest on your deposit. The interest the bank pays you as a percent of your deposits is the interest rate. Similarly, if you demand a loan to buy a car or a computer, you will need to pay interest on the money you borrow.

Let's consider the market for borrowing money with credit cards. In 2015, almost 200 million Americans were cardholders. Credit cards allow you to borrow money from the card's issuer, and pay back the borrowed amount plus interest, although most allow you a period of time in which you can repay the loan without paying interest. A typical credit card interest rate ranges from 12% to 18% per year. In May 2016, Americans had about $943 billion outstanding in credit card debts. About half of U.S. families with credit cards report that they almost always pay the full balance on time, but one-quarter of U.S. families with credit cards say that they "hardly ever" pay off the card in full. In fact, in 2014, 56% of consumers carried an unpaid balance in the last 12 months. Let's say that, on average, the annual interest rate for credit card borrowing is 15% per year. Thus, Americans pay tens of billions of dollars every year in interest on their credit cards—plus basic fees for the credit card or fees for late payments.

Figure 1.5a illustrates demand and supply in the financial market for credit cards. The horizontal axis of the financial market shows the quantity of money loaned or borrowed in this market. The vertical or price axis shows the rate of return, which in the case of credit card borrowing we can measure with an interest rate. Table 1.5a shows the quantity of financial capital that consumers demand at various interest rates and the quantity that credit card firms (often banks) are willing to supply.

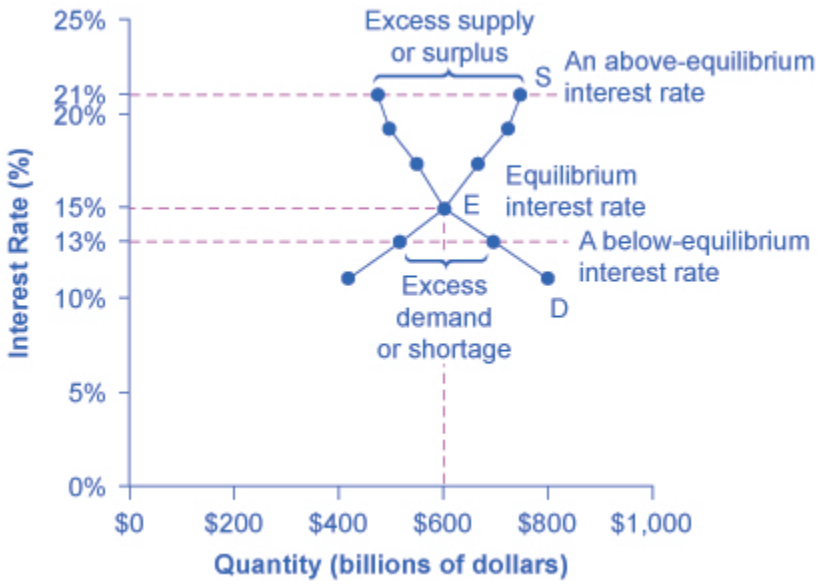

Figure 1.5a Demand and Supply for Borrowing Money with Credit Cards. In this market for credit card borrowing, the demand curve (D) for borrowing financial capital intersects the supply curve (S) for lending financial capital at equilibrium (E). At the equilibrium (E), the interest rate (the "price" in this market) is 15% and the quantity of financial capital loaned and borrowed is $600 billion. The equilibrium price is where the quantity demanded and the quantity supplied are equal. At an above-equilibrium interest rate like 21%, the quantity of financial capital supplied would increase to $750 billion, but the quantity demanded would decrease to $480 billion. At a below-equilibrium interest rate like 13%, the quantity of financial capital demanded would increase to$700 billion, but the quantity of financial capital supplied would decrease to $510 billion. Figure by Steven A. Greenlaw & David Shapiro (OpenStax), licensed under CC BY 4.0.

Table 1.5a: Demand and Supply for Borrowing Money with Credit Cards

Interest Rate (%)	Quantity of Financial Capital Demanded (Borrowing) ($ billions)	Quantity of Financial Capital Supplied (Lending) ($ billions)
11	800	420
13	700	510
15	600	600
17	550	660
19	500	720
21	480	750

The laws of demand and supply continue to apply in the financial markets. According to the law of demand, a higher rate of return (that is, a higher price) will decrease the quantity demanded. As the interest rate rises, consumers will reduce the quantity that they borrow. According to the law of supply, a higher price increases

the quantity supplied. Consequently, as the interest rate paid on credit card borrowing rises, more firms will be eager to issue credit cards and to encourage customers to use them. Conversely, if the interest rate on credit cards falls, the quantity of financial capital supplied in the credit card market will decrease and the quantity demanded will increase.

Equilibrium in Financial Markets

In the financial market for credit cards in Figure 1.5a, the supply curve (S) and the demand curve (D) cross at the equilibrium point (E). The equilibrium occurs at an interest rate of 15%, where the quantity of funds demanded and the quantity supplied are equal at an equilibrium quantity of $600 billion.

If the interest rate (remember, this measures the "price" in the financial market) is above the equilibrium level, then an excess supply, or a surplus, of financial capital will arise in this market. For example, at an interest rate of 21%, the quantity of funds supplied increases to $750 billion, while the quantity demanded decreases to $480 billion. At this above-equilibrium interest rate, firms are eager to supply loans to credit card borrowers, but relatively few people or businesses wish to borrow. As a result, some credit card firms will lower the interest rates (or other fees) they charge to attract more business. This strategy will push the interest rate down toward the equilibrium level.

If the interest rate is below the equilibrium, then excess demand or a shortage of funds occurs in this market. At an interest rate of 13%, the quantity of funds credit card borrowers demand increases to $700 billion, but the quantity credit card firms are willing to supply is only $510 billion. In this situation, credit card firms will perceive that they are overloaded with eager borrowers and conclude that they have an opportunity to raise interest rates or fees. The interest rate will face economic pressures to creep up toward the equilibrium level.

The FRED database publishes some two dozen measures of interest rates, including interest rates on credit cards, automobile loans, personal loans, mortgage loans, and more. You can find these at the FRED website [New Tab] (https://fred.stlouisfed.org/categories/22).

Shifts in Demand and Supply in Financial Markets

Those who supply financial capital face two broad decisions: how much to save, and how to divide up their savings among different forms of financial investments. We will discuss each of these in turn.

Participants in financial markets must decide when they prefer to consume goods: now or in the future. Economists call this intertemporal decision making because it involves decisions across time. Unlike a decision about what to buy from the grocery store, people make investment or savings decisions across a period of time, sometimes a long period.

Most workers save for retirement because their income in the present is greater than their needs, while the opposite will be true once they retire. Thus, they save today and supply financial markets. If their income increases, they save more. If their perceived situation in the future changes, they change the amount of their saving. For example, there is some evidence that Social Security, the program that workers pay into in order to qualify for government checks after retirement, has tended to reduce the quantity of financial capital that workers save. If this is true, Social Security has shifted the supply of financial capital at any interest rate to the left.

By contrast, many college students need money today when their income is low (or nonexistent) to pay their college expenses. As a result, they borrow today and demand from financial markets. Once they graduate and become employed, they will pay back the loans. Individuals borrow money to purchase homes or cars. A business seeks financial investment so that it has the funds to build a factory or invest in a research and development project that will not pay off for five years, ten years, or even more. Thus, when consumers and businesses have greater confidence that they will be able to repay in the future, the quantity demanded of financial capital at any given interest rate will shift to the right.

For example, in the technology boom of the late 1990s, many businesses became extremely confident that investments in new technology would have a high rate of return, and their demand for financial capital shifted to the right. Conversely, during the 2008 and 2009 Great Recession, their demand for financial capital at any given interest rate shifted to the left.

To this point, we have been looking at saving in total. Now let us consider what affects saving in different types of financial investments. In deciding between different forms of financial investments, suppliers of financial capital will have to consider the rates of return and the risks involved. Rate of return is a positive attribute of investments, but risk is a negative. If Investment A becomes more risky, or the return diminishes, then savers will shift their funds to Investment B—and the supply curve of financial capital for Investment A will shift back to the left while the supply curve of capital for Investment B shifts to the right.

The United States as a Global Borrower

In the global economy, trillions of dollars of financial investment cross national borders every year. In the early 2000s, financial investors from foreign countries were investing several hundred billion dollars per year more in the U.S. economy than U.S. financial investors were investing abroad. The following Work It Out deals with one of the macroeconomic concerns for the U.S. economy in recent years.

Work It Out

The Effect of Growing U.S. Debt

Imagine that foreign investors viewed the U.S. economy as a less desirable place to put their money because of fears about the growth of the U.S. public debt. Using the four-step process for analyzing how changes in supply and demand affect equilibrium outcomes, how would increased U.S. public debt affect the equilibrium price and quantity for capital in U.S. financial markets?

Step 1. Draw a diagram showing demand and supply for financial capital that represents the original scenario in which foreign investors are pouring money into the U.S. economy. Figure 1.5b. has the vertical axis is Rate of Return (R) and the horizontal axis is Quantity of Financial Capital (Q). Figure 1.5b shows a demand curve (D_0) and a supply curve (S_0) where the supply of capital includes the funds arriving from foreign investors. (D_0) slopes downward from left to right and (S_0) slopes upward from left to right. The original equilibrium E_0 occurs where S_0 and D_0 intersect, at interest rate R_0 and quantity of financial investment Q_0.

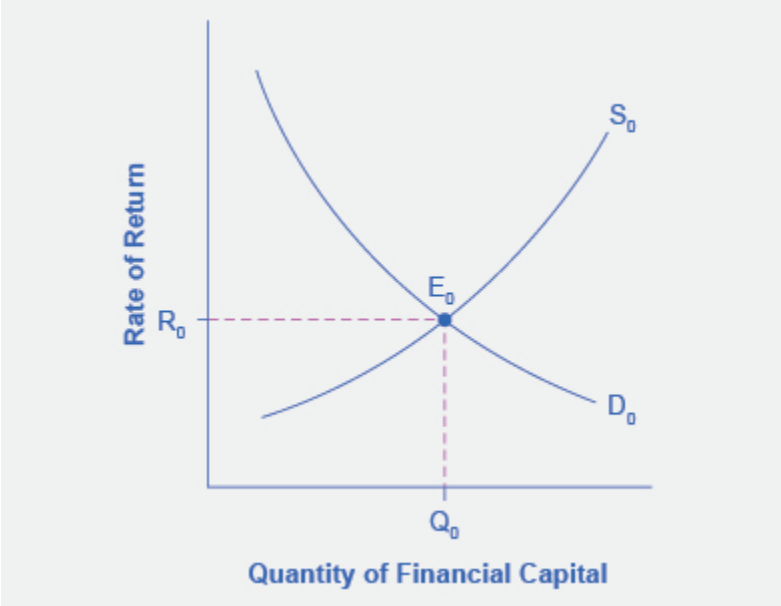

Figure 1.5b The United States as a Global Borrower Before U.S. Debt Uncertainty. The graph shows the demand for financial capital from and supply of financial capital into the U.S. financial markets by the foreign sector before the increase in uncertainty regarding U.S. public debt. Figure by Steven A. Greenlaw & David Shapiro (OpenStax), licensed under CC BY 4.0.

Step 2. Will the diminished confidence in the U.S. economy as a place to invest affect demand or supply of financial capital? Yes, it will affect supply. Many foreign investors look to the U.S. financial markets

to store their money in safe financial vehicles with low risk and stable returns. Diminished confidence means U.S. financial assets will be seen as more risky.

Step 3. Will supply increase or decrease? When the enthusiasm of foreign investors' for investing their money in the U.S. economy diminishes, the supply of financial capital shifts to the left. Using the same base graph above (Figure 1.5b) , Figure 1.5c shows the supply curve shift to the left from S_0 to S_1.

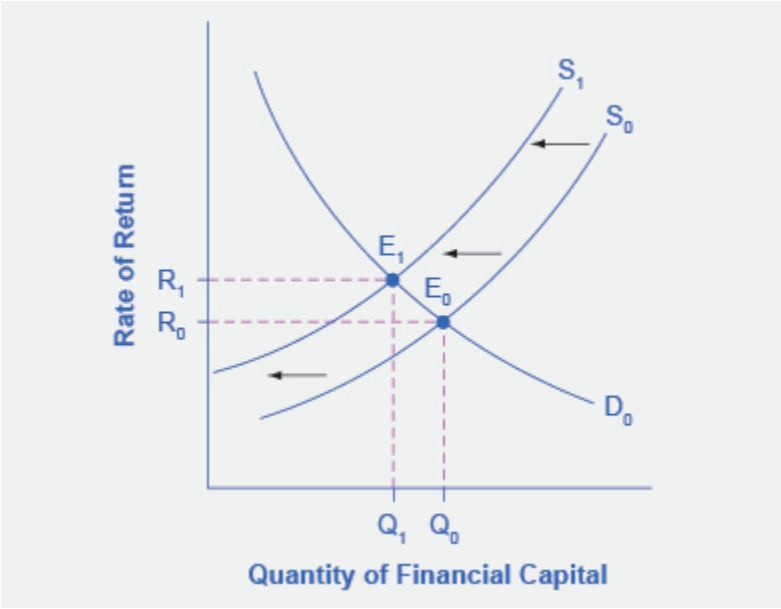

Figure 1.5c. The United States as a Global Borrower Before and After U.S. Debt Uncertainty. The graph shows the demand for financial capital and supply of financial capital into the U.S. financial markets by the foreign sector before and after the increase in uncertainty regarding U.S. public debt. The original equilibrium (E_0) occurs at an equilibrium rate of return (R_0) and the equilibrium quantity is at Q_0. Figure by Steven A. Greenlaw & David Shapiro (OpenStax), licensed under CC BY 4.0.

Step 4. Thus, foreign investors' diminished enthusiasm leads to a new equilibrium (E_1) occurring where S_1 and D_0 intersect at the higher interest rate, R_1, and the lower quantity of financial investment, Q_1. In short, U.S. borrowers will have to pay more interest on their borrowing.

The economy has experienced an enormous inflow of foreign capital. According to the U.S. Bureau of Economic Analysis, by the third quarter of 2015, U.S. investors had accumulated $23.3 trillion of foreign assets, but foreign investors owned a total of $30.6 trillion of U.S. assets. If foreign investors were to pull their money out of the U.S. economy and invest elsewhere in the world, the result could be a significantly lower quantity of financial investment in the United States, available only at a higher interest rate. This reduced

inflow of foreign financial investment could impose hardship on U.S. consumers and firms interested in borrowing.

In a modern, developed economy, financial capital often moves invisibly through electronic transfers between one bank account and another. Yet we can analyze these flows of funds with the same tools of demand and supply as markets for goods or labour.

Price Ceilings in Financial Markets: Usury Laws

As we noted earlier, about 200 million Americans own credit cards, and their interest payments and fees total tens of billions of dollars each year. It is little wonder that political pressures sometimes arise for setting limits on the interest rates or fees that credit card companies charge. The firms that issue credit cards, including banks, oil companies, phone companies, and retail stores, respond that the higher interest rates are necessary to cover the losses created by those who borrow on their credit cards and who do not repay on time or at all. These companies also point out that cardholders can avoid paying interest if they pay their bills on time.

Consider the credit card market as Figure 1.5d illustrators. In this financial market, the vertical axis shows the interest rate (which is the price in the financial market). Demanders in the credit card market are households and businesses. Suppliers are the companies that issue credit cards. This figure does not use specific numbers, which would be hypothetical in any case, but instead focuses on the underlying economic relationships. Imagine a law imposes a price ceiling that holds the interest rate charged on credit cards at the rate Rc, which lies below the interest rate R_0 that would otherwise have prevailed in the market. The horizontal dashed line at interest rate R_c in Figure 1.5d shows the price ceiling. The demand and supply model predicts that at the lower price ceiling interest rate, the quantity demanded of credit card debt will increase from its original level of Q_0 to Qd; however, the quantity supplied of credit card debt will decrease from the original Q_0 to Qs. At the price ceiling (Rc), quantity demanded will exceed quantity supplied. Consequently, a number of people who want to have credit cards and are willing to pay the prevailing interest rate will find that companies are unwilling to issue cards to them. The result will be a credit shortage.

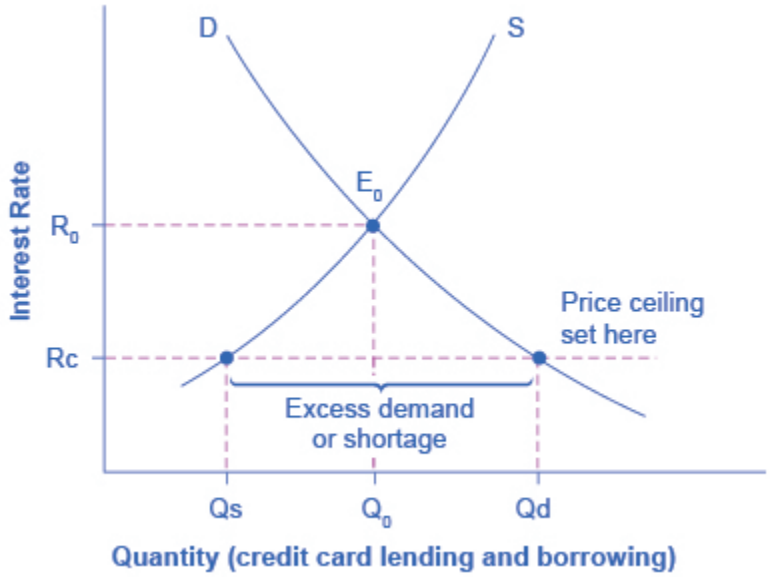

Figure 1.5d Credit Card Interest Rates: Another Price Ceiling Example. The original intersection of demand D and supply S occurs at equilibrium E_0. However, a price ceiling is set at the interest rate Rc, below the equilibrium interest rate R_0, and so the interest rate cannot adjust upward to the equilibrium. At the price ceiling, the quantity demanded, Q_d, exceeds the quantity supplied, Qs. There is excess demand, also called a shortage. Figure by Steven A. Greenlaw & David Shapiro (OpenStax), licensed under CC BY 4.0.

Figure 1.5d Credit Card Interest Rates: Another Price Ceiling Example Text Verision

The vertical axis is interest rate and the horizontal axis is quantity (credit card lending and borrowing). The demand curve (D) slopes downward left to right and the supply curve (S) slopes upward from right to left. The original intersection of demand (D) and supply (S) occurs at equilibrium E_0 at point R_0 and Q_0. The price ceiling indicated by a doted line is set at interest R_c and occurs below the interest rate R_0. At the lower price ceiling interest rate, the quantity demanded of credit card debt will increase it shifting from its original level of Q_0 to the right to Q_d . The quantity supplied of credit card debt will decrease from the original Q_0 to Qs, shifting to the left. At the price ceiling (Rc), quantity demanded will exceed quantity supplied. The difference between Qs and Q_d is the excess demand also called shortage.

Many states do have **usury laws**, which impose an upper limit on the interest rate that lenders can charge. However, in many cases these upper limits are well above the market interest rate. For example, if the interest rate is not allowed to rise above 30% per year, it can still fluctuate below that level according to market forces. A price ceiling that is set at a relatively high level is nonbinding, and it will have no practical effect unless the equilibrium price soars high enough to exceed the price ceiling.

Key Concepts & Summary

In the demand and supply analysis of financial markets, the "price" is the rate of return or the interest rate received. We measure the quantity by the money that flows from those who supply financial capital to those who demand it. Two factors can shift the supply of financial capital to a certain investment: if people want to alter their existing levels of consumption, and if the riskiness or return on one investment changes relative to other investments. Factors that can shift demand for capital include business confidence and consumer confidence in the future—since financial investments received in the present are typically repaid in the future.

Attribution

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1.6 - THE MARKET SYSTEM AS AN EFFICIENT MECHANISM FOR INFORMATION

Learning Objectives

- Apply demand and supply models to analyze prices and quantities
- Explain the effects of price controls on the equilibrium of prices and quantities

Prices exist in markets for goods and services, for labour, and for financial capital. In all of these markets, prices serve as a remarkable social mechanism for collecting, combining, and transmitting information that is relevant to the market—namely, the relationship between demand and supply—and then serving as messengers to convey that information to buyers and sellers. In a market-oriented economy, no government agency or guiding intelligence oversees the set of responses and interconnections that result from a change in price. Instead, each consumer reacts according to that person's preferences and budget set, and each profit-seeking producer reacts to the impact on its expected profits. The following Clear It Up feature examines the demand and supply models.

Clear It Up

Why are demand and supply curves important?

The demand and supply model is the second fundamental diagram for this course. (The opportunity set model that we introduced in the Choice in a World of Scarcity chapter was the first.) Just as it would be foolish to try to learn the arithmetic of long division by memorizing every possible combination of numbers that can be divided by each other, it would be foolish to try to memorize every specific example of demand and supply in this chapter, this textbook, or this course. Demand and

supply is not primarily a list of examples. It is a model to analyze prices and quantities. Even though demand and supply diagrams have many labels, they are fundamentally the same in their logic. Your goal should be to understand the underlying model so you can use it to analyze any market.

Figure 1.6a displays a generic demand and supply curve. The horizontal axis shows the different measures of quantity: a quantity of a good or service, or a quantity of labour for a given job, or a quantity of financial capital. The vertical axis shows a measure of price: the price of a good or service, the wage in the labour market, or the rate of return (like the interest rate) in the financial market.

The demand and supply model can explain the existing levels of prices, wages, and rates of return. To carry out such an analysis, think about the quantity that will be demanded at each price and the quantity that will be supplied at each price—that is, think about the shape of the demand and supply curves—and how these forces will combine to produce equilibrium.

We can also use demand and supply to explain how economic events will cause changes in prices, wages, and rates of return. There are only four possibilities: the change in any single event may cause the demand curve to shift right or to shift left, or it may cause the supply curve to shift right or to shift left. The key to analyzing the effect of an economic event on equilibrium prices and quantities is to determine which of these four possibilities occurred. The way to do this correctly is to think back to the list of factors that shift the demand and supply curves. Note that if more than one variable is changing at the same time, the overall impact will depend on the degree of the shifts. When there are multiple variables, economists isolate each change and analyze it independently.

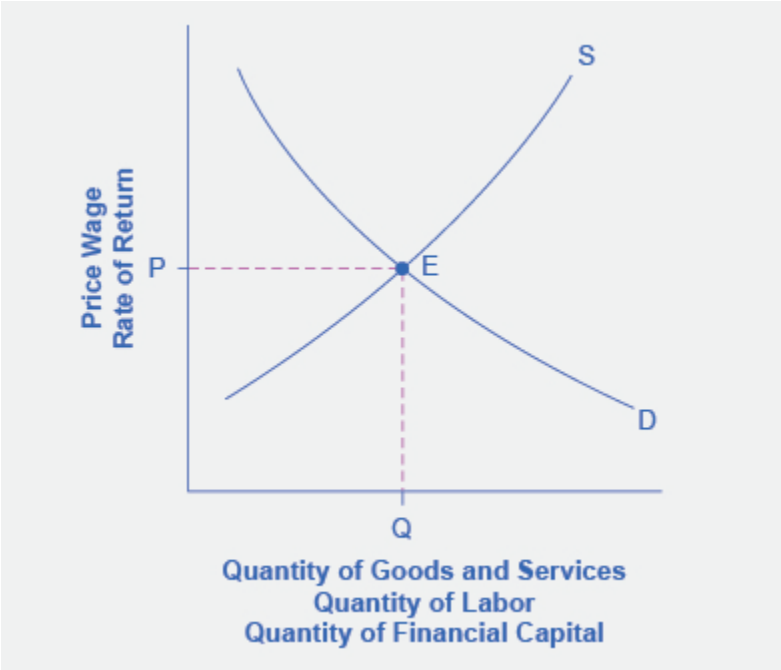

Figure 1.6a Demand and Supply Curves. The figure displays a generic demand and supply curve. The horizontal axis shows the different measures of quantity: a quantity of a good or service, a quantity of labour for a given job, or a quantity of financial capital. The vertical axis shows a measure of price: the price of a good or service, the wage in the labour market, or the rate of return (like the interest rate) in the financial market. We can use the demand and supply curves explain how economic events will cause changes in prices, wages, and rates of return. Figure by Steven A. Greenlaw & David Shapiro (OpenStax), licensed under CC BY 4.0.

An increase in the price of some product signals consumers that there is a shortage; therefore, they may want to economize on buying this product. For example, if you are thinking about taking a plane trip to Hawaii, but the ticket turns out to be expensive during the week you intend to go, you might consider other weeks when the ticket might be cheaper. The price could be high because you were planning to travel during a holiday when demand for traveling is high. Maybe the cost of an input like jet fuel increased or the airline has raised the price temporarily to see how many people are willing to pay it. Perhaps all of these factors are present at the same time. You do not need to analyze the market and break down the price change into its underlying factors. You just have to look at the ticket price and decide whether and when to fly.

In the same way, price changes provide useful information to producers. Imagine the situation of a farmer who grows oats and learns that the price of oats has risen. The higher price could be due to an increase in

demand caused by a new scientific study proclaiming that eating oats is especially healthful. Perhaps the price of a substitute grain, like corn, has risen, and people have responded by buying more oats. The oat farmer does not need to know the details. The farmer only needs to know that the price of oats has risen and that it will be profitable to expand production as a result.

The actions of individual consumers and producers as they react to prices overlap and interlock in markets for goods, labour, and financial capital. A change in any single market is transmitted through these multiple interconnections to other markets. The vision of the role of flexible prices helping markets to reach equilibrium and linking different markets together helps to explain why price controls can be so counterproductive. Price controls are government laws that serve to regulate prices rather than allow the various markets to determine prices. There is an old proverb: "Don't kill the messenger." In ancient times, messengers carried information between distant cities and kingdoms. When they brought bad news, there was an emotional impulse to kill the messenger. However, killing the messenger did not kill the bad news. Moreover, killing the messenger had an undesirable side effect: Other messengers would refuse to bring news to that city or kingdom, depriving its citizens of vital information.

Those who seek price controls are trying to kill the messenger—or at least to stifle an unwelcome message that prices are bringing about the equilibrium level of price and quantity. However, price controls do nothing to affect the underlying forces of demand and supply, and this can have serious repercussions. During China's "Great Leap Forward" in the late 1950s, the government kept food prices artificially low, with the result that 30 to 40 million people died of starvation because the low prices depressed farm production. This was communist party leader Mao Zedong's social and economic campaign to rapidly transform the country from an agrarian economy to a socialist society through rapid industrialization and collectivization. Changes in demand and supply will continue to reveal themselves through consumers' and producers' behavior. Immobilizing the price messenger through price controls will deprive everyone in the economy of critical information. Without this information, it becomes difficult for everyone—buyers and sellers alike—to react in a flexible and appropriate manner as changes occur throughout the economy.

Bring It Home

Baby Boomers Come of Age

The theory of supply and demand can explain what happens in the labour markets and suggests that the demand for nurses will increase as healthcare needs of baby boomers increase, as Figure 1.6b shows. The impact of that increase will result in an average salary higher than the $67,490 earned in 2015 referenced in the first part of this case. The new equilibrium (E_1) will be at the new equilibrium price (Pe_1).Equilibrium quantity will also increase from Qe_0 to Qe_1.

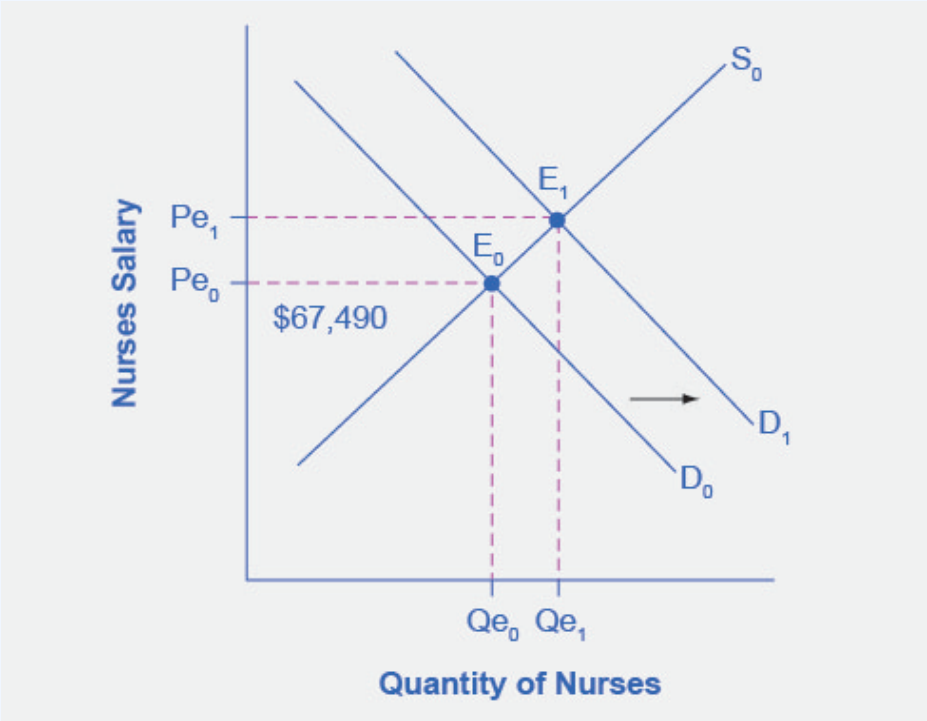

Figure 1.6b Impact of Increasing Demand for Nurses 2014-2024. In 2014, the median salary for nurses was $67,490. As demand for services increases, the demand curve shifts to the right (from D_0 to D_1) and the equilibrium quantity of nurses increases from Qe_0 to Qe_1. The equilibrium salary increases from Pe_0 to Pe_1. Figure by Steven A. Greenlaw & David Shapiro (OpenStax), licensed under CC BY 4.0.

Figure 1.6b Impact of Increasing Demand for Nurses 2014-2024 Text Version

The vertical axis is nurses salary (P) and the horizontal axis is the quantity of nurses (Q). The supply curve (S_0) is a straight line trending upwards from left to right and the demand curve (D_0) is a straight line trending upwards from left to right. The Equilibrium (E_0) occurs where S_0 and D_0 intersect at point Qe_0 and Pe_0 . As demand for services increases, the demand curve shifts to the right from D_0 to D_1 . The equilibrium quantity of nurses increases from Qe_0 to Qe_1 and the equilibrium salary increases from Pe_0 to Pe_1. The new equilibrium (E_1) occurs where S_0 and D_1 intersect at point Qe_1 and Pe_1.

Suppose that as the demand for nurses increases, the supply shrinks due to an increasing number of nurses entering retirement and increases in the tuition of nursing degrees. The leftward shift of the supply curve in Figure 1.6c captures the impact of a decreasing supply of nurses. The shifts in the two curves result in higher salaries for nurses, but the overall impact in the quantity of nurses is uncertain, as it depends on the relative shifts of supply and demand.

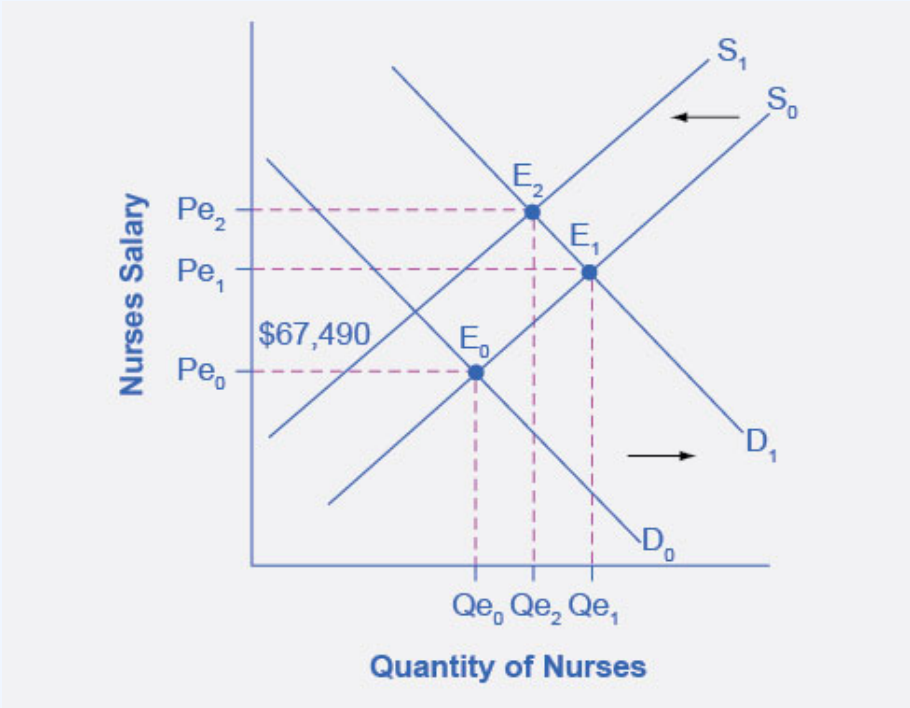

Figure 1.6c Impact of Decreasing Supply of Nurses between 2014 and 2024. The increase in demand for nurses shown in Figure 4.10 leads to both higher prices and higher quantities demanded. As nurses retire from the work force, the supply of nurses decreases, causing a leftward shift in the supply curve, from S_0 to S_1, and higher salaries for nurses at Pe_2. The net effect on the equilibrium quantity of nurses is uncertain, which in this representation is less than Qe_1, but more than the initial Qe_0. Figure by Steven A. Greenlaw & David Shapiro (OpenStax), licensed under CC BY 4.0.

Figure 1.6c Impact of Decreasing Supply of Nurses between 2014 and 2024 Text Version

The same as Figure 4.10: The vertical axis is nurses salary (P) and the horizontal axis is the quantity of nurses (Q). The supply curve (S_0) is a straight line trending upwards from left to right and the demand curve (D_0) is a straight line trending upwards from left to right. The Equilibrium (E_0) occurs where S_0 and D_0 intersect at point Qe_0 and Pe_0 . As demand for services increases, the demand curve shifts to the right from D_0 to D_1 . The equilibrium quantity of nurses increases from Qe_0 to Qe_1 and the equilibrium salary increases from Pe_0 to Pe_1. The new equilibrium (E_1) occurs where S_0 and D_1 intersect at point Qe_1 and Pe_1.

As nurses retire from the work force, the supply of nurses decreases causing a leftward shift in the supply curve, from S_0 to S_1. The equilibrium salary increases from Pe_1 to Pe_2 and the equilibrium quantity of nurses is uncertain shifting to left from Qe_1 to Qe_2 , but is still more than the initial Qe_0 . The equilibrium shifts from E_1 to E_2 occurring where S_1 and D_1 intersect at point Qe_2 and Pe_2.

While we do not know if the number of nurses will increase or decrease relative to their initial employment, we know they will have higher salaries.

Key Concepts & Summary

The market price system provides a highly efficient mechanism for disseminating information about relative scarcities of goods, services, labour, and financial capital. Market participants do not need to know why prices have changed, only that the changes require them to revisit previous decisions they made about supply and demand. Price controls hide information about the true scarcity of products and thereby cause misallocation of resources.

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1.7 - SELF-CHECK, CRITICAL THINKING & REVIEW QUESTIONS

Self Check Questions

1. What is scarcity? Can you think of two causes of scarcity?
2. Residents of the town of Smithfield like to consume hams, but each ham requires 10 people to produce it and takes a month. If the town has a total of 100 people, what is the maximum amount of ham the residents can consume in a month?
3. A consultant works for$200 per hour. She likes to eat vegetables, but is not very good at growing them. Why does it make more economic sense for her to spend her time at the consulting job and shop for her vegetables?
4. A computer systems engineer could paint his house, but it makes more sense for him to hire a painter to do it. Explain why.
5. What would be another example of a "system" in the real world that could serve as a metaphor for micro and macroeconomics?
6. Suppose we extend the circular flow model to add imports and exports. Copy the circular flow diagram onto a sheet of paper and then add a foreign country as a third agent. Draw a rough sketch of the flows of imports, exports, and the payments for each on your diagram.
7. What is an example of a problem in the world today, not mentioned in the chapter, that has an economic dimension?
8. The chapter defines *private enterprise* as a characteristic of market-oriented economies. What would *public enterprise* be? *Hint* : It is a characteristic of command economies.
9. Why might Belgium, France, Italy, and Sweden have a higher export to GDP ratio than the United States?

Check your answers

1. Scarcity means human wants for goods and services exceed the available supply. Supply is

limited because resources are limited. Demand, however, is virtually unlimited. Whatever the supply, it seems human nature to want more.

2. 100 people/10 people per ham = a maximum of 10 hams per month if all residents produce ham. Since consumption is limited by production, the maximum number of hams residents could consume per month is 10.
3. She is very productive at her consulting job, but not very productive growing vegetables. Time spent consulting would produce far more income than it what she could save growing her vegetables using the same amount of time. So on purely economic grounds, it makes more sense for her to maximize her income by applying her labour to what she does best (i.e. specialization of labour).
4. The engineer is better at computer science than at painting. Thus, his time is better spent working for pay at his job and paying a painter to paint his house. Of course, this assumes he does not paint his house for fun!
5. There are many physical systems that would work, for example, the study of planets (micro) in the solar system (macro), or solar systems (micro) in the galaxy (macro).
6. Draw a box outside the original circular flow to represent the foreign country. Draw an arrow from the foreign country to firms, to represents imports. Draw an arrow in the reverse direction representing payments for imports. Draw an arrow from firms to the foreign country to represent exports. Draw an arrow in the reverse direction to represent payments for imports.
7. There are many such problems. Consider the AIDS epidemic. Why are so few AIDS patients in Africa and Southeast Asia treated with the same drugs that are effective in the United States and Europe? It is because neither those patients nor the countries in which they live have the resources to purchase the same drugs.
8. Public enterprise means the factors of production (resources and businesses) are owned and operated by the government.
9. The United States is a large country economically speaking, so it has less need to trade internationally than the other countries mentioned. (This is the same reason that France and Italy have lower ratios than Belgium or Sweden.) One additional reason is that each of the other countries is a member of the European Union, where trade between members occurs without barriers to trade, like tariffs and quotas.

Critical Thinking Questions

1. Suppose you have a team of two workers: one is a baker and one is a chef. Explain why the kitchen can produce more meals in a given period of time if each worker specializes in what they do best than if each worker tries to do everything from appetizer to dessert.
2. Why would division of labour without trade not work?
3. Can you think of any examples of *free* goods, that is, goods or services that are not scarce?
4. A balanced federal budget and a balance of trade are secondary goals of macroeconomics, while growth in the standard of living (for example) is a primary goal. Why do you think that is so?
5. Macroeconomics is an aggregate of what happens at the microeconomic level. Would it be possible for what happens at the macro level to differ from how economic agents would react to some stimulus at the micro level? *Hint:* Think about the behavior of crowds.
6. Why is it unfair or meaningless to criticize a theory as "unrealistic?"
7. Suppose, as an economist, you are asked to analyze an issue unlike anything you have ever done before. Also, suppose you do not have a specific model for analyzing that issue. What should you do? *Hint:* What would a carpenter do in a similar situation?
8. Why do you think that most modern countries' economies are a mix of command and market types?
9. Can you think of ways that globalization has helped you economically? Can you think of ways that it has not?

Review Questions

1. Give the three reasons that explain why the division of labour increases an economy's level

of production.

2. What are three reasons to study economics?
3. What is the difference between microeconomics and macroeconomics?
4. What are examples of individual economic agents?
5. What are the three main goals of macroeconomics?
6. How did John Maynard Keynes define economics?
7. Are households primarily buyers or sellers in the goods and services market? In the labour market?
8. Are firms primarily buyers or sellers in the goods and services market? In the labour market?
9. What are the three ways that societies can organize themselves economically?
10. What is globalization? How do you think it might have affected the economy over the past decade?

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1.8 - SELF-CHECK, CRITICAL THINKING & REVIEW QUESTIONS FOR DEMAND MARKETS

Self Check Questions

1. In the labour market, what causes a movement along the demand curve? What causes a shift in the demand curve?
2. In the labour market, what causes a movement along the supply curve? What causes a shift in the supply curve?
3. Why is a living wage considered a price floor? Does imposing a living wage have the same outcome as a minimum wage?
4. In the financial market, what causes a movement along the demand curve? What causes a shift in the demand curve?
5. In the financial market, what causes a movement along the supply curve? What causes a shift in the supply curve?
6. If a usury law limits interest rates to no more than 35%, what would the likely impact be on the amount of loans made and interest rates paid?
7. Which of the following changes in the financial market will lead to a decline in interest rates:

    a. a rise in demand
    b. a fall in demand
    c. a rise in supply
    d. a fall in supply

8. Which of the following changes in the financial market will lead to an increase in the quantity of loans made and received:

    a. a rise in demand

b. a fall in demand
c. a rise in supply
d. a fall in supply

9. Identify the most accurate statement. A price floor will have the largest effect if it is set:

   a. substantially above the equilibrium price
   b. slightly above the equilibrium price
   c. slightly below the equilibrium price
   d. substantially below the equilibrium price

   Sketch all four of these possibilities on a demand and supply diagram to illustrate your answer

10. A price ceiling will have the largest effect:

    a. substantially below the equilibrium price
    b. slightly below the equilibrium price
    c. substantially above the equilibrium price
    d. slightly above the equilibrium price

    Sketch all four of these possibilities on a demand and supply diagram to illustrate your answer.

11. Select the correct answer. A price floor will usually shift:

    a. demand
    b. supply
    c. both
    d. neither

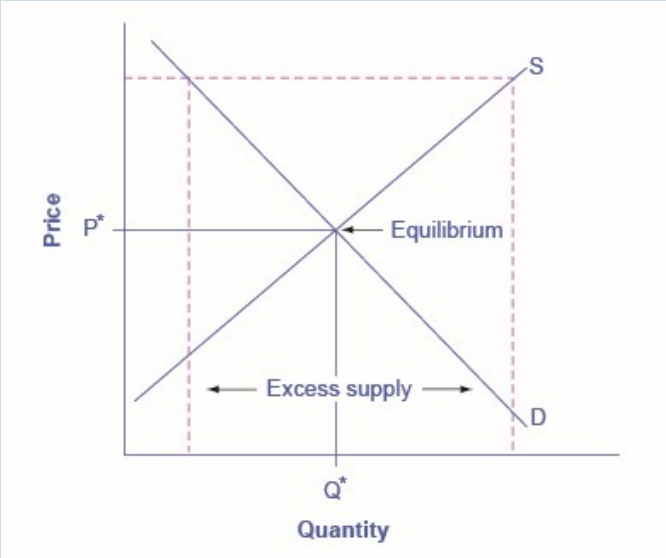
    Illustrate your answer with a diagram.

12. Select the correct answer. A price ceiling will usually shift:

    a. demand
    b. supply
    c. both
    d. neither

Check your Answer

1. Changes in the wage rate (the price of labour) cause a movement along the demand curve. A change in anything else that affects demand for labour (e.g., changes in output, changes in the production process that use more or less labour, government regulation) causes a shift in the demand curve.
2. Changes in the wage rate (the price of labour) cause a movement along the supply curve. A change in anything else that affects supply of labour (e.g., changes in how desirable the job is perceived to be, government policy to promote training in the field) causes a shift in the supply curve.
3. Since a living wage is a suggested minimum wage, it acts like a price floor (assuming, of course, that it is followed). If the living wage is binding, it will cause an excess supply of labour at that wage rate.
4. Changes in the interest rate (i.e., the price of financial capital) cause a movement along the demand curve. A change in anything else (non-price variable) that affects demand for financial capital (e.g., changes in confidence about the future, changes in needs for borrowing) would shift the demand curve.
5. Changes in the interest rate (i.e., the price of financial capital) cause a movement along the supply curve. A change in anything else that affects the supply of financial capital (a non-price variable) such as income or future needs would shift the supply curve.
6. If market interest rates stay in their normal range, an interest rate limit of 35% would not be binding. If the equilibrium interest rate rose above 35%, the interest rate would be capped at that rate, and the quantity of loans would be lower than the equilibrium quantity, causing a shortage of loans.
7. b and c will lead to a fall in interest rates. At a lower demand, lenders will not be able to charge as much, and with more available lenders, competition for borrowers will drive rates down.
8. a and c will increase the quantity of loans. More people who want to borrow will result in more loans being given, as will more people who want to lend.
9. A price floor prevents a price from falling below a certain level, but has no effect on prices above that level. It will have its biggest effect in creating excess supply (as measured by the entire area inside the dotted lines on the graph, from D to S) if it is substantially above the equilibrium price. This is illustrated in the following figure.

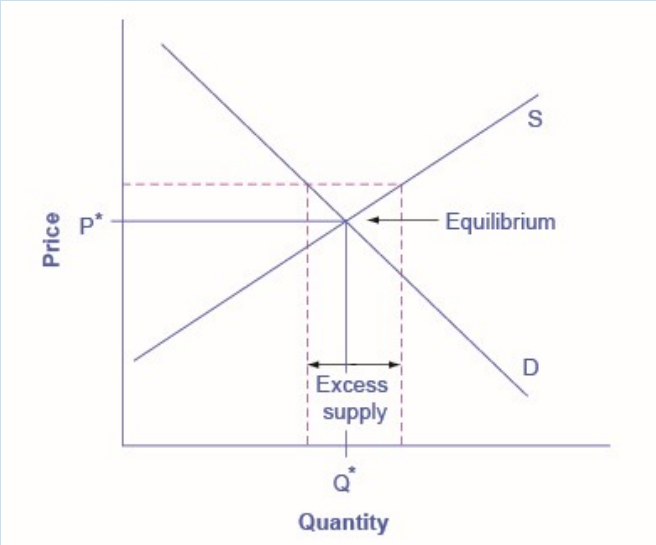


Question 9 Figure 1.8A: Substantially Above Equilibrium Price. Figure by Steven A. Greenlaw & David Shapiro (OpenStax), licensed under CC BY 4.0.

Question 9 Figure 1.8A: Substantially Above Equilibrium Price (Text Version)

The vertical axis is Price (P) and the horizontal axis is Quantity (Q). The supply curve (S) slopes upward from left to right the demand curve (D) slopes downward from left to right. The equilibrium occurs where S and D intersect, at point P* and Q*. The graph shows a dashed price floor line substantially above the equilibrium price with excess supply beneath the equilibrium.

It will have a lesser effect if it is slightly above the equilibrium price. This is illustrated in the next figure.

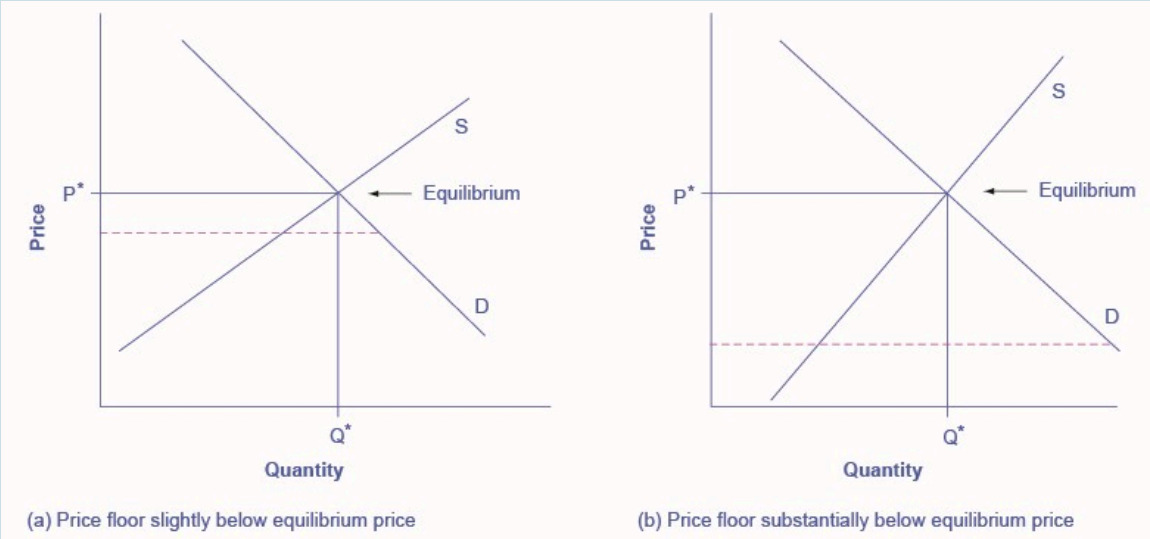


Question 9 Figure 1.8B: Slightly Above Equilibrium Price. Figure by Steven A. Greenlaw & David Shapiro (OpenStax), licensed under CC BY 4.0.

Question 9 Figure 1.8B: Slightly Above Equilibrium Price (Text Version)

The vertical axis is Price (P) and the horizontal axis is Quantity (Q). The supply curve (S) slopes more gradually upward from left to right then Question 9 Figure 1.8A . The demand curve (D) slopes downward from left to right. The equilibrium occurs where S and D intersect, at point P* and Q*. The graph shows a dashed price floor line that is just slightly above equilibrium and there is less excess supply.

It will have no effect if it is set either slightly or substantially below the equilibrium price, since an equilibrium price above a price floor will not be affected by that price floor. The following figure illustrates these situations.



Question 9 Figure 1.8C: Set Either Slightly or Substantially Below the Equilibrium Price. Figure by Steven A. Greenlaw & David Shapiro (OpenStax), licensed under CC BY 4.0.

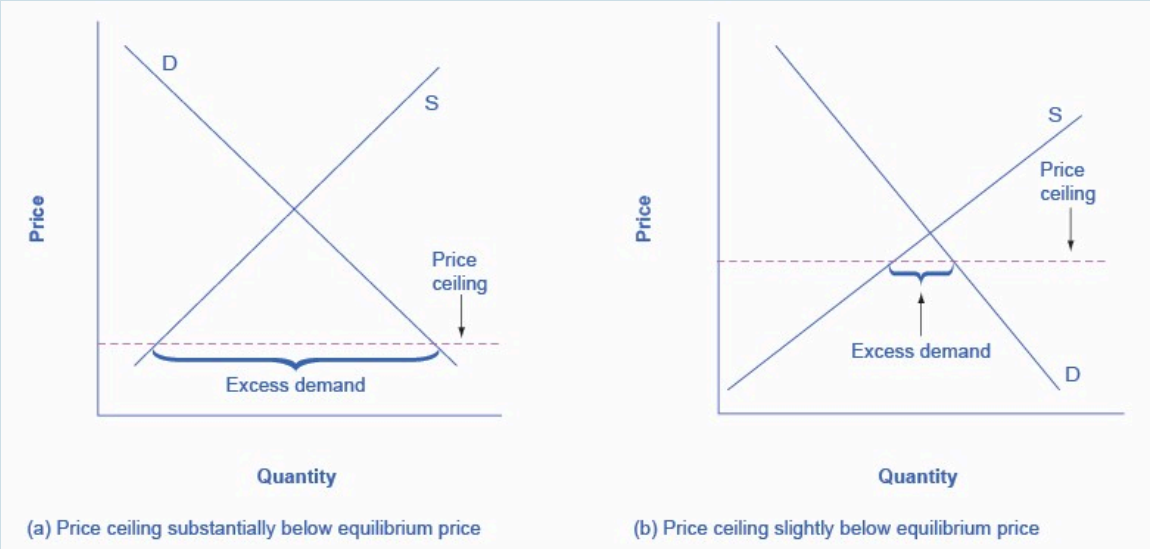
Question 9 Figure 1.8C: Set Either Slightly or Substantially Below the Equilibrium Price (Text Version)

There are two graphs with the same vertical axis is Price (P) and the horizontal axis is Quantity (Q).

Graph A: The supply curve (S) slopes more gradually upward from left to right and the demand curve (D) slopes downward from left to right. The equilibrium occurs where S and D intersect, at point P* and Q*. Shows a dashed price floor line that is just slightly below equilibrium

Graph B: The supply curve (S) slopes upward from left to right and the demand curve (D) slopes downward from left to right. The equilibrium occurs where S and D intersect, at point P* and Q*. Shows a dashed price floor line that is substantially below equilibrium.

10. **Question 10)** A price ceiling prevents a price from rising above a certain level, but has no effect on prices below that level. It will have its biggest effect in creating excess demand if it is substantially below the equilibrium price. The following figure illustrates these situations.



Question 10 Figure 1.8D: Excess Demand if it is Substantially Below the Equilibrium Price. Figure by Steven A. Greenlaw & David Shapiro (OpenStax), licensed by CC BY 4.0.

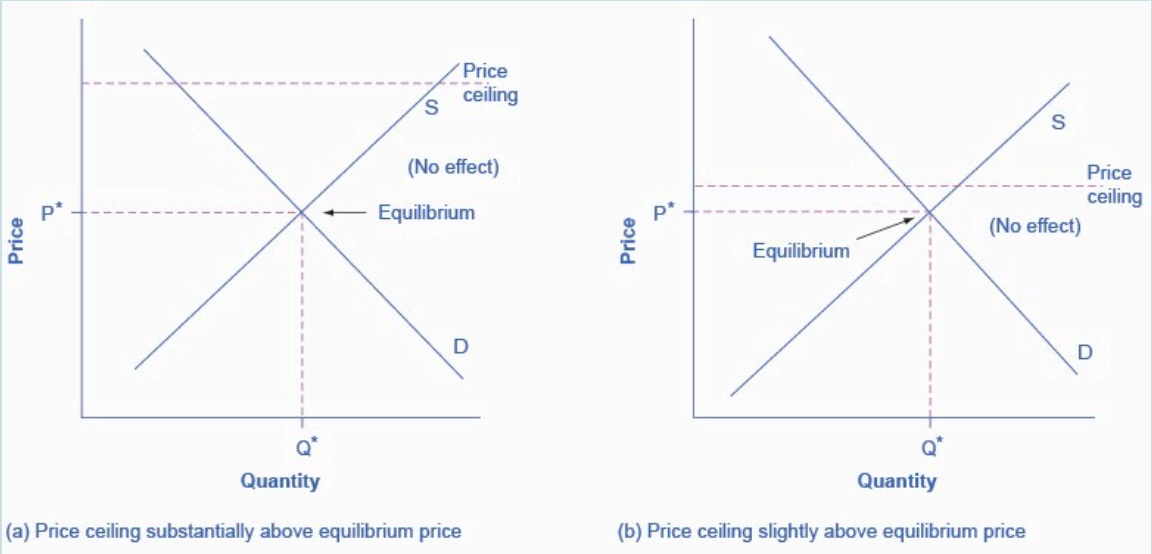
Question 10 Figure 1.8D: Excess Demand if it is Substantially Below the Equilibrium Price (Text Version)

There are two graphs with the same vertical axis is Price (P) and the horizontal axis is Quantity (Q).

Graph A: Price ceiling substantially below equilibrium price. The supply curve (S) slopes upward from left to right. The demand curve (D) occurs slightly to the left slopes downward from left to right. Shows a dashed price ceiling line that is substantially below equilibrium has more excess demand.

Graph B: Price ceiling slightly below equilibrium price. The supply curve (S) occurs slightly to lower to the left and slopes more gradually upward from left to right. The demand curve (D) slopes downward from left to right. Shows a dashed price floor line that is just slightly below equilibrium has less excess demand.

When the price ceiling is set substantially or slightly above the equilibrium price, it will have no effect on creating excess demand. The following figure illustrates these situations.



Question 10 Figure 1.8E: Price Ceiling is Set Substantially or Slightly Above the Equilibrium Price. Figure by Steven A. Greenlaw & David Shapiro (OpenStax), licensed under CC BY 4.0.

Question 10 Figure 1.8E: Price Ceiling is Set Substantially or Slightly Above the Equilibrium Price (Text Version)

There are two graphs with the same vertical axis is Price (P) and the horizontal axis is Quantity (Q).

Graph A: Price ceiling substantially above equilibrium price. The supply curve (S) slopes upward from left to right and the demand curve (D) slopes downward from left to right. The equilibrium occurs where S and D intersect, at point P* and Q*. Shows a dashed price ceiling line that is substantially above equilibrium.

Graph B: Price ceiling slightly above equilibrium price. The supply curve (S) slopes upward from left to right and the demand curve (D) slopes downward from left to right. The equilibrium occurs where S and D intersect, at point P* and Q*. Shows a dashed price ceiling line that is just slightly above equilibrium.

11. Neither. A shift in demand or supply means that at every price, either a greater or a lower quantity is demanded or supplied. A price floor does not shift a demand curve or a supply curve. However, if the price floor is set above the equilibrium, it will cause the quantity supplied on the supply curve to be greater than the quantity demanded on the demand curve, leading to excess supply.
12. Neither. A shift in demand or supply means that at every price, either a greater or a lower quantity is demanded or supplied. A price ceiling does not shift a demand curve or a supply

curve. However, if the price ceiling is set below the equilibrium, it will cause the quantity demanded on the demand curve to be greater than the quantity supplied on the supply curve, leading to excess demand.

Critical Thinking Questions

1. Other than the demand for labour, what would be another example of a "derived demand?"
2. Suppose that a 5% increase in the minimum wage causes a 5% reduction in employment. How would this affect employers and how would it affect workers? In your opinion, would this be a good policy?
3. Under what circumstances would a minimum wage be a nonbinding price floor? Under what circumstances would a living wage be a binding price floor?
4. Suppose the U.S. economy began to grow more rapidly than other countries in the world. What would be the likely impact on U.S. financial markets as part of the global economy?
5. If the government imposed a federal interest rate ceiling of 20% on all loans, who would gain and who would lose?
6. Why are the factors that shift the demand for a product different from the factors that shift the demand for labour? Why are the factors that shift the supply of a product different from those that shift the supply of labour?
7. During a discussion several years ago on building a pipeline to Alaska to carry natural gas, the U.S. Senate passed a bill stipulating that there should be a guaranteed minimum price for the natural gas that would flow through the pipeline. The thinking behind the bill was that if private firms had a guaranteed price for their natural gas, they would be more willing to drill for gas and to pay to build the pipeline.

    a. Using the demand and supply framework, predict the effects of this price floor on the price, quantity demanded, and quantity supplied.
    b. With the enactment of this price floor for natural gas, what are some of the likely unintended consequences in the market?

c. Suggest some policies other than the price floor that the government can pursue if it wishes to encourage drilling for natural gas and for a new pipeline in Alaska.

Review Questions

1. What is the "price" commonly called in the labour market?
2. Are households demanders or suppliers in the goods market? Are firms demanders or suppliers in the goods market? What about the labour market and the financial market?
3. Name some factors that can cause a shift in the demand curve in labour markets.
4. Name some factors that can cause a shift in the supply curve in labour markets.
5. How do economists define equilibrium in financial markets?
6. What would be a sign of a shortage in financial markets?
7. Would usury laws help or hinder resolution of a shortage in financial markets?
8. Whether the product market or the labour market, what happens to the equilibrium price and quantity for each of the four possibilities: increase in demand, decrease in demand, increase in supply, and decrease in supply.

Exercises

1. Identify each of the following as involving either demand or supply. Draw a circular flow diagram and label the flows A through F. (Some choices can be on both sides of the goods market.)

    a. Households in the labour market

b. Firms in the goods market
c. Firms in the financial market
d. Households in the goods market
e. Firms in the labour market
f. Households in the financial market

2. Predict how each of the following events will raise or lower the equilibrium wage and quantity of oil workers in Texas. In each case, sketch a demand and supply diagram to illustrate your answer.

   a. The price of oil rises.
   b. New oil-drilling equipment is invented that is cheap and requires few workers to run.
   c. Several major companies that do not drill oil open factories in Texas, offering many well-paid jobs outside the oil industry.
   d. Government imposes costly new regulations to make oil-drilling a safer job.

3. Predict how each of the following economic changes will affect the equilibrium price and quantity in the financial market for home loans. Sketch a demand and supply diagram to support your answers.

   a. The number of people at the most common ages for home-buying increases.
   b. People gain confidence that the economy is growing and that their jobs are secure.
   c. Banks that have made home loans find that a larger number of people than they expected are not repaying those loans.
   d. Because of a threat of a war, people become uncertain about their economic future.
   e. The overall level of saving in the economy diminishes.
   f. The federal government changes its bank regulations in a way that makes it cheaper and easier for banks to make home loans.

4. Table 1.8a (seen below) shows the amount of savings and borrowing in a market for loans to purchase homes, measured in millions of dollars, at various interest rates. What is the equilibrium interest rate and quantity in the capital financial market? How can you tell? Now, imagine that because of a shift in the perceptions of foreign investors, the supply curve shifts so that there will be $10 million less supplied at every interest rate. Calculate the new equilibrium interest rate and quantity, and explain why the direction of the interest rate shift makes intuitive sense.

Table 1.8a

Interest Rate (%)	Qs	Qd
5	130	170
6	135	150
7	140	140
8	145	135
9	150	125
10	155	110

5. Imagine that to preserve the traditional way of life in small fishing villages, a government decides to impose a price floor that will guarantee all fishermen a certain price for their catch.
    1. Using the demand and supply framework, predict the effects on the price, quantity demanded, and quantity supplied.
    2. With the enactment of this price floor for fish, what are some of the likely unintended consequences in the market?
    3. Suggest some policies other than the price floor to make it possible for small fishing villages to continue.
6. What happens to the price and the quantity bought and sold in the cocoa market if countries producing cocoa experience a drought and a new study is released demonstrating the health benefits of cocoa? Illustrate your answer with a demand and supply graph.

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1.9 - READING LIST

1. Artificial Intelligence has changed our world [New Tab] (https://www.meer.com/en/64215-artificial-intelligence-has-changed-our-world)
2. Everything you need to know about the Fourth Industrial Revolution [New Tab] (https://www.cnbc.com/2019/01/16/fourth-industrial-revolution-explained-davos-2019.html)

Reading List compiled by Norm Smith.

CHAPTER 2 - INTRODUCTION TO CHOICE IN A WORLD OF SCARCITY

Learning Objectives

- How Individuals Make Choices Based on Their Budget Constraint
- The Production Possibilities Frontier and Social Choices
- Confronting Objections to the Economic Approach

Bring It Home

Choices … to What Degree?

In 2015, the median income for workers who hold master's degrees varies from males to females. The average of the two is $2,951 weekly. Multiply this average by 52 weeks, and you get an average salary of $153,452. Compare that to the median weekly earnings for a full-time worker over 25 with no higher than a bachelor's degree: $1,224 weekly and $63,648 a year. What about those with no higher than a high school diploma in 2015? They earn just $664 weekly and $34,528 over 12 months. In other words, says the Bureau of Labor Statistics (BLS), earning a bachelor's degree boosted salaries 54% over what you would have earned if you had stopped your education after high school. A master's degree yields a salary almost double that of a high school diploma.

Given these statistics, we might expect many people to choose to go to college and at least earn a bachelor's degree. Assuming that people want to improve their material well-being, it seems like they would make those choices that provide them with the greatest opportunity to consume goods and services. As it turns out, the analysis is not nearly as simple as this. In fact, in 2014, the BLS reported that while almost 88% of the population in the United States had a high school diploma, only 33.6%

of 25 to 65 year olds had bachelor's degrees, and only 7.4% of 25 to 65 year olds in 2014 had earned a master's.

This brings us to the subject of this chapter: why people make the choices they make and how economists explain those choices.

You will learn quickly when you examine the relationship between economics and scarcity that choices involve tradeoffs. Every choice has a cost.

In 1968, the Rolling Stones recorded "You Can't Always Get What You Want." Economists chuckled, because they had been singing a similar tune for decades. English economist Lionel Robbins (1898–1984), in his *Essay on the Nature and Significance of Economic Science* in 1932, described not always getting what you want in this way:

"The time at our disposal is limited. There are only twenty-four hours in the day. We have to choose between the different uses to which they may be put. ... Everywhere we turn, if we choose one thing we must relinquish others which, in different circumstances, we would wish not to have relinquished. Scarcity of means to satisfy given ends is an almost ubiquitous condition of human nature."

Because people live in a world of scarcity, they cannot have all the time, money, possessions, and experiences they wish. Neither can society.

This chapter will continue our discussion of scarcity and the economic way of thinking by first introducing three critical concepts: opportunity cost, marginal decision making, and diminishing returns. Later, it will consider whether the economic way of thinking accurately describes either how we *make* choices and how we *should* make them.

Attribution

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2.1 - HOW INDIVIDUALS MAKE CHOICES BASED ON THEIR BUDGET CONSTRAINT

Learning Objectives

- Calculate and graph budget constraints
- Explain opportunity sets and opportunity costs
- Evaluate the law of diminishing marginal utility
- Explain how marginal analysis and utility influence choices

Consider the typical consumer's budget problem. Consumers have a limited amount of income to spend on the things they need and want. Suppose Alphonso has $10 in spending money each week that he can allocate between bus tickets for getting to work and the burgers that he eats for lunch. Burgers cost $2 each, and bus tickets are 50 cents each. We can see Alphonso's budget problem in Figure 2.1a.

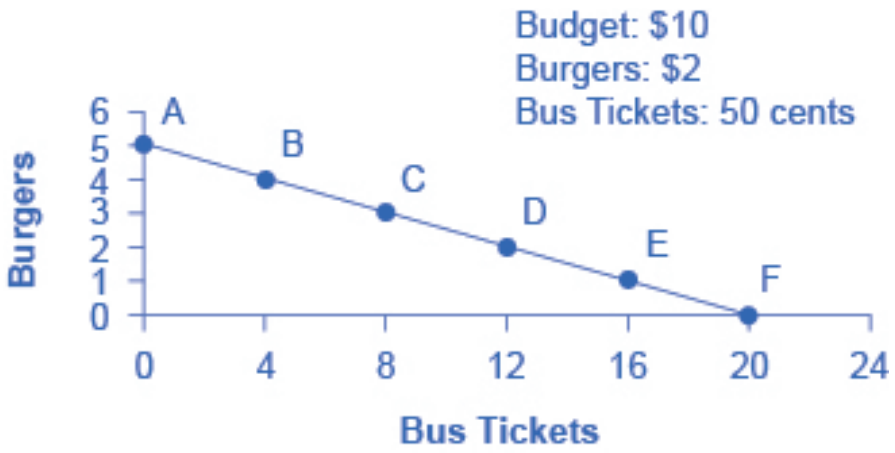

Figure 2.1a The Budget Constraint: Alphonso's Consumption Choice Opportunity Frontier. Each point on the budget constraint represents a combination of burgers and bus tickets whose total cost adds up to Alphonso's budget of $10. The relative price of burgers and bus tickets determines the slope of the budget constraint. All along the budget set, giving up one burger means gaining four bus tickets. The Budget Constraint: Alphonso's Consumption Choice Opportunity Frontier by Steven A. Greenlaw & David Shapiro (OpenStax), licensed under CC BY 4.0.

Figure 2.1a The Budget Constraint: Alphonso's Consumption Choice Opportunity Frontier (Text version)

Figure 2.1a The **Budget Constraint**: Alphonso's Consumption Choice Opportunity Frontier graph shows the budget line as a downward slope that connects all points)A-F) and represents the opportunity set of burgers and bus tickets. The vertical axis is burger purchases ranging from 0-6 and the horizontal axis is bus ticket purchase ranging from 0 to 24.

Description of Points in Figure 2.1a The Budget Constraint: Alphonso's Consumption Choice Opportunity Frontier graph

Points	Point location in the graph
A	5 burger purchases , 0 bus ticket purchases
B	4 burger purchases , 4 bus ticket purchases
C	8 burger purchases , 3 bus ticket purchases
D	2 burger purchases , 12 bus ticket purchases
E	1 burger purchases , 16 bus ticket purchases
F	0 burger purchases, 20 bus ticket purchases

If Alphonso spends all his money on burgers, he can afford five per week. ($10 per week \div $2 per burger = 5 burgers per week .) However, if he does this, he will not be able to afford any bus tickets. Point A in the figure shows the choice (zero bus tickets and five burgers). Alternatively, if Alphonso spends all his money on bus tickets, he can afford 20 per week. ($10 per week $0.50 per bus ticket = 20 bus tickets per week.) Then, however, he will not be able to afford any burgers. Point F shows this alternative choice (20 bus tickets and zero burgers).

If we connect all the points between A and F, we get Alphonso's **budget constraint**. This indicates all the combination of burgers and bus tickets Alphonso can afford, given the price of the two goods and his budget amount.

If Alphonso is like most people, he will choose some combination that includes both bus tickets and burgers. That is, he will choose some combination on the budget constraint that is between points A and F. Every point on (or inside) the constraint shows a combination of burgers and bus tickets that Alphonso can afford. Any point outside the constraint is not affordable, because it would cost more money than Alphonso has in his budget.

The budget constraint clearly shows the tradeoff Alphonso faces in choosing between burgers and bus tickets. Suppose he is currently at point D, where he can afford 12 bus tickets and two burgers. What would it cost Alphonso for one more burger? It would be natural to answer $2, but that's not the way economists think. Instead they ask, how many bus tickets would Alphonso have to give up to get one more burger, while staying within his budget? Since bus tickets cost 50 cents, Alphonso would have to give up four to afford one more burger. That is the true cost to Alphonso.

The Concept of Opportunity Cost

Economists use the term **opportunity cost** to indicate what one must give up to obtain what he or she desires. The idea behind opportunity cost is that the cost of one item is the lost opportunity to do or consume something else. In short, opportunity cost is the value of the next best alternative. For Alphonso, the opportunity cost of a burger is the four bus tickets he would have to give up. He would decide whether or not to choose the burger depending on whether the value of the burger exceeds the value of the forgone alternative—in this case, bus tickets. Since people must choose, they inevitably face tradeoffs in which they have to give up things they desire to obtain other things they desire more.

Link It Up

Linestanding.com [New Tab] (http://www.linestanding.com/) is an example of opportunity cost—paying someone else to wait in line for you.

A fundamental principle of economics is that every choice has an opportunity cost. If you sleep through your economics class, the opportunity cost is the learning you miss from not attending class. If you spend your income on video games, you cannot spend it on movies. If you choose to marry one person, you give up the opportunity to marry anyone else. In short, opportunity cost is all around us and part of human existence.

Identifying Opportunity Cost

In many cases, it is reasonable to refer to the opportunity cost as the price. If your cousin buys a new bicycle for $300, then $300 measures the amount of "other consumption" that he has forsaken. For practical purposes, there may be no special need to identify the specific alternative product or products that he could have bought with that $300, but sometimes the price as measured in dollars may not accurately capture the true opportunity cost. This problem can loom especially large when costs of time are involved.

For example, consider a boss who decides that all employees will attend a two-day retreat to "build team spirit." The out-of-pocket monetary cost of the event may involve hiring an outside consulting firm to run the retreat, as well as room and board for all participants. However, an opportunity cost exists as well: during the two days of the retreat, none of the employees are doing any other work.

Attending college is another case where the opportunity cost exceeds the monetary cost. The out-of-pocket costs of attending college include tuition, books, room and board, and other expenses. However, in addition, during the hours that you are attending class and studying, it is impossible to work at a paying job. Thus, college imposes both an out-of-pocket cost and an opportunity cost of lost earnings.

Work It Out

What is the opportunity cost associated with increased airport security measures?

After the terrorist plane hijackings on September 11, 2001, many steps were proposed to improve air travel safety. For example, the federal government could provide armed "sky marshals" who would

travel inconspicuously with the rest of the passengers. The cost of having a sky marshal on every flight would be roughly $3 billion per year. Retrofitting all U.S. planes with reinforced cockpit doors to make it harder for terrorists to take over the plane would have a price tag of $450 million. Buying more sophisticated security equipment for airports, like three-dimensional baggage scanners and cameras linked to face recognition software, could cost another $2 billion.

However, the single biggest cost of greater airline security does not involve spending money. It is the opportunity cost of additional waiting time at the airport. According to the United States Department of Transportation (DOT), there were 895.5 million systemwide (domestic and international) scheduled service passengers in 2015. Since the 9/11 hijackings, security screening has become more intensive, and consequently, the procedure takes longer than in the past. Say that, on average, each air passenger spends an extra 30 minutes in the airport per trip. Economists commonly place a value on time to convert an opportunity cost in time into a monetary figure. Because many air travelers are relatively high-paid business people, conservative estimates set the average price of time for air travelers at $20 per hour. By these back-of-the-envelope calculations, the opportunity cost of delays in airports could be as much as 800 million × 0.5 hours × $20/hour, or $8 billion per year. Clearly, the opportunity costs of waiting time can be just as important as costs that involve direct spending.

In some cases, realizing the opportunity cost can alter behavior. Imagine, for example, that you spend $8 on lunch every day at work. You may know perfectly well that bringing a lunch from home would cost only $3 a day, so the opportunity cost of buying lunch at the restaurant is $5 each day (that is, the $8 buying lunch costs minus the $3 your lunch from home would cost). Five dollars each day does not seem to be that much. However, if you project what that adds up to in a year—250 days a year × $5 per day equals $1,250, the cost, perhaps, of a decent vacation. If you describe the opportunity cost as "a nice vacation" instead of "$5 a day," you might make different choices.

Marginal Decision-Making and Diminishing Marginal Utility

The budget constraint framework helps to emphasize that most choices in the real world are not about getting all of one thing or all of another; that is, they are not about choosing either the point at one end of the budget constraint or else the point all the way at the other end. Instead, most choices involve **marginal analysis**, which means examining the benefits and costs of choosing a little more or a little less of a good. People naturally compare costs and benefits, but often we look at total costs and total benefits, when the optimal choice necessitates comparing how costs and benefits change from one option to another. You might think of marginal analysis as "change analysis." Marginal analysis is used throughout economics.

We now turn to the notion of **utility**. People desire goods and services for the satisfaction or utility those goods and services provide. Utility is subjective but that does not make it less real. Economists typically

assume that the more of some good one consumes (for example, slices of pizza), the more utility one obtains. At the same time, the utility a person receives from consuming the first unit of a good is typically more than the utility received from consuming the fifth or the tenth unit of that same good. When Alphonso chooses between burgers and bus tickets, for example, the first few bus rides that he chooses might provide him with a great deal of utility—perhaps they help him get to a job interview or a doctor's appointment. However, later bus rides might provide much less utility—they may only serve to kill time on a rainy day. Similarly, the first burger that Alphonso chooses to buy may be on a day when he missed breakfast and is ravenously hungry. However, if Alphonso has a burger every single day, the last few burgers may taste pretty boring. The general pattern that consumption of the first few units of any good tends to bring a higher level of utility to a person than consumption of later units is a common pattern. Economists refer to this pattern as the **law of diminishing marginal utility**, which means that as a person receives more of a good, the additional (or marginal) utility from each additional unit of the good declines. In other words, the first slice of pizza brings more satisfaction than the sixth.

The law of diminishing marginal utility explains why people and societies rarely make all-or-nothing choices. You would not say, "My favorite food is ice cream, so I will eat nothing but ice cream from now on." Instead, even if you get a very high level of utility from your favorite food, if you ate it exclusively, the additional or marginal utility from those last few servings would not be very high. Similarly, most workers do not say: "I enjoy leisure, so I'll never work." Instead, workers recognize that even though some leisure is very nice, a combination of all leisure and no income is not so attractive. The budget constraint framework suggests that when people make choices in a world of scarcity, they will use marginal analysis and think about whether they would prefer a little more or a little less.

A rational consumer would only purchase additional units of some product as long as the marginal utility exceeds the opportunity cost. Suppose Alphonso moves down his budget constraint from Point A to Point B to Point C and further. As he consumes more bus tickets, the marginal utility of bus tickets will diminish, while the opportunity cost, that is, the marginal utility of foregone burgers, will increase. Eventually, the opportunity cost will exceed the marginal utility of an additional bus ticket. If Alphonso is rational, he won't purchase more bus tickets once the marginal utility just equals the opportunity cost. While we can't (yet) say exactly how many bus tickets Alphonso will buy, that number is unlikely to be the most he can afford, 20.

Sunk Costs

In the budget constraint framework, all decisions involve what will happen next: that is, what quantities of goods will you consume, how many hours will you work, or how much will you save. These decisions do not look back to past choices. Thus, the budget constraint framework assumes that **sunk costs**, which are costs that were incurred in the past and cannot be recovered, should not affect the current decision.

Consider the case of Selena, who pays $8 to see a movie, but after watching the film for 30 minutes, she knows that it is truly terrible. Should she stay and watch the rest of the movie because she paid for the ticket, or should she leave? The money she spent is a sunk cost, and unless the theater manager is sympathetic, Selena will not get a refund. However, staying in the movie still means paying an opportunity cost in time. Her choice is whether to spend the next 90 minutes suffering through a cinematic disaster or to do something—anything—else. The lesson of sunk costs is to forget about the money and time that is irretrievably gone and instead to focus on the marginal costs and benefits of current and future options.

For people and firms alike, dealing with sunk costs can be frustrating. It often means admitting an earlier error in judgment. Many firms, for example, find it hard to give up on a new product that is doing poorly because they spent so much money in creating and launching the product. However, the lesson of sunk costs is to ignore them and make decisions based on what will happen in the future.

From a Model with Two Goods to One of Many Goods

The budget constraint diagram containing just two goods, like most models used in this book, is not realistic. After all, in a modern economy people choose from thousands of goods. However, thinking about a model with many goods is a straightforward extension of what we discussed here. Instead of drawing just one budget constraint, showing the tradeoff between two goods, you can draw multiple budget constraints, showing the possible tradeoffs between many different pairs of goods. In more advanced classes in economics, you would use mathematical equations that include many possible goods and services that can be purchased, together with their quantities and prices, and show how the total spending on all goods and services is limited to the overall budget available. The graph with two goods that we presented here clearly illustrates that every choice has an opportunity cost, which is the point that does carry over to the real world.

Key Concepts & Summary

Economists see the real world as one of scarcity: that is, a world in which people's desires exceed what is possible. As a result, economic behavior involves tradeoffs in which individuals, firms, and society must forgo something that they desire to obtain things that they desire more. Individuals face the tradeoff of what quantities of goods and services to consume. The budget constraint, which is the frontier of the opportunity set, illustrates the range of available choices. The relative

price of the choices determines the slope of the budget constraint. Choices beyond the budget constraint are not affordable.

Opportunity cost measures cost by what we forgo in exchange. Sometimes we can measure opportunity cost in money, but it is often useful to consider time as well, or to measure it in terms of the actual resources that we must forfeit.

Most economic decisions and tradeoffs are not all-or-nothing. Instead, they involve marginal analysis, which means they are about decisions on the margin, involving a little more or a little less. The law of diminishing marginal utility points out that as a person receives more of something—whether it is a specific good or another resource—the additional marginal gains tend to become smaller. Because sunk costs occurred in the past and cannot be recovered, they should be disregarded in making current decisions.

Attribution

Except where otherwise noted, this chapter is adapted from "How Individuals Make Choices Based on Their Budget Constraint (https://openstax.org/books/principles-microeconomics-2e/pages/2-1-how-individuals-make-choices-based-on-their-budget-constraint)" and "Key Concepts and Summary (https://openstax.org/books/principles-microeconomics-2e/pages/2-key-concepts-and-summary)" In *Principles of Microeconomics 2e* (https://openstax.org/books/principles-microeconomics-2e/pages/1-introduction) (OpenStax) by Steven A. Greenlaw & David Shapiro, licensed under CC BY 4.0./Adaptations include addition of key concepts and summary and the removal of Understanding Budget Constraints, and minor edits.

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2.2 - THE PRODUCTION POSSIBILITIES FRONTIER AND SOCIAL CHOICES

Learning Objectives

- Interpret production possibilities frontier graphs
- Contrast a budget constraint and a production possibilities frontier
- Explain the relationship between a production possibilities frontier and the law of diminishing returns
- Contrast productive efficiency and allocative efficiency
- Define comparative advantage

Just as individuals cannot have everything they want and must instead make choices, society as a whole cannot have everything it might want, either. This section of the chapter will explain the constraints society faces, using a model called the **production possibilities frontier (PPF)**. There are more similarities than differences between individual choice and social choice. As you read this section, focus on the similarities.

Because society has limited resources (e.g., labour, land, capital, raw materials) at any point in time, there is a limit to the quantities of goods and services it can produce. Suppose a society desires two products, healthcare and education. The production possibilities frontier in Figure 2.2a illustrates this situation.

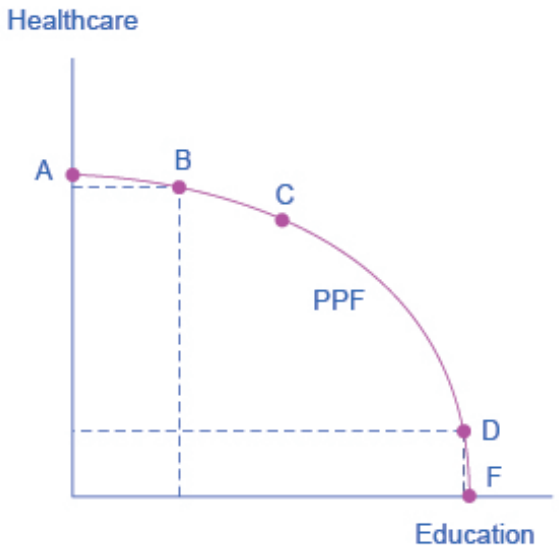

Figure 2.2a A Healthcare vs. Education Production Possibilities Frontier. This production possibilities frontier shows a tradeoff between devoting social resources to healthcare and devoting them to education. At A all resources go to healthcare and at B, most go to healthcare. At D most resources go to education, and at F, all go to education. A Healthcare vs. Education Production Possibilities Frontier by Steven A. Greenlaw & David Shapiro (OpenStax), licensed under CC BY 4.0.

Figure 2.2a shows healthcare on the vertical axis and education on the horizontal axis. If the society were to allocate all of its resources to healthcare, it could produce at point A which is located at the highest point on the healthcare axis and the lowest point (point 0) of education. However, it would not have any resources to produce education. If it were to allocate all of its resources to education, it could produce at point F which is located at the lowest point on the healthcare axis (point 0) and the highest point of education. Alternatively, the society could choose to produce any combination of healthcare and education on the production possibilities frontier. In effect, the production possibilities frontier plays the same role for society as the budget constraint plays for Alphonso. Society can choose any combination of the two goods on or inside the PPF. However, it does not have enough resources to produce outside the PPF. PPF (production possibilities frontier) is depicted by a downward sloping arched curve connecting point A to point F with Point B, C and D occurring along this line to denote possible combinations that could occur along the PPF.

Most importantly, the production possibilities frontier clearly shows the tradeoff between healthcare and education. Suppose society has chosen to operate at point B, and it is considering producing more education. Because the PPF is downward sloping from left to right, the only way society can obtain more education is by giving up some healthcare. That is the tradeoff society faces. Suppose it considers moving from point B to point C. What would the opportunity cost be for the additional education? The opportunity cost would be

the healthcare society has to forgo. Just as with Alphonso's budget constraint, the slope of the production possibilities frontier shows the opportunity cost. By now you might be saying, "Hey, this PPF is sounding like the budget constraint." If so, read the following Clear It Up feature.

Clear It Up

What's the difference between a budget constraint and a PPF?

There are two major differences between a budget constraint and a production possibilities frontier. The first is the fact that the budget constraint is a straight line. This is because its slope is given by the relative prices of the two goods, which from the point of view of an individual consumer, are fixed, so the slope doesn't change. In contrast, the PPF has a curved shape because of the law of the diminishing returns. Thus, the slope is different at various points on the PPF. The second major difference is the absence of specific numbers on the axes of the PPF. There are no specific numbers because we do not know the exact amount of resources this imaginary economy has, nor do we know how many resources it takes to produce healthcare and how many resources it takes to produce education. If this were a real world example, that data would be available.

Whether or not we have specific numbers, conceptually we can measure the opportunity cost of additional education as society moves from point B to point C on the PPF. We measure the additional education by the horizontal distance between B and C. The foregone healthcare is given by the vertical distance between B and C. The slope of the PPF between B and C is (approximately) the vertical distance (the "rise") over the horizontal distance (the "run"). This is the opportunity cost of the additional education.

The PPF and the Law of Increasing Opportunity Cost

The budget constraints that we presented earlier in this chapter, showing individual choices about what quantities of goods to consume, were all straight lines. The reason for these straight lines was that the relative prices of the two goods in the consumption budget constraint determined the slope of the budget constraint. However, we drew the production possibilities frontier for healthcare and education as a curved line. Why does the PPF have a different shape?

To understand why the PPF is curved, start by considering point A at the top left-hand side of the PPF. At point A, all available resources are devoted to healthcare and none are left for education. This situation would be extreme and even ridiculous. For example, children are seeing a doctor every day, whether they are sick or not, but not attending school. People are having cosmetic surgery on every part of their bodies, but no high

school or college education exists. Now imagine that some of these resources are diverted from healthcare to education, so that the economy is at point B instead of point A. Diverting some resources away from A to B causes relatively little reduction in health because the last few marginal dollars going into healthcare services are not producing much additional gain in health. However, putting those marginal dollars into education, which is completely without resources at point A, can produce relatively large gains. For this reason, the shape of the PPF from A to B is relatively flat, representing a relatively small drop-off in health and a relatively large gain in education.

Now consider the other end, at the lower right, of the production possibilities frontier. Imagine that society starts at choice D, which is devoting nearly all resources to education and very few to healthcare, and moves to point F, which is devoting *all* spending to education and none to healthcare. For the sake of concreteness, you can imagine that in the movement from D to F, the last few doctors must become high school science teachers, the last few nurses must become school librarians rather than dispensers of vaccinations, and the last few emergency rooms are turned into kindergartens. The gains to education from adding these last few resources to education are very small. However, the opportunity cost lost to health will be fairly large, and thus the slope of the PPF between D and F is steep, showing a large drop in health for only a small gain in education.

The lesson is not that society is likely to make an extreme choice like devoting no resources to education at point A or no resources to health at point F. Instead, the lesson is that the gains from committing additional marginal resources to education depend on how much is already being spent. If on the one hand, very few resources are currently committed to education, then an increase in resources used can bring relatively large gains. On the other hand, if a large number of resources are already committed to education, then committing additional resources will bring relatively smaller gains.

This pattern is common enough that economists have given it a name: the law of increasing opportunity cost, which holds that as production of a good or service increases, the marginal opportunity cost of producing it increases as well. This happens because some resources are better suited for producing certain goods and services instead of others. When government spends a certain amount more on reducing crime, for example, the original increase in opportunity cost of reducing crime could be relatively small. However, additional increases typically cause relatively larger increases in the opportunity cost of reducing crime, and paying for enough police and security to reduce crime to nothing at all would be a tremendously high opportunity cost.

The curvature of the production possibilities frontier shows that as we add more resources to education, moving from left to right along the horizontal axis, the original increase in opportunity cost is fairly small, but gradually increases. Thus, the slope of the PPF is relatively flat near the vertical-axis intercept. Conversely, as we add more resources to healthcare, moving from bottom to top on the vertical axis, the original declines in opportunity cost are fairly large, but again gradually diminish. Thus, the slope of the PPF is relatively steep

near the horizontal-axis intercept. In this way, the law of increasing opportunity cost produces the outward-bending shape of the production possibilities frontier.

Productive Efficiency and Allocative Efficiency

The study of economics does not presume to tell a society what choice it should make along its production possibilities frontier. In a market-oriented economy with a democratic government, the choice will involve a mixture of decisions by individuals, firms, and government. However, economics can point out that some choices are unambiguously better than others. This observation is based on the concept of efficiency. In everyday usage, efficiency refers to lack of waste. An inefficient machine operates at high cost, while an efficient machine operates at lower cost, because it is not wasting energy or materials. An inefficient organization operates with long delays and high costs, while an efficient organization meets schedules, is focused, and performs within budget.

The production possibilities frontier can illustrate two kinds of efficiency: **productive efficiency** and **allocative efficiency**. Figure 2.2b illustrates these ideas using a production possibilities frontier between healthcare and education.

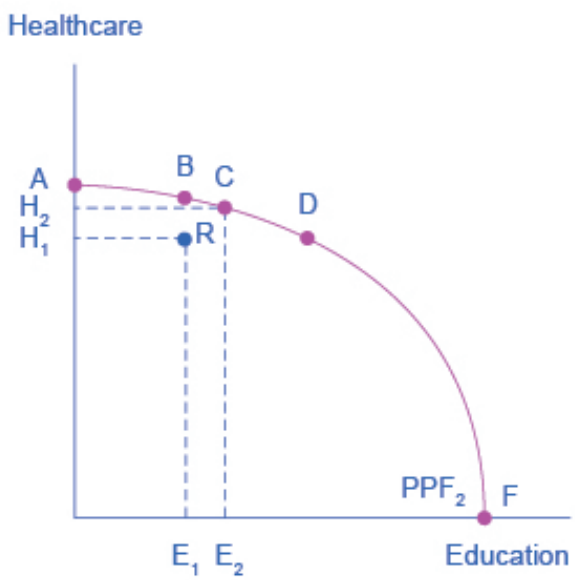

Figure 2.2b Productive and Allocative Efficiency. Productive and Allocative Efficiency by Steven A. Greenlaw & David Shapiro (OpenStax), licensed under CC BY 4.0.

Figure 2.2b Productive and Allocative Efficiency (Text version)

Figure 2.2b has the same base graph as Figure 2.3: healthcare is on the vertical axis and education on the horizontal axis. Point A is located at the lowest point (point 0) of education and the highest point on the healthcare axis. Point F is located at the highest point of education and the lowest point on the healthcare axis (point 0). The PPF (production possibilities frontier) is depicted by a downward sloping arched curve connecting point A to point F with Point B, C and D occurring along this line to denote possible combinations that could occur along the PPF. But it also denotes productive efficiency which is illustrated by Point R located below and to the left of the PPF line at (E_1, H_1) and Point C located at (E_2, H_2).

Productive efficiency means it is impossible to produce more of one good without decreasing the quantity that is produced of another good. Thus, all choices along a given PPF like B, C, and D display productive efficiency, but R does not. Allocative efficiency means that the particular mix of goods being produced—that is, the specific choice along the production possibilities frontier—represents the allocation that society most desires.

Productive efficiency means that, given the available inputs and technology, it is impossible to produce more of one good without decreasing the quantity that is produced of another good. All choices on the PPF in Figure 2.2b, including A, B, C, D, and F, display productive efficiency. As a firm moves from any one of these choices to any other, either healthcare increases and education decreases or vice versa. However, any choice inside the production possibilities frontier is productively inefficient and wasteful because it is possible to produce more of one good, the other good, or some combination of both goods.

For example, point R is productively inefficient because it is possible at choice C to have more of both goods: education on the horizontal axis is higher at point C than point R (E_2 is greater than E_1), and healthcare on the vertical axis is also higher at point C than point R (H_2 is great than H_1).

We can show the particular mix of goods and services produced—that is, the specific combination of selected healthcare and education along the production possibilities frontier—as a ray (line) from the origin to a specific point on the PPF. Output mixes that had more healthcare (and less education) would have a steeper ray, while those with more education (and less healthcare) would have a flatter ray.

Allocative efficiency means that the particular combination of goods and services on the production possibility curve that a society produces represents the combination that society most desires. How to determine what a society desires can be a controversial question, and is usually a discussion in political science, sociology, and philosophy classes as well as in economics. At its most basic, allocative efficiency means producers supply the quantity of each product that consumers demand. Only one of the productively efficient choices will be the allocatively efficient choice for society as a whole.

Why Society Must Choose

Every society faces the problem of scarcity, where limited resources conflict with unlimited needs and wants. The production possibilities curve illustrates the choices involved in this dilemma.

Every economy faces two situations in which it may be able to expand consumption of all goods. In the first case, a society may discover that it has been using its resources inefficiently, in which case by improving efficiency and producing on the production possibilities frontier, it can have more of all goods (or at least more of some and less of none). In the second case, as resources grow over a period of years (e.g., more labour and more capital), the economy grows. As it does, the production possibilities frontier for a society will tend to shift outward and society will be able to afford more of all goods.

However, improvements in productive efficiency take time to discover and implement, and economic growth happens only gradually. Thus, a society must choose between tradeoffs in the present. For government, this process often involves trying to identify where additional spending could do the most good and where reductions in spending would do the least harm. At the individual and firm level, the market economy coordinates a process in which firms seek to produce goods and services in the quantity, quality, and price that people want. However, for both the government and the market economy in the short term, increases in production of one good typically mean offsetting decreases somewhere else in the economy.

The PPF and Comparative Advantage

While every society must choose how much of each good or service it should produce, it does not need to produce every single good it consumes. Often how much of a good a country decides to produce depends on how expensive it is to produce it versus buying it from a different country. As we saw earlier, the curvature of a country's PPF gives us information about the tradeoff between devoting resources to producing one good versus another. In particular, its slope gives the opportunity cost of producing one more unit of the good in the x-axis in terms of the other good (in the y-axis). Countries tend to have different opportunity costs of producing a specific good, either because of different climates, geography, technology, or skills.

Suppose two countries, the US and Brazil, need to decide how much they will produce of two crops: sugar cane and wheat. Due to its climatic conditions, Brazil can produce quite a bit of sugar cane per acre but not much wheat. Conversely, the U.S. can produce large amounts of wheat per acre, but not much sugar cane. Clearly, Brazil has a lower opportunity cost of producing sugar cane (in terms of wheat) than the U.S. The reverse is also true: the U.S. has a lower opportunity cost of producing wheat than Brazil. We illustrate this by the PPFs of the two countries in Figure 2.2c.

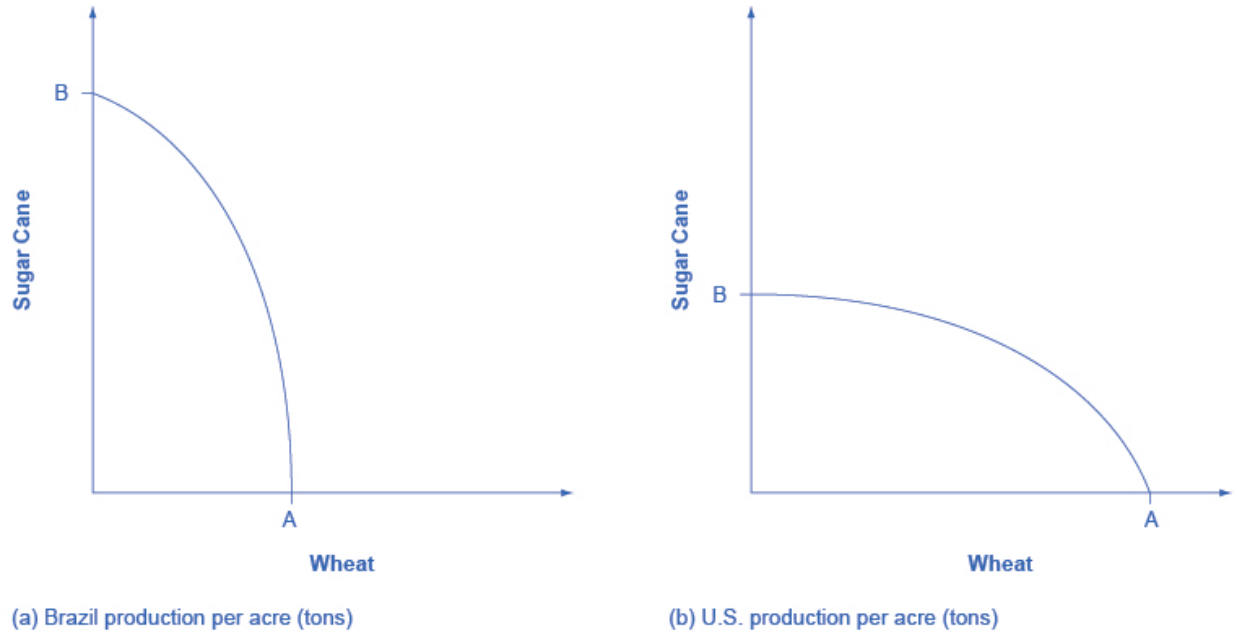

Figure 2.2c Production Possibility Frontier for the U.S. and Brazil. The U.S. PPF is flatter than the Brazil PPF implying that the opportunity cost of wheat in terms of sugar cane is lower in the U.S. than in Brazil. Conversely, the opportunity cost of sugar cane is lower in Brazil. The U.S. has comparative advantage in wheat and Brazil has comparative advantage in sugar cane. Production Possibility Frontier for the U.S. and Brazil by Steven A. Greenlaw & David Shapiro (OpenStax), licensed under CC BY 4.0.

Figure 2.2c Production Possibility Frontier for the U.S. and Brazil (Text version)

Figure 2.2c Production Possibility Frontier for the U.S. and Brazil graph shows two images. Both images have y-axes labeled "Sugar Cane" and x-axes labeled "Wheat." In image (a), Brazil's Sugar Cane production per acre (tons) is nearly double the production of its wheat. The line slopes steeply from high Sugar Cane levels at point B on the y-axis to mid x-axis Wheat levels at point A. In image. (b), the U.S.'s Sugar Cane production per acre (tons) is nearly half the production of its wheat. The line slope curves more gradually from the middle of y-axis Sugar Cane levels at point B to far right Point A (Wheat) on the x-axis. The U.S. PPF is flatter than the Brazil PPF implying that the opportunity cost of wheat in terms of sugar cane is lower in the U.S. than in Brazil. Conversely, the opportunity cost of sugar cane is lower in Brazil. The U.S. has comparative advantage in wheat and Brazil has comparative advantage in sugar cane.

When a country can produce a good at a lower opportunity cost than another country, we say that this country has a **comparative advantage** in that good. Comparative advantage is not the same as absolute advantage, which is when a country can produce more of a good. In our example, Brazil has an absolute advantage in sugar cane and the U.S. has an absolute advantage in wheat. One can easily see this with a simple observation of the extreme production points in the PPFs of the two countries. If Brazil devoted all of its

resources to producing wheat, it would be producing at point A. If however it had devoted all of its resources to producing sugar cane instead, it would be producing a much larger amount than the U.S., at point B.

The slope of the PPF gives the opportunity cost of producing an additional unit of wheat. While the slope is not constant throughout the PPFs, it is quite apparent that the PPF in Brazil is much steeper than in the U.S., and therefore the opportunity cost of wheat generally higher in Brazil. When countries engage in trade, they specialize in the production of the goods in which they have comparative advantage, and trade part of that production for goods in which they do not have comparative advantage. With trade, manufacturers produce goods where the opportunity cost is lowest, so total production increases, benefiting both trading parties.

Key Concepts & Summary

A production possibilities frontier defines the set of choices society faces for the combinations of goods and services it can produce given the resources available. The shape of the PPF is typically curved outward, rather than straight. Choices outside the PPF are unattainable and choices inside the PPF are wasteful. Over time, a growing economy will tend to shift the PPF outwards.

The law of diminishing returns holds that as increments of additional resources are devoted to producing something, the marginal increase in output will become increasingly smaller. All choices along a production possibilities frontier display productive efficiency; that is, it is impossible to use society's resources to produce more of one good without decreasing production of the other good. The specific choice along a production possibilities frontier that reflects the mix of goods society prefers is the choice with allocative efficiency. The curvature of the PPF is likely to differ by country, which results in different countries having comparative advantage in different goods. Total production can increase if countries specialize in the goods in which they have comparative advantage and trade some of their production for the remaining goods.

Attribution

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2.3 - CONFRONTING OBJECTIONS TO THE ECONOMIC APPROACH

Learning Objectives

- Analyze arguments against economic approaches to decision-making
- Interpret a tradeoff diagram
- Contrast normative statements and positive statements

It is one thing to understand the economic approach to decision-making and another thing to feel comfortable applying it. The sources of discomfort typically fall into two categories: that people do not act in the way that fits the economic way of thinking, and that even if people did act that way, they should try not to. Let's consider these arguments in turn.

First Objection: People, Firms, and Society Do Not Act Like This

The economic approach to decision-making seems to require more information than most individuals possess and more careful decision-making than most individuals actually display. After all, do you or any of your friends draw a budget constraint and mutter to yourself about maximizing utility before you head to the shopping mall? Do members of the U.S. Congress contemplate production possibilities frontiers before they vote on the annual budget? The messy ways in which people and societies operate somehow doesn't look much like neat budget constraints or smoothly curving production possibilities frontiers.

However, the economics approach can be a useful way to analyze and understand the tradeoffs of economic decisions. To appreciate this point, imagine for a moment that you are playing basketball, dribbling to the right, and throwing a bounce-pass to the left to a teammate who is running toward the basket. A physicist or

engineer could work out the correct speed and trajectory for the pass, given the different movements involved and the weight and bounciness of the ball. However, when you are playing basketball, you do not perform any of these calculations. You just pass the ball, and if you are a good player, you will do so with high accuracy.

Someone might argue: "The scientist's formula of the bounce-pass requires a far greater knowledge of physics and far more specific information about speeds of movement and weights than the basketball player actually has, so it must be an unrealistic description of how basketball passes actually occur." This reaction would be wrongheaded. The fact that a good player can throw the ball accurately because of practice and skill, without making a physics calculation, does not mean that the physics calculation is wrong.

Similarly, from an economic point of view, someone who shops for groceries every week has a great deal of practice with how to purchase the combination of goods that will provide that person with utility, even if the shopper does not phrase decisions in terms of a budget constraint. Government institutions may work imperfectly and slowly, but in general, a democratic form of government feels pressure from voters and social institutions to make the choices that are most widely preferred by people in that society. Thus, when thinking about the economic actions of groups of people, firms, and society, it is reasonable, as a first approximation, to analyze them with the tools of economic analysis.

Second Objection: People, Firms, and Society Should Not Act This Way

The economics approach portrays people as self-interested. For some critics of this approach, even if self-interest is an accurate description of how people behave, these behaviors are not moral. Instead, the critics argue that people should be taught to care more deeply about others. Economists offer several answers to these concerns.

First, economics is not a form of moral instruction. Rather, it seeks to describe economic behavior as it actually exists. Philosophers draw a distinction between **positive statements**, which describe the world as it is, and **normative statements**, which describe how the world should be. Positive statements are factual. They may be true or false, but we can test them, at least in principle. Normative statements are subjective questions of opinion. We cannot test them since we cannot prove opinions to be true or false. They just are opinions based on one's values. For example, an economist could analyze a proposed subway system in a certain city. If the expected benefits exceed the costs, he concludes that the project is worthy—an example of positive analysis. Another economist argues for extended unemployment compensation during the Great Depression because a rich country like the United States should take care of its less fortunate citizens—an example of normative analysis.

Even if the line between positive and normative statements is not always crystal clear, economic analysis does

try to remain rooted in the study of the actual people who inhabit the actual economy. Fortunately however, the assumption that individuals are purely self-interested is a simplification about human nature. In fact, we need to look no further than to Adam Smith, the very father of modern economics to find evidence of this. The opening sentence of his book, *The Theory of Moral Sentiments*, puts it very clearly: "How selfish soever man may be supposed, there are evidently some principles in his nature, which interest him in the fortune of others, and render their happiness necessary to him, though he derives nothing from it except the pleasure of seeing it." Clearly, individuals are both self-interested and altruistic.

Second, we can label self-interested behavior and profit-seeking with other names, such as personal choice and freedom. The ability to make personal choices about buying, working, and saving is an important personal freedom. Some people may choose high-pressure, high-paying jobs so that they can earn and spend considerable amounts of money on themselves. Others may allocate large portions of their earnings to charity or spend it on their friends and family. Others may devote themselves to a career that can require much time, energy, and expertise but does not offer high financial rewards, like being an elementary school teacher or a social worker. Still others may choose a job that does consume much of their time or provide a high level of income, but still leaves time for family, friends, and contemplation. Some people may prefer to work for a large company; others might want to start their own business. People's freedom to make their own economic choices has a moral value worth respecting.

Clear It Up

Is a diagram by any other name the same?

When you study economics, you may feel buried under an avalanche of diagrams. Your goal should be to recognize the common underlying logic and pattern of the diagrams, not to memorize each one.

This chapter uses only one basic diagram, although we present it with different sets of labels. The consumption budget constraint and the production possibilities frontier for society, as a whole, are the same basic diagram. Figure 2.3a shows an individual budget constraint and a production possibilities frontier for two goods, Good 1 and Good 2. The tradeoff diagram always illustrates three basic themes: scarcity, tradeoffs, and economic efficiency.

The first theme is scarcity. It is not feasible to have unlimited amounts of both goods. Even if the budget constraint or a PPF shifts, scarcity remains—just at a different level. The second theme is tradeoffs. As depicted in the budget constraint or the production possibilities frontier, it is necessary to forgo some of one good to gain more of the other good. The details of this tradeoff vary. In a budget constraint we determine, the tradeoff is determined by the relative prices of the goods: that is, the relative price of two goods in the consumption choice budget constraint. These tradeoffs appear as a

straight line. However, a curved line represents the tradeoffs in many production possibilities frontiers because the **law of diminishing returns** holds that as we add resources to an area, the marginal gains tend to diminish. Regardless of the specific shape, tradeoffs remain.

The third theme is economic efficiency, or getting the most benefit from scarce resources. All choices on the production possibilities frontier show productive efficiency because in such cases, there is no way to increase the quantity of one good without decreasing the quantity of the other. Similarly, when an individual makes a choice along a budget constraint, there is no way to increase the quantity of one good without decreasing the quantity of the other. The choice on a production possibilities set that is socially preferred, or the choice on an individual's budget constraint that is personally preferred, will display allocative efficiency.

The basic budget constraint/production possibilities frontier diagram will recur throughout this book. Some examples include using these tradeoff diagrams to analyze trade, environmental protection and economic output, equality of incomes and economic output, and the macroeconomic tradeoff between consumption and investment. Do not allow the different labels to confuse you. The budget constraint/production possibilities frontier diagram is always just a tool for thinking carefully about scarcity, tradeoffs, and efficiency in a particular situation.

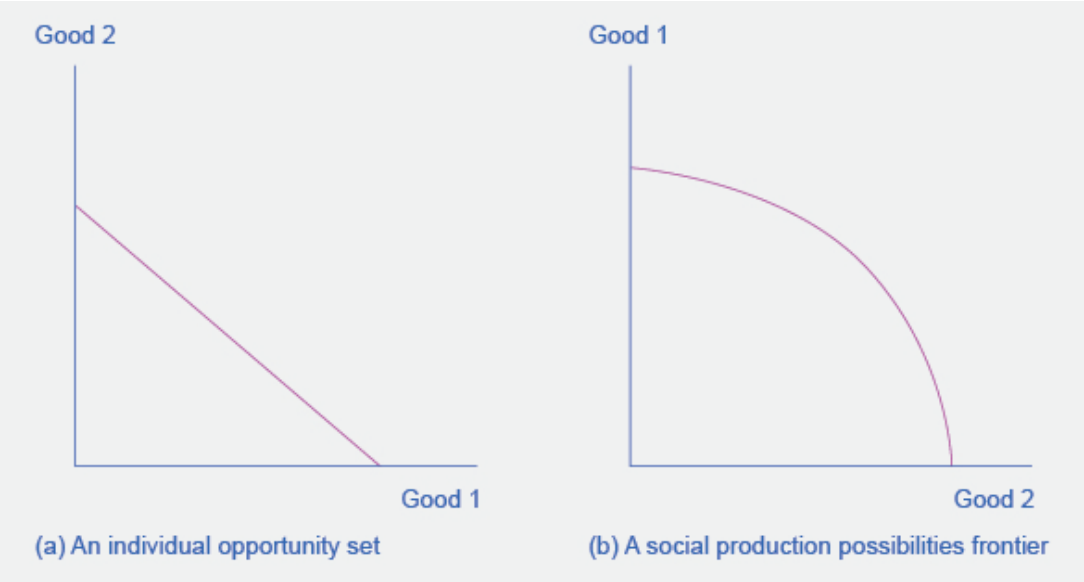

Figure 2.3a The Tradeoff Diagram. Both the individual opportunity set (or budget constraint) and the social production possibilities frontier show the constraints under which individual consumers and society as a whole operate. Both diagrams show the tradeoff in choosing more of one good at the cost of less of the other. The Tradeoff Diagram by Steven A. Greenlaw & David Shapiro (Openstax), licensed under CC BY 4.0

Figure 2.3a The Tradeoff Diagram (Text version)

Two graphs will occur frequently throughout the text. They represent the possible outcomes of

constraints/production of goods. The graph on the left has "Good 2" along the y-axis and "Good 1" along the x-axis and the line is trending straight down from left to right. The graph on the right has "Good 1" along the y-axis and "Good 2" along the x-axis and the line is curving downward left to right. Both the individual opportunity set (or budget constraint) and the social production possibilities frontier show the constraints under which individual consumers and society as a whole operate. Both diagrams show the tradeoff in choosing more of one good at the cost of less of the other.

Third, self-interested behavior can lead to positive social results. For example, when people work hard to make a living, they create economic output. Consumers who are looking for the best deals will encourage businesses to offer goods and services that meet their needs. Adam Smith, writing in *The Wealth of Nations*, named this property the **invisible hand**. In describing how consumers and producers interact in a market economy, Smith wrote:

"Every individual… generally, indeed, neither intends to promote the public interest, nor knows how much he is promoting it. By preferring the support of domestic to that of foreign industry, he intends only his own security; and by directing that industry in such a manner as its produce may be of the greatest value, he intends only his own gain. And he is in this, as in many other cases, led by an invisible hand to promote an end which was no part of his intention…By pursuing his own interest he frequently promotes that of the society more effectually than when he really intends to promote it."

The metaphor of the invisible hand suggests the remarkable possibility that broader social good can emerge from selfish individual actions.

Fourth, even people who focus on their own self-interest in the economic part of their life often set aside their own narrow self-interest in other parts of life. For example, you might focus on your own self-interest when asking your employer for a raise or negotiating to buy a car. Then you might turn around and focus on other people when you volunteer to read stories at the local library, help a friend move to a new apartment, or donate money to a charity. Self-interest is a reasonable starting point for analyzing many economic decisions, without needing to imply that people never do anything that is not in their own immediate self-interest.

Bring It Home

Choices … to What Degree?

What have we learned? We know that scarcity impacts all the choices we make. An economist might argue that people do not obtain a bachelor's or master's degree because they do not have the

resources to make those choices or because their incomes are too low and/or the price of these degrees is too high. A bachelor's or a master's degree may not be available in their **opportunity set**.

The price of these degrees may be too high not only because the actual price, college tuition (and perhaps room and board), is too high. An economist might also say that for many people, the full opportunity cost of a bachelor's or a master's degree is too high. For these people, they are unwilling or unable to make the tradeoff of forfeiting years of working, and earning an income, to earn a degree.

Finally, the statistics we introduced at the start of the chapter reveal information about intertemporal choices. An economist might say that people choose not to obtain a college degree because they may have to borrow money to attend college, and the interest they have to pay on that loan in the future will affect their decisions today. Also, it could be that some people have a preference for current consumption over future consumption, so they choose to work now at a lower salary and consume now, rather than postponing that consumption until after they graduate college.

Key Concepts & Summary

The economic way of thinking provides a useful approach to understanding human behavior. Economists make the careful distinction between positive statements, which describe the world as it is, and normative statements, which describe how the world should be. Even when economics analyzes the gains and losses from various events or policies, and thus draws normative conclusions about how the world should be, the analysis of economics is rooted in a positive analysis of how people, firms, and governments actually behave, not how they should behave.

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2.4 - CONFRONTING SCARCITY: CHOICES IN PRODUCTION

Start Up: Tightening Security at the World's Airports

Do you want safer air travel or not? While that question is seldom asked so bluntly, any person who travels by air can tell you that our collective answer has been "yes," and it has been accompanied by increases in security and its associated costs at airports all over the world. Why? In short, "9/11." Terrorists hijacked four U.S. commercial airliners on September 11, 2001, and the tragic results that followed led to a sharp tightening in airport security.

In an effort to prevent similar disasters, airport security officials scrutinize luggage and passengers more carefully than ever before. In the months following 9/11, delays of as much as three hours were common as agents tried to assure that no weapons or bombs could be smuggled onto another plane.

"What to produce?" is a fundamental economic question. Every economy must answer this question. Should it produce more education, better health care, improved transportation, a cleaner environment? There are limits to what a nation can produce; deciding to produce more of one thing inevitably means producing less of something else. Individuals in much of the world, after the tragedy of 9/11, clearly were willing to give up time, and a fair amount of individual privacy, in an effort to obtain greater security. Nations and individual cities also devoted additional resources to police and other forms of protection in an effort to prevent tragedies such as 9/11. People all over the world chose to produce less of other goods in order to devote more resources to the production of greater security. And, as of early 2009, the choice to devote more resources to security had paid off; there had been no similar hijackings in the United States.

In this chapter we use our first model, the production possibilities model, to examine the nature of choices to produce more of some goods and less of others. As its name suggests, the production possibilities model shows the goods and services that an economy is capable of producing—its possibilities—given the factors of production and the technology it has available. The model specifies what it means to use resources fully and efficiently and suggests some important implications for international trade. We can also use the model to illustrate economic growth, a process that expands the set of production possibilities available to an economy.

We then turn to an examination of the type of economic system in which choices are made. An economic system is the set of rules that define how an economy's resources are to be owned and how decisions about their use are to be made. We will see that economic systems differ in terms of how they answer the

fundamental economic questions. Many of the world's economic systems, including the systems that prevail in North America, Europe, and much of Asia and Central and South America, rely on individuals operating in a market economy to make those choices. Other economic systems, including those of Cuba and North Korea today and historically those of the former Soviet Union, Soviet bloc countries, and China, rely—or relied—on government to make these choices. Different economic systems result in different sets of choices and thus different outcomes; the fact that market economies generally outperform the others when it comes to providing more of the things that people want helps to explain the dramatic shift from government-dominated toward market-dominated economic systems that has occurred throughout the world in the past 25 years. The chapter concludes with an examination of the role of government in an economy that relies chiefly on markets to allocate goods and services.

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2.5 - FACTORS OF PRODUCTION

Learning Objectives

- Define the three factors of production—labour, capital, and natural resources.
- Explain the role of technology and entrepreneurs in the utilization of the economy's factors of production.

Choices concerning what goods and services to produce are choices about an economy's use of its factors of production, the resources available to it for the production of goods and services. The value, or satisfaction, that people derive from the goods and services they consume and the activities they pursue is called utility. Ultimately, then, an economy's factors of production create utility; they serve the interests of people.

The factors of production in an economy are its labour, capital, and natural resources. Labour is the human effort that can be applied to the production of goods and services. People who are employed or would like to be are considered part of the labour available to the economy. Capital is a factor of production that has been produced for use in the production of other goods and services. Office buildings, machinery, and tools are examples of capital. Natural resources are the resources of nature that can be used for the production of goods and services.

In the next three sections, we will take a closer look at the factors of production we use to produce the goods and services we consume. The three basic building blocks of labour, capital, and natural resources may be used in different ways to produce different goods and services, but they still lie at the core of production. We will then look at the roles played by technology and entrepreneurs in putting these factors of production to work. As economists began to grapple with the problems of scarcity, choice, and opportunity cost two centuries ago, they focused on these concepts, just as they are likely to do two centuries hence.

Labour

Labour is human effort that can be applied to production. People who work to repair tires, pilot airplanes, teach children, or enforce laws are all part of the economy's labour. People who would like to work but have not found employment—who are unemployed—are also considered part of the labour available to the economy.

In some contexts, it is useful to distinguish two forms of labour. The first is the human equivalent of a natural resource. It is the natural ability an untrained, uneducated person brings to a particular production process. But most workers bring far more. The skills a worker has as a result of education, training, or experience that can be used in production are called human capital. Students who are attending a college or university are acquiring human capital. Workers who are gaining skills through experience or through training are acquiring human capital. Children who are learning to read are acquiring human capital.

The amount of labour available to an economy can be increased in two ways. One is to increase the total quantity of labour, either by increasing the number of people available to work or by increasing the average number of hours of work per week. The other is to increase the amount of human capital possessed by workers.

Capital

Long ago, when the first human beings walked the earth, they produced food by picking leaves or fruit off a plant or by catching an animal and eating it. We know that very early on, however, they began shaping stones into tools, apparently for use in butchering animals. Those tools were the first capital because they were produced for use in producing other goods—food and clothing.

Modern versions of the first stone tools include saws, meat cleavers, hooks, and grinders; all are used in butchering animals. Tools such as hammers, screwdrivers, and wrenches are also capital. Transportation equipment, such as cars and trucks, is capital. Facilities such as roads, bridges, ports, and airports are capital. Buildings, too, are capital; they help us to produce goods and services.

Capital does not consist solely of physical objects. The score for a new symphony is capital because it will be used to produce concerts. Computer software used by business firms or government agencies to produce goods and services is capital. Capital may thus include physical goods and intellectual discoveries. Any resource is capital if it satisfies two criteria:

1. The resource must have been produced.
2. The resource can be used to produce other goods and services.

One thing that is not considered capital is money. A firm cannot use money directly to produce other goods, so money does not satisfy the second criterion for capital. Firms can, however, use money to acquire capital. Money is a form of financial capital. Financial capital includes money and other "paper" assets (such as stocks and bonds) that represent claims on future payments. These financial assets are not capital, but they can be used directly or indirectly to purchase factors of production or goods and services.

Natural Resources

There are two essential characteristics of natural resources. The first is that they are found in nature—that no human effort has been used to make or alter them. The second is that they can be used for the production of goods and services. That requires knowledge; we must know how to use the things we find in nature before they become resources.

Consider oil. Oil in the ground is a natural resource because it is found (not manufactured) and can be used to produce goods and services. However, 250 years ago oil was a nuisance, not a natural resource. Pennsylvania farmers in the eighteenth century who found oil oozing up through their soil were dismayed, not delighted. No one knew what could be done with the oil. It was not until the mid-nineteenth century that a method was found for refining oil into kerosene that could be used to generate energy, transforming oil into a natural resource. Oil is now used to make all sorts of things, including clothing, drugs, gasoline, and plastic. It became a natural resource because people discovered and implemented a way to use it.

Defining something as a natural resource only if it can be used to produce goods and services does not mean that a tree has value only for its wood or that a mountain has value only for its minerals. If people gain utility from the existence of a beautiful wilderness area, then that wilderness provides a service. The wilderness is thus a natural resource.

The natural resources available to us can be expanded in three ways. One is the discovery of new natural resources, such as the discovery of a deposit of ore containing titanium. The second is the discovery of new uses for resources, as happened when new techniques allowed oil to be put to productive use or sand to be used in manufacturing computer chips. The third is the discovery of new ways to extract natural resources in order to use them. New methods of discovering and mapping oil deposits have increased the world's supply of this important natural resource.

Technology and the Entrepreneur

Goods and services are produced using the factors of production available to the economy. Two things play a crucial role in putting these factors of production to work. The first is technology, the knowledge that can be

applied to the production of goods and services. The second is an individual who plays a key role in a market economy: the entrepreneur. An entrepreneur is a person who, operating within the context of a market economy, seeks to earn profits by finding new ways to organize factors of production. In non-market economies the role of the entrepreneur is played by bureaucrats and other decision makers who respond to incentives other than profit to guide their choices about resource allocation decisions.

The interplay of entrepreneurs and technology affects all our lives. Entrepreneurs put new technologies to work every day, changing the way factors of production are used. Farmers and factory workers, engineers and electricians, technicians and teachers all work differently than they did just a few years ago, using new technologies introduced by entrepreneurs. The music you enjoy, the books you read, the athletic equipment with which you play are produced differently than they were five years ago. The book you are reading was written and manufactured using technologies that did not exist ten years ago. We can dispute whether all the changes have made our lives better. What we cannot dispute is that they have made our lives different.

Key Takeaways

- Factors of production are the resources the economy has available to produce goods and services.
- Labour is the human effort that can be applied to the production of goods and services. Labour's contribution to an economy's output of goods and services can be increased either by increasing the quantity of labour or by increasing human capital.
- Capital is a factor of production that has been produced for use in the production of other goods and services.
- Natural resources are those things found in nature that can be used for the production of goods and services.
- Two keys to the utilization of an economy's factors of production are technology and, in the case of a market economic system, the efforts of entrepreneurs.

Try It!

Explain whether each of the following is labour, capital, or a natural resource.

1. An unemployed factory worker
2. A college professor
3. The library building on your campus
4. Yellowstone National Park
5. An untapped deposit of natural gas
6. The White House
7. The local power plant

Check your Answers[1]

1. **Question 1)** An unemployed factory worker could be put to work; he or she counts as labour. **Question 2)** A college professor is labour. **Question 3)** The library building on your campus is part of capital. **Question 4)** Yellowstone National Park. Those areas of the park left in their natural state are a natural resource. Facilities such as visitors' centers, roads, and campgrounds are capital. **Question 5)** An untapped deposit of natural gas is a natural resource. Once extracted and put in a storage tank, natural gas is capital. **Question 6)** The White House is capital. **Question 7)** The local power plant is capital.

Case in Point: Technology Cuts Costs, Boosts Productivity and Profits

Figure 2.5a. Oil Platform (https://www.flickr.com/photos/jstephenconn/7933885172/in/photolist-d66eDE-4wFxFo-5s7UQ9-bPhyuc-NuDD8R-6uvxKL-bnEtbo-9XVyze-5umBk9-3QoQ5-52RVds-9XVyzc-VvmG8i-4txRE-2k3AFBT-29nyRh1-mpGc9v-2kzAjbp-6NLjbs-hKGB2G-hKFwH4-hKG2Ht-2kT8LCk-2n7HsKv-2jd57T4-7GtThU-2ncgsTL-2eFXLTX-4svmTi-8ntGRC-8K3mnH-ewZKWQ-xzPGM-xzPFo-4RvJjD-2n7FdY4-2eBnBvG-2jmtRqE-2huKv2K-2guzjN4-SzRvrC-3dfdEB-69vEai-ccWzWG-2kT9z3Z-2mjYnqT-2i4K6EB-2hBksnf-2hLfSNc-2j83zMd) by J. Stephen Conn, licensed under CC BY-NC 2.0.

Technology can seem an abstract force in the economy—important, but invisible.

It is not invisible to the 130 people who work on a Shell Oil Company oil rig called Mars, located in the deep waters of the Gulf of Mexico, about 160 miles southwest of Pensacola, Florida. The name Mars reflects its otherworld appearance—it extends 300 feet above the water's surface and has steel tendons that reach 3,000 feet to the floor of the gulf. This facility would not exist if it were not for the development of better oil discovery methods that include three-dimensional seismic mapping techniques, satellites that locate oil from space, and drills that can make turns as drilling

foremen steer them by monitoring them on computer screens from the comfort of Mars. "We don't hit as many dry holes," commented Shell manager Miles Barrett. As a result of these new technologies, over the past two decades, the cost of discovering a barrel of oil dropped from $20 to under $5. And the technologies continue to improve. Three-dimensional surveys are being replaced with four-dimensional ones that allow geologists to see how the oil fields change over time.

The Mars project was destroyed by Hurricane Katrina in 2005. Royal Dutch Shell completed repairs in 2006—at a cost of $200 million. But, the facility is again pumping 130,000 barrels of oil per day and 150 million cubic feet of natural gas—the energy equivalent of an additional 26,000 barrels of oil.

Technology is doing more than helping energy companies track oil deposits. It is changing the way soft drinks and other grocery items are delivered to retail stores. For example, when a PepsiCo delivery driver arrives at a 7-Eleven, the driver keys into a handheld computer the inventory of soft drinks, chips, and other PepsiCo products. The information is transmitted to a main computer at the warehouse that begins processing the next order for that store. The result is that the driver can visit more stores in a day and PepsiCo can cover a given territory with fewer drivers and trucks.

New technology is even helping to produce more milk from cows. Ed Larsen, who owns a 1,200-cow dairy farm in Wisconsin, never gets up before dawn to milk the cows, the way he did as a boy. Rather, the cows are hooked up to electronic milkers. Computers measure each cow's output, and cows producing little milk are sent to a "hospital wing" for treatment. With the help of such technology, as well as better feed, today's dairy cows produce 50% more milk than did cows 20 years ago. Even though the number of dairy cows in the United States in the last 20 years has fallen 17%, milk output has increased 25%.

Who benefits from technological progress? Consumers gain from lower prices and better service. Workers gain: Their greater ability to produce goods and services translates into higher wages. And firms gain: Lower production costs mean higher profits. Of course, some people lose as technology advances. Some jobs are eliminated, and some firms find their services are no longer needed. One can argue about whether particular technological changes have improved our lives, but they have clearly made—and will continue to make—them far different.

Sources: David Ballingrud, "Drilling in the Gulf: Life on Mars," *St. Petersburg Times* (Florida), August 5, 2001, p. 1A; Barbara Hagenbaugh, "Dairy Farms Evolve to Survive," *USA Today*, August 7, 2003, p. 1B; Del Jones and Barbara Hansen, "Special Report: A Who's Who of Productivity," *USA Today*, August 30, 2001, p. 1B; and Christopher Helman, Shell Shocked, *Forbes Online*, July 27, 2006.

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2.6 - THE PRODUCTION POSSIBILITIES CURVE

Learning Objectives

- Explain the concept of the production possibilities curve and understand the implications of its downward slope and bowed-out shape.
- Use the production possibilities model to distinguish between full employment and situations of idle factors of production and between efficient and inefficient production.
- Understand specialization and its relationship to the production possibilities model and comparative advantage.

An economy's factors of production are scarce; they cannot produce an unlimited quantity of goods and services. A production possibilities curve is a graphical representation of the alternative combinations of goods and services an economy can produce. It illustrates the production possibilities model. In drawing the production possibilities curve, we shall assume that the economy can produce only two goods and that the quantities of factors of production and the technology available to the economy are fixed.

Watch It!

Watch the video Production Possibilities Curve Review (https://www.youtube.com/watch?v=O6XL__2CDPU) (6 mins)

One or more interactive elements has been excluded from this version of the text. You can view them online here: https://ecampusontario.pressbooks.pub/laboureconomics/?p=831#oembed-1

Video Source: Jacob Clifford. (2014, August 14). *Production possibilities curve review* [Video] YouTube. https://www.youtube.com/watch?v=O6XL__2CDPU

Constructing a Production Possibilities Curve

To construct a production possibilities curve, we will begin with the case of a hypothetical firm, Alpine Sports, Inc., a specialized sports equipment manufacturer. Christie Ryder began the business 15 years ago with a single ski production facility near Killington ski resort in central Vermont. Ski sales grew, and she also saw demand for snowboards rising—particularly after snowboard competition events were included in the 2002 Winter Olympics in Salt Lake City. She added a second plant in a nearby town. The second plant, while smaller than the first, was designed to produce snowboards as well as skis. She also modified the first plant so that it could produce both snowboards and skis. Two years later she added a third plant in another town. While even smaller than the second plant, the third was primarily designed for snowboard production but could also produce skis.

We can think of each of Ms. Ryder's three plants as a miniature economy and analyze them using the production possibilities model. We assume that the factors of production and technology available to each of the plants operated by Alpine Sports are unchanged.

Suppose the first plant, Plant 1, can produce 200 pairs of skis per month when it produces only skis. When devoted solely to snowboards, it produces 100 snowboards per month. It can produce skis and snowboards simultaneously as well.

The table in Figure 2.6a A Production Possibilities Curve gives three combinations of skis and snowboards that Plant 1 can produce each month. Combination A involves devoting the plant entirely to ski production; combination C means shifting all of the plant's resources to snowboard production; combination B involves the production of both goods. These values are plotted in a production possibilities curve for Plant 1. The curve is a downward-sloping straight line, indicating that there is a linear, negative relationship between the production of the two goods.

Neither skis nor snowboards is an independent or a dependent variable in the production possibilities model; we can assign either one to the vertical or to the horizontal axis. Here, we have placed the number of pairs of

skis produced per month on the vertical axis and the number of snowboards produced per month on the horizontal axis.

The negative slope of the production possibilities curve reflects the scarcity of the plant's capital and labor. Producing more snowboards requires shifting resources out of ski production and thus producing fewer skis. Producing more skis requires shifting resources out of snowboard production and thus producing fewer snowboards.

The slope of Plant 1's production possibilities curve measures the rate at which Alpine Sports must give up ski production to produce additional snowboards. Because the production possibilities curve for Plant 1 is linear, we can compute the slope between any two points on the curve and get the same result. Between points A and B, for example, the slope equals −2 pairs of skis/snowboard (equals −100 pairs of skis/50 snowboards). (Many students are helped when told to read this result as "−2 pairs of skis *per* snowboard.") We get the same value between points B and C, and between points A and C.

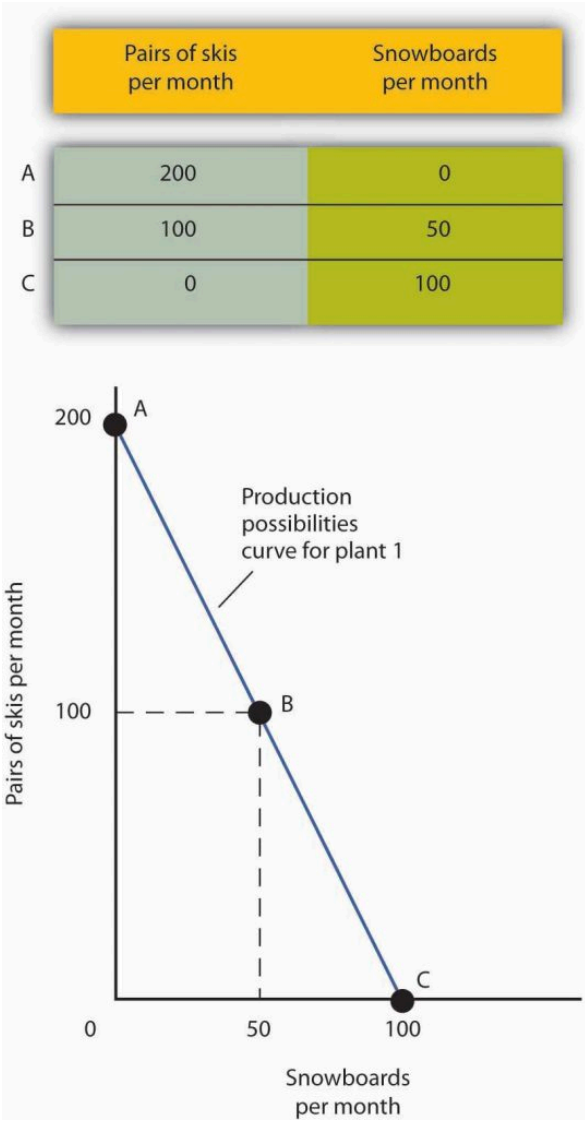


Figure 2.6a. A Production Possibilities Curve. A Production Possibilities Curve by University of Minnesota, licensed under CC BY-NC-SA 4.0.

Figure 2.6a. A Production Possibilities Curve (Text version)

The table shows the combinations of pairs of skis and snowboards that Plant 1 is capable of producing each month. These are also illustrated with a production possibilities curve. Notice that this curve is linear, sloping downward left to right.

Table 2.6a A Production Possibilities Curve

Points	Pairs of skis per month	Snowboards per month
A	200	0
B	100	50
C	0	100

To see this relationship more clearly, examine Figure 2.6b The Slope of a Production Possibilities Curve. Suppose Plant 1 is producing 100 pairs of skis and 50 snowboards per month at point B. Now consider what would happen if Ms. Ryder decided to produce 1 more snowboard per month. The segment of the curve around point B is magnified in Figure 2.6b The Slope of a Production Possibilities Curve. The slope between points B and B′ is −2 pairs of skis/snowboard. Producing 1 additional snowboard at point B′ requires giving up 2 pairs of skis. We can think of this as the opportunity cost of producing an additional snowboard at Plant 1. This opportunity cost equals the absolute value of the slope of the production possibilities curve.

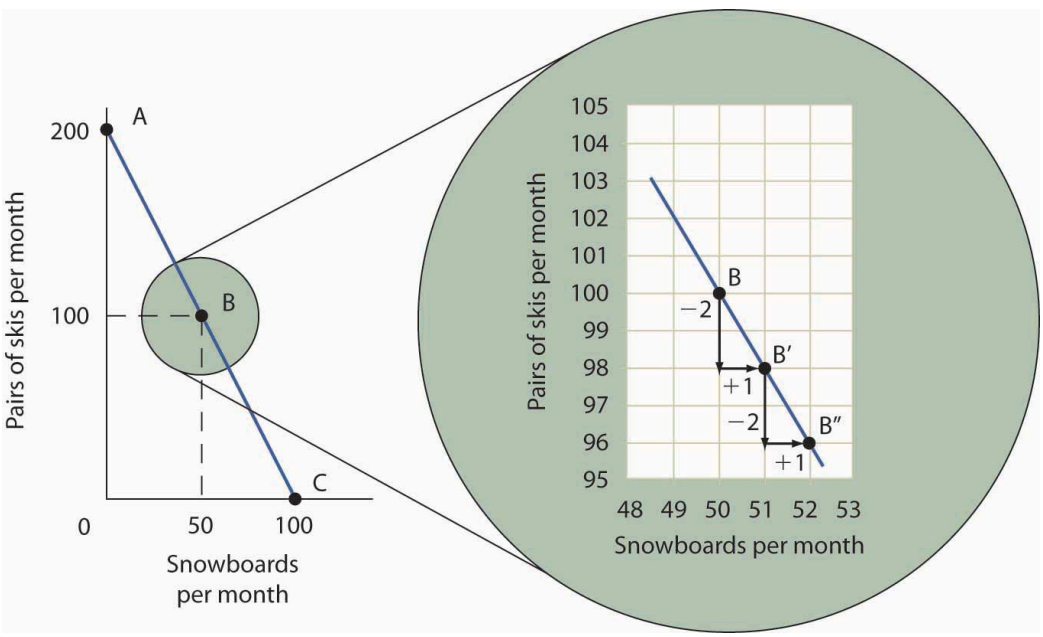


Figure 2.6b. The Slope of a Production Possibilities Curve. The Slope of a Production Possibilities Curve by University of Minnesota, licensed under CC BY-NC-SA 4.0.

Figure 2.6b. The Slope of a Production Possibilities Curve (Text version)

The table shows the data for Figure 2.6b. The vertical axis is pairs of skis per month and the horizontal axis is snowboards per month. The slope is linear, trending downwards left to right.

Table 2.6b. The Slope of a Production Possibilities Curve

Points	Pair of skis per month	Snowboards per month
B	100	50
B’	98	51
B”	96	52

The slope of the linear production possibilities curve in Figure 2.6a “A Production Possibilities Curve” is constant; it is −2 pairs of skis/snowboard. In the section of the curve shown here, the slope can be calculated between points B and B′. Expanding snowboard production to 51 snowboards per month from 50 snowboards per month requires a reduction in ski production to 98 pairs of skis per month from 100 pairs. The slope equals −2 pairs of skis/snowboard (that is, it must give up two pairs of skis to free up the resources necessary to produce one additional snowboard). To shift from B′ to B″, Alpine Sports must give up two more pairs of skis per snowboard. The absolute value of the slope of a production possibilities curve measures the opportunity cost of an additional unit of the good on the horizontal axis measured in terms of the quantity of the good on the vertical axis that must be forgone.

The absolute value of the slope of any production possibilities curve equals the opportunity cost of an additional unit of the good on the horizontal axis. It is the amount of the good on the vertical axis that must be given up in order to free up the resources required to produce one more unit of the good on the horizontal axis. We will make use of this important fact as we continue our investigation of the production possibilities curve.

Figure 2.6c Production Possibilities at Three Plants production possibilities curves for each of the firm’s three plants. Each of the plants, if devoted entirely to snowboards, could produce 100 snowboards. Plants 2 and 3, if devoted exclusively to ski production, can produce 100 and 50 pairs of skis per month, respectively. The exhibit gives the slopes of the production possibilities curves for each plant. The opportunity cost of an additional snowboard at each plant equals the absolute values of these slopes (that is, the number of pairs of skis that must be given up per snowboard).

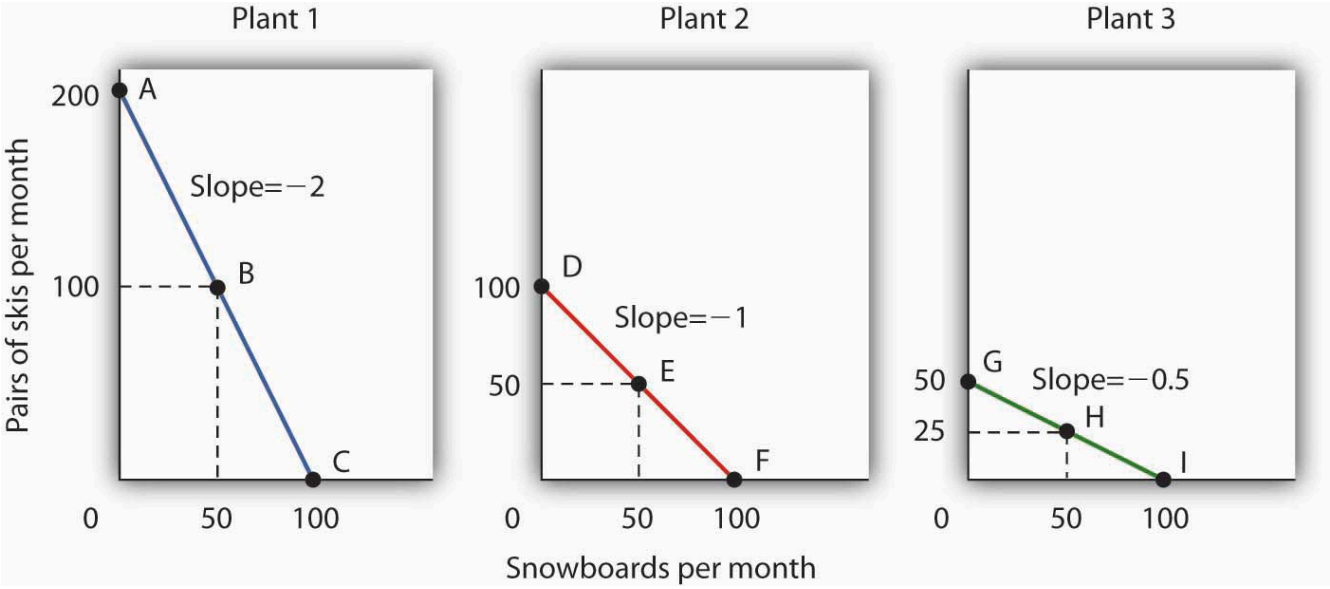


Figure 2.6c Production Possibilities at Three Plants. Production Possibilities at Three Plants by University of Minnesota, licensed under CC BY-NC-SA 4.0.

Figure 2.6c Production Possibilities at Three Plants Text Version

The slopes of the production possibilities curves for each plant differ. The steeper the curve, the greater the opportunity cost of an additional snowboard. Here, the opportunity cost is lowest at Plant 3 and greatest at Plant 1.

The three tables below outline data for the graphs above. The vertical axis is pairs of skis per month and the horizontal axis is snowboards per month. Plant 1 has a slope of negative 2, Plant 2 has a slope of negative 1,

Table 2.6c Production Possibilities Plant 1

Points	Pairs of skis per month	Snowboards per month
A	200	0
B	100	50
C	0	100

Table 2.6d Production Possibilities Plant 2

Points	Pairs of skis per month	Snowboards per month
D	100	0
E	50	50
F	0	100

Table 2.6e Production Possibilities Plant 3

Points	Pairs of skis per month	Snowboards per month
G	50	0
H	25	50
I	0	100

The exhibit gives the slopes of the production possibilities curves for each of the firm's three plants. The opportunity cost of an additional snowboard at each plant equals the absolute values of these slopes. More generally, the absolute value of the slope of any production possibilities curve at any point gives the opportunity cost of an additional unit of the good on the horizontal axis, measured in terms of the number of units of the good on the vertical axis that must be forgone.

The greater the absolute value of the slope of the production possibilities curve, the greater the opportunity cost will be. The plant for which the opportunity cost of an additional snowboard is greatest is the plant with the steepest production possibilities curve; the plant for which the opportunity cost is lowest is the plant with the flattest production possibilities curve. The plant with the lowest opportunity cost of producing snowboards is Plant 3; its slope of −0.5 means that Ms. Ryder must give up half a pair of skis in that plant to produce an additional snowboard. In Plant 2, she must give up one pair of skis to gain one more snowboard. We have already seen that an additional snowboard requires giving up two pairs of skis in Plant 1.

Watch It!

Watch the video (Production Possibility Frontier/Curve, PPF, PPC) Why can't things be free? (https://www.youtube.com/watch?v=PGaDeJ-oKzQ) (4 mins)

One or more interactive elements has been excluded from this version of the text. You can view them online here: https://ecampusontario.pressbooks.pub/laboureconomics/?p=831#oembed-2

Video Source: Economics Mafia. (2014, June 29). *(Production possibility frontier/curve, PPF, PPC) Why can't things be free?* [Video]. YouTube. https://www.youtube.com/watch?v=PGaDeJ-oKzQ

Comparative Advantage and the Production Possibilities

Curve

To construct a combined production possibilities curve for all three plants, we can begin by asking how many pairs of skis Alpine Sports could produce if it were producing only skis. To find this quantity, we add up the values at the vertical intercepts of each of the production possibilities curves in Figure 2.6c Production Possibilities at Three Plants. These intercepts tell us the maximum number of pairs of skis each plant can produce. Plant 1 can produce 200 pairs of skis per month, Plant 2 can produce 100 pairs of skis at per month, and Plant 3 can produce 50 pairs. Alpine Sports can thus produce 350 pairs of skis per month if it devotes its resources exclusively to ski production. In that case, it produces no snowboards.

Now suppose the firm decides to produce 100 snowboards. That will require shifting one of its plants out of ski production. Which one will it choose to shift? The sensible thing for it to do is to choose the plant in which snowboards have the lowest opportunity cost—Plant 3. It has an advantage not because it can produce more snowboards than the other plants (all the plants in this example are capable of producing up to 100 snowboards per month) but because it is the least productive plant for making skis. Producing a snowboard in Plant 3 requires giving up just half a pair of skis.

Economists say that an economy has a comparative advantage in producing a good or service if the opportunity cost of producing that good or service is lower for that economy than for any other. Plant 3 has a comparative advantage in snowboard production because it is the plant for which the opportunity cost of additional snowboards is lowest. To put this in terms of the production possibilities curve, Plant 3 has a comparative advantage in snowboard production (the good on the horizontal axis) because its production possibilities curve is the flattest of the three curves.

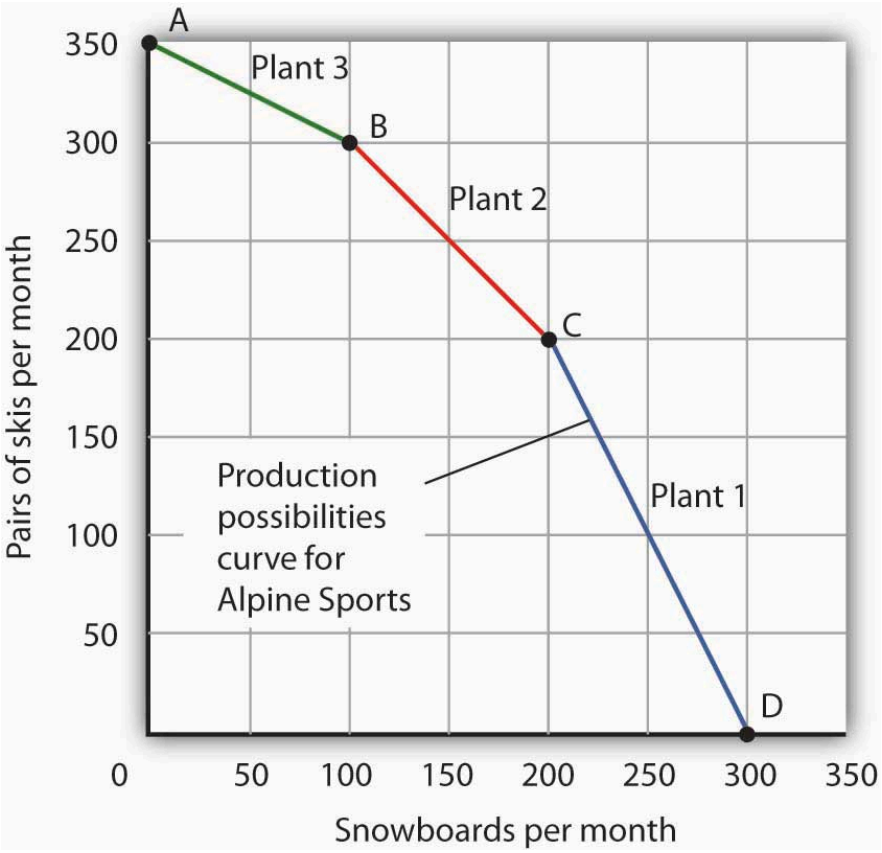


Figure 2.6d. The Combined Production Possibilities Curve for Alpine Sports. The Combined Production Possibilities Curve for Alpine Sports by University of Minnesota, licensed under CC BY-N-SA 4.0.

The curve shown combines the production possibilities curves for each plant. At point A, Alpine Sports produces 350 pairs of skis per month and no snowboards. If the firm wishes to increase snowboard production, it will first use Plant 3, which has a comparative advantage in snowboards.

Plant 3's comparative advantage in snowboard production makes a crucial point about the nature of comparative advantage. It need not imply that a particular plant is especially good at an activity. In our example, all three plants are equally good at snowboard production. Plant 3, though, is the least efficient of the three in ski production. Alpine thus gives up fewer skis when it produces snowboards in Plant 3. Comparative advantage thus can stem from a lack of efficiency in the production of an alternative good rather than a special proficiency in the production of the first good.

The combined production possibilities curve for the firm's three plants is shown in a class="xref" href="#fig2_5">Figure 2.6d The Combined Production Possibilities Curve for Alpine Sports. We begin at point A, with all three plants producing only skis. Production totals 350 pairs of skis per month and zero snowboards. If the firm were to produce 100 snowboards at Plant 3, ski production would fall by 50 pairs per month (recall that the opportunity cost per snowboard at Plant 3 is half a pair of skis). That would bring ski

production to 300 pairs, at point B. If Alpine Sports were to produce still more snowboards in a single month, it would shift production to Plant 2, the facility with the next-lowest opportunity cost. Producing 100 snowboards at Plant 2 would leave Alpine Sports producing 200 snowboards and 200 pairs of skis per month, at point C. If the firm were to switch entirely to snowboard production, Plant 1 would be the last to switch because the cost of each snowboard there is 2 pairs of skis. With all three plants producing only snowboards, the firm is at point D on the combined production possibilities curve, producing 300 snowboards per month and no skis.

Notice that this production possibilities curve, which is made up of linear segments from each assembly plant, has a bowed-out shape; the absolute value of its slope increases as Alpine Sports produces more and more snowboards. This is a result of transferring resources from the production of one good to another according to comparative advantage. We shall examine the significance of the bowed-out shape of the curve in the next section.

The Law of Increasing Opportunity Cost

We see in Figure 2.6d The Combined Production Possibilities Curve for Alpine Sports that, beginning at point A and producing only skis, Alpine Sports experiences higher and higher opportunity costs as it produces more snowboards. The fact that the opportunity cost of additional snowboards increases as the firm produces more of them is a reflection of an important economic law. The law of increasing opportunity cost holds that as an economy moves along its production possibilities curve in the direction of producing more of a particular good, the opportunity cost of additional units of that good will increase.

We have seen the law of increasing opportunity cost at work traveling from point A toward point D on the production possibilities curve in Figure 2.6d The Combined Production Possibilities Curve for Alpine Sports. The opportunity cost of each of the first 100 snowboards equals half a pair of skis; each of the next 100 snowboards has an opportunity cost of 1 pair of skis, and each of the last 100 snowboards has an opportunity cost of 2 pairs of skis. The law also applies as the firm shifts from snowboards to skis. Suppose it begins at point D, producing 300 snowboards per month and no skis. It can shift to ski production at a relatively low cost at first. The opportunity cost of the first 200 pairs of skis is just 100 snowboards at Plant 1, a movement from point D to point C, or 0.5 snowboards per pair of skis. We would say that Plant 1 has a comparative advantage in ski production. The next 100 pairs of skis would be produced at Plant 2, where snowboard production would fall by 100 snowboards per month. The opportunity cost of skis at Plant 2 is 1 snowboard per pair of skis. Plant 3 would be the last plant converted to ski production. There, 50 pairs of skis could be produced per month at a cost of 100 snowboards, or an opportunity cost of 2 snowboards per pair of skis.

The bowed-out production possibilities curve for Alpine Sports illustrates the law of increasing opportunity

cost. Scarcity implies that a production possibilities curve is downward sloping; the law of increasing opportunity cost implies that it will be bowed out, or concave, in shape.

The bowed-out curve of Figure 2.6d The Combined Production Possibilities Curve for Alpine Sports becomes smoother as we include more production facilities. Suppose Alpine Sports expands to 10 plants, each with a linear production possibilities curve. Panel (a) of Figure 2.6e Production Possibilities for the Economy shows the combined curve for the expanded firm, constructed as we did in Figure 2.6d The Combined Production Possibilities Curve for Alpine Sports. This production possibilities curve includes 10 linear segments and is almost a smooth curve. As we include more and more production units, the curve will become smoother and smoother. In an actual economy, with a tremendous number of firms and workers, it is easy to see that the production possibilities curve will be smooth. We will generally draw production possibilities curves for the economy as smooth, bowed-out curves, like the one in Panel (b). This production possibilities curve shows an economy that produces only skis and snowboards. Notice the curve still has a bowed-out shape; it still has a negative slope. Notice also that this curve has no numbers. Economists often use models such as the production possibilities model with graphs that show the general shapes of curves but that do not include specific numbers.

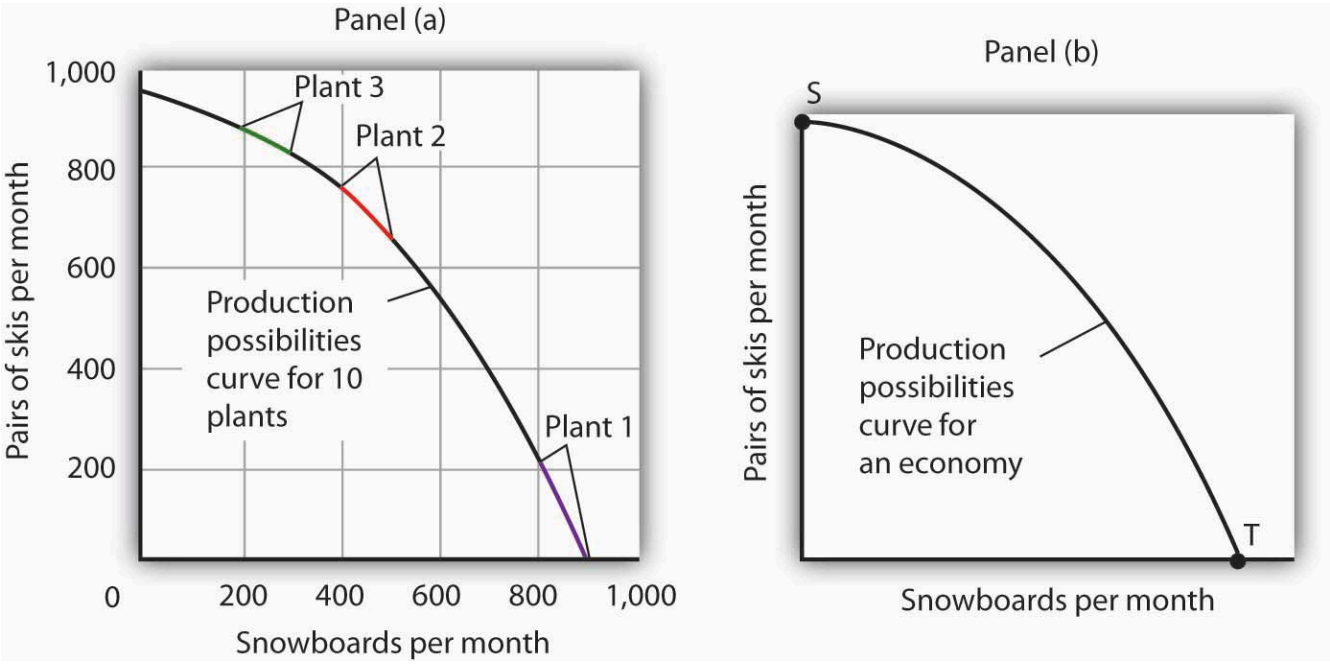


Figure 2.6e. Production Possibilities for the Economy. Production Possibilities for the Economy by University of Minnesota, licensed under CC BY- NC-SA 4.0.

As we combine the production possibilities curves for more and more units, the curve becomes smoother. It retains its negative slope and bowed-out shape. In Panel (a) we have a combined production possibilities curve for Alpine Sports, assuming that it now has 10 plants producing skis and snowboards. Even though each of the plants has a linear curve, combining them according to comparative advantage, as we did with 3 plants in

Figure 2.6d The Combined Production Possibilities Curve for Alpine Sports, produces what appears to be a smooth, nonlinear curve, even though it is made up of linear segments. In drawing production possibilities curves for the economy, we shall generally assume they are smooth and "bowed out," as in Panel (b). This curve depicts an entire economy that produces only skis and snowboards.

Movements Along the Production Possibilities Curve

We can use the production possibilities model to examine choices in the production of goods and services. In applying the model, we assume that the economy can produce two goods, and we assume that technology and the factors of production available to the economy remain unchanged. In this section, we shall assume that the economy operates on its production possibilities curve so that an increase in the production of one good in the model implies a reduction in the production of the other.

We shall consider two goods and services: national security and a category we shall call "all other goods and services." This second category includes the entire range of goods and services the economy can produce, aside from national defense and security. Clearly, the transfer of resources to the effort to enhance national security reduces the quantity of other goods and services that can be produced. In the wake of the 9/11 attacks in 2001, nations throughout the world increased their spending for national security. This spending took a variety of forms. One, of course, was increased defense spending. Local and state governments also increased spending in an effort to prevent terrorist attacks. Airports around the world hired additional agents to inspect luggage and passengers.

The increase in resources devoted to security meant fewer "other goods and services" could be produced. In terms of the production possibilities curve in Figure 2.6f Spending More for Security, the choice to produce more security and less of other goods and services means a movement from A to B. Of course, an economy cannot really *produce* security; it can only attempt to provide it. The attempt to provide it requires resources; it is in that sense that we shall speak of the economy as "producing" security.

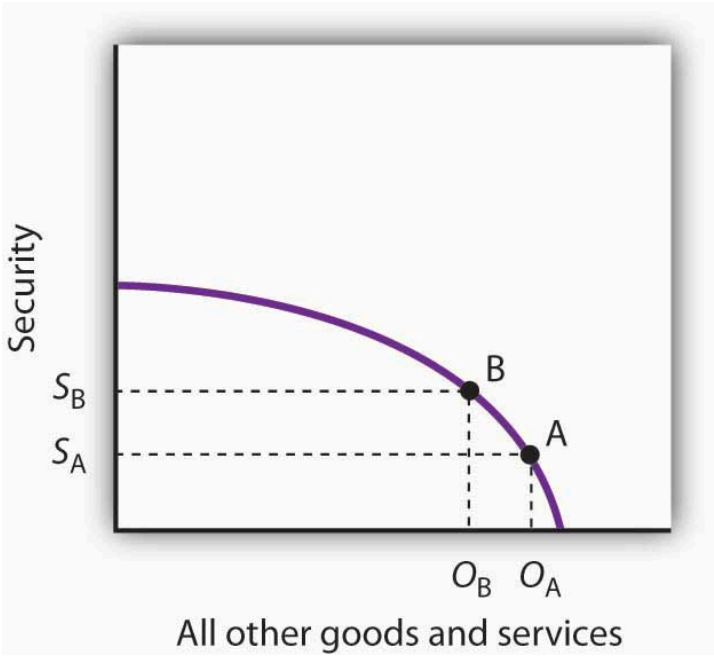


Figure 2.6f Spending More for Security. Spending More for Security by University of Minnesota, licensed under CC BY-NC-SA 4.0.

Here, an economy that can produce two categories of goods, security and "all other goods and services," begins at point A on its production possibilities curve. The economy produces S_A units of security and O_A units of all other goods and services per period. A movement from A to B requires shifting resources out of the production of all other goods and services and into spending on security. The increase in spending on security, to S_A units of security per period, has an opportunity cost of reduced production of all other goods and services. Production of all other goods and services falls by $O_A - O_B$ units per period.

At point A, the economy was producing S_A units of security on the vertical axis—defense services and various forms of police protection—and O_A units of other goods and services on the horizontal axis. The decision to devote more resources to security and less to other goods and services represents the choice we discussed in the chapter introduction. In this case we have categories of goods rather than specific goods. Thus, the economy chose to increase spending on security in the effort to defeat terrorism. Since we have assumed that the economy has a fixed quantity of available resources, the increased use of resources for security and national defense necessarily reduces the number of resources available for the production of other goods and services.

The law of increasing opportunity cost tells us that, as the economy moves along the production possibilities curve in the direction of more of one good, its opportunity cost will increase. We may conclude that, as the economy moved along this curve in the direction of greater production of security, the opportunity cost of the additional security began to increase. That is because the resources transferred from the production of

other goods and services to the production of security had a greater and greater comparative advantage in producing things other than security.

The production possibilities model does not tell us where on the curve a particular economy will operate. Instead, it lays out the possibilities facing the economy. Many countries, for example, chose to move along their respective production possibilities curves to produce more security and national defense and less of all other goods in the wake of 9/11. We will see in the chapter on demand and supply how choices about what to produce are made in the marketplace.

Producing on Versus Producing Inside the Production Possibilities Curve

An economy that is operating inside its production possibilities curve could, by moving onto it, produce more of all the goods and services that people value, such as food, housing, education, medical care, and music. Increasing the availability of these goods would improve the standard of living. Economists conclude that it is better to be on the production possibilities curve than inside it.

Two things could leave an economy operating at a point inside its production possibilities curve. First, the economy might fail to use fully the resources available to it. Second, it might not allocate resources on the basis of comparative advantage. In either case, production within the production possibilities curve implies the economy could improve its performance.

Idle Factors of Production

Suppose an economy fails to put all its factors of production to work. Some workers are without jobs, some buildings are without occupants, some fields are without crops. Because an economy's production possibilities curve assumes the full use of the factors of production available to it, the failure to use some factors results in a level of production that lies inside the production possibilities curve.

If all the factors of production that are available for use under current market conditions are being utilized, the economy has achieved full employment. An economy cannot operate on its production possibilities curve unless it has full employment.

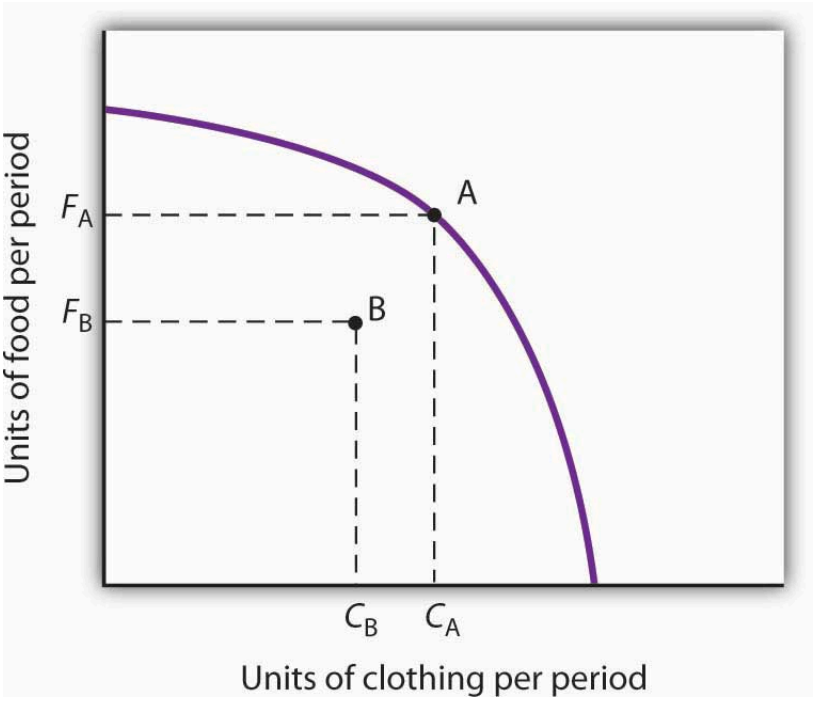


Figure 2.6g Idle Factors and Production. Idle Factors and Production by University of Minnesota, licensed under CC BY-NC-SA 4.0.

Figure 2.6g Idle Factors and Production Text Version

The vertical axis is units of food per period and the horizontal axis is units of clothing per period. There is a downward arched curve from left to right. Point A occurs along the production possibilities curve. Point B occurs shift to the left and downward and does not occur on the production possibilities curve. The production possibilities curve shown suggests an economy that can produce two goods, food and clothing. As a result of a failure to achieve full employment, the economy operates at a point such as B, producing F_B units of food and C_B units of clothing per period. Putting its factors of production to work allows a move to the production possibilities curve, to a point such as A. The production of both goods rises.

Figure 2.6g "Idle Factors and Production" shows an economy that can produce food and clothing. If it chooses to produce at point A, for example, it can produce F_A units of food and C_A units of clothing. Now suppose that a large fraction of the economy's workers lose their jobs, so the economy no longer makes full use of one factor of production: labor. In this example, production moves to point B, where the economy produces less food (F_B) and less clothing (C_B) than at point A. We often think of the loss of jobs in terms of the workers; they have lost a chance to work and to earn income. But the production possibilities model points to another loss: goods and services the economy could have produced that are not being produced.

Inefficient Production

Now suppose Alpine Sports is fully employing its factors of production. Could it still operate inside its production possibilities curve? Could an economy that is using all its factors of production still produce less than it could? The answer is "Yes," and the key lies in comparative advantage. An economy achieves a point on its production possibilities curve only if it allocates its factors of production on the basis of comparative advantage. If it fails to do that, it will operate inside the curve.

Suppose that, as before, Alpine Sports has been producing only skis. With all three of its plants producing skis, it can produce 350 pairs of skis per month (and no snowboards). The firm then starts producing snowboards. This time, however, imagine that Alpine Sports switches plants from skis to snowboards in numerical order: Plant 1 first, Plant 2 second, and then Plant 3. Figure 2.6h "Efficient Versus Inefficient Production" illustrates the result. Instead of the bowed-out production possibilities curve ABCD, we get a bowed-in curve, AB′C′D. Suppose that Alpine Sports is producing 100 snowboards and 150 pairs of skis at point B′. Had the firm based its production choices on comparative advantage, it would have switched Plant 3 to snowboards and then Plant 2, so it could have operated at a point such as C. It would be producing more snowboards and more pairs of skis—and using the same quantities of factors of production it was using at B′. Had the firm based its production choices on comparative advantage, it would have switched Plant 3 to snowboards and then Plant 2, so it would have operated at point C. It would be producing more snowboards and more pairs of skis—and using the same quantities of factors of production it was using at B′. When an economy is operating on its production possibilities curve, we say that it is engaging in efficient production. If it is using the same quantities of factors of production but is operating inside its production possibilities curve, it is engaging in inefficient production. Inefficient production implies that the economy could be producing more goods without using any additional labor, capital, or natural resources.

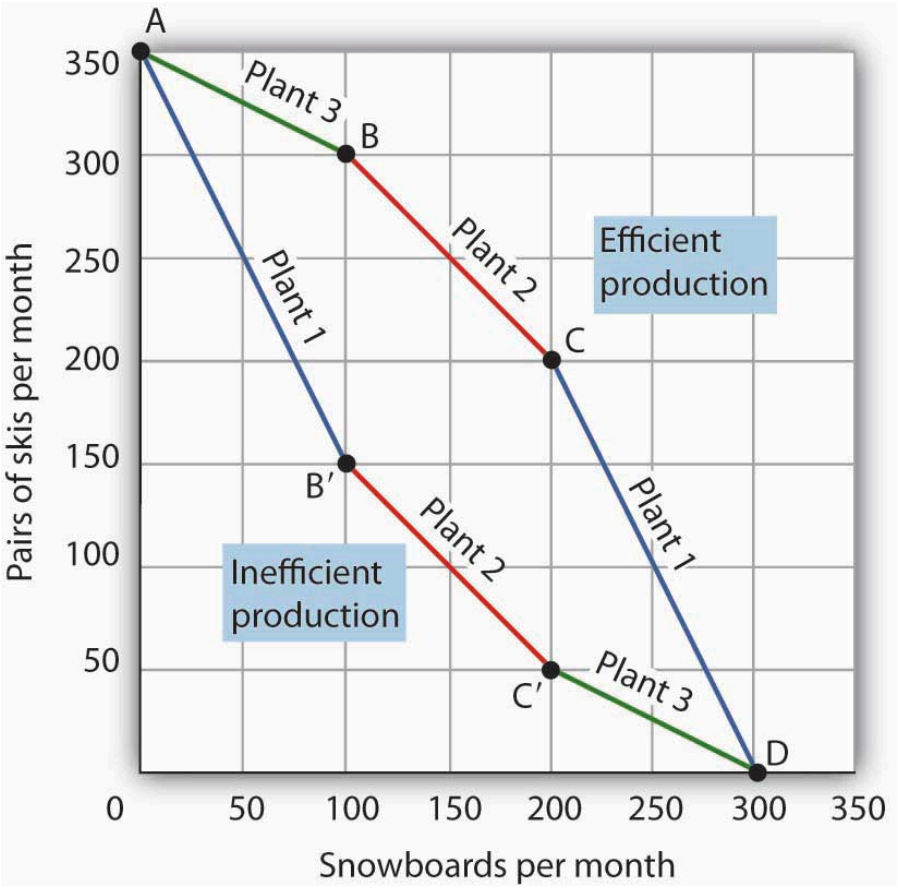


Figure 2.6h Efficient Versus Inefficient Production. Efficient Versus Inefficient Production by University of Minnesota, licensed under CC BY-NC-SA 4.0.

Figure 2.6h Efficient Versus Inefficient Production Text Version

The graph has a vertical axis pairs of skis per month and horizontal axis snowboards per month and depicts 2 lines: the efficient production and inefficient production.

Now suppose that, to increase snowboard production, it transfers plants in numerical order: Plant 1 first, then Plant 2, and finally Plant 3. The inefficient production starts with Plant 1 at Point A (350 pairs of skis, 0 snowboards), then Plant 2 at Point B' (150 pairs of skis, 100 snowboards) then Plant 3 at Point C' (50 pairs of skis, 200 snowboards) ending at Point D (0 pairs of skis, 300 snowboards). The result is the bowed-in curve AB′C′D.

The efficient production is an arching curve that slopes downward left to right. It connects Plant 3 from point A (350 pairs of skis, 0 snowboards) to Plant 2 at Point B (300 pairs of skis, 100 snowboards) and connects with Plant 1 at Point C (200 pairs of skis, 200 snowboards) and ends at Point D (0 pairs of skis, 300 snowboards). Production on the production possibilities curve ABCD requires that factors of production be transferred according to comparative advantage.

When factors of production are allocated on a basis other than comparative advantage, the result is inefficient production. Suppose Alpine Sports operates the three plants we examined in Figure 2.6c "Production Possibilities at Three Plants". Suppose further that all three plants are devoted exclusively to ski production; the firm operates at A. Now suppose that, to increase snowboard production, it transfers plants in numerical order: Plant 1 first, then Plant 2, and finally Plant 3. The result is the bowed-in curve AB′C′D. Production on the production possibilities curve ABCD requires that factors of production be transferred according to comparative advantage.

Points on the production possibilities curve thus satisfy two conditions: the economy is making full use of its factors of production, and it is making efficient use of its factors of production. If there are idle or inefficiently allocated factors of production, the economy will operate inside the production possibilities curve. Thus, the production possibilities curve not only shows what can be produced; it provides insight into how goods and services should be produced. It suggests that to obtain efficiency in production, factors of production should be allocated on the basis of comparative advantage. Further, the economy must make full use of its factors of production if it is to produce the goods and services it is capable of producing.

Specialization

The production possibilities model suggests that specialization will occur. Specialization implies that an economy is producing the goods and services in which it has a comparative advantage. If Alpine Sports selects point C in Figure 2.6h Efficient Versus Inefficient Production, for example, it will assign Plant 1 exclusively to ski production and Plants 2 and 3 exclusively to snowboard production.

Such specialization is typical in an economic system. Workers, for example, specialize in particular fields in which they have a comparative advantage. People work and use the income they earn to buy—perhaps import—goods and services from people who have a comparative advantage in doing other things. The result is a far greater quantity of goods and services than would be available without this specialization.

Think about what life would be like without specialization. Imagine that you are suddenly completely cut off from the rest of the economy. You must produce everything you consume; you obtain nothing from anyone else. Would you be able to consume what you consume now? Clearly not. It is hard to imagine that most of us could even survive in such a setting. The gains we achieve through specialization are enormous.

Nations specialize as well. Much of the land in the United States has a comparative advantage in agricultural production and is devoted to that activity. Hong Kong, with its huge population and tiny endowment of land, allocates virtually none of its land to agricultural use; that option would be too costly. Its land is devoted largely to nonagricultural use.

Watch it!

Watch the video Specialization and Trade: Crash Course Economics #2 (https://www.youtube.com/watch?v=NI9TLDIPVcs) (9 mins)

One or more interactive elements has been excluded from this version of the text. You can view them online here: https://ecampusontario.pressbooks.pub/laboureconomics/?p=831#oembed-3

Video Source: CrashCourse. (2015, July 15).*Specialization and Trade: Crash Course Economics #2* [Video]. YouTube. https://www.youtube.com/watch?v=NI9TLDIPVcs

Key Takeaways

- A production possibilities curve shows the combinations of two goods an economy is capable of producing.
- The downward slope of the production possibilities curve is an implication of scarcity.
- The bowed-out shape of the production possibilities curve results from allocating resources based on comparative advantage. Such an allocation implies that the law of increasing opportunity cost will hold.
- An economy that fails to make full and efficient use of its factors of production will operate inside its production possibilities curve.
- Specialization means that an economy is producing the goods and services in which it has a comparative advantage.

Try It!

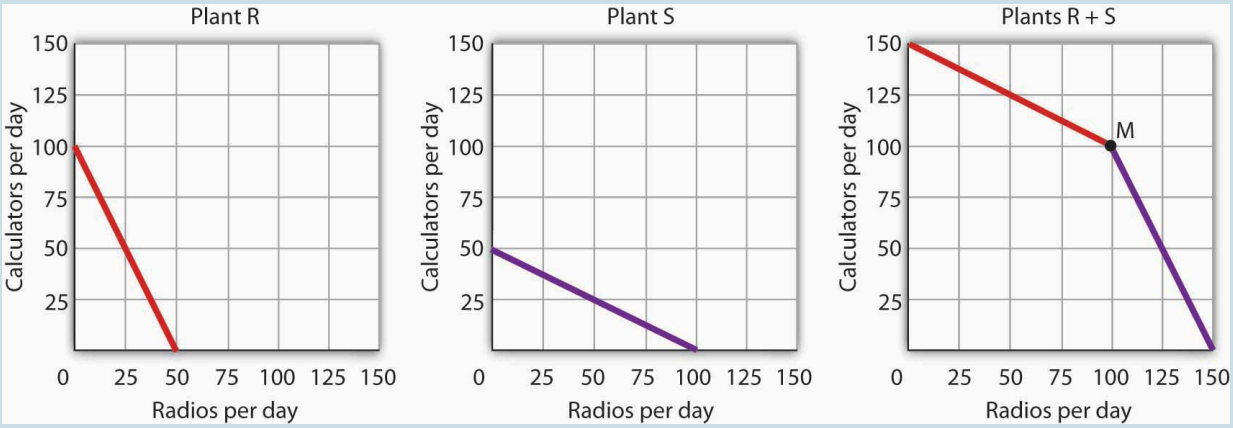
Suppose a manufacturing firm is equipped to produce radios or calculators. It has two plants, Plant R and Plant S, at which it can produce these goods. Given the labor and the capital available at both plants, it can produce the combinations of the two goods at the two plants shown.

Output per day, Plant S

Combination	Calculators	Radios
D	50	0
E	25	50
F	0	100

Put calculators on the vertical axis and radios on the horizontal axis. Draw the production possibilities curve for Plant R. On a separate graph, draw the production possibilities curve for Plant S. Which plant has a comparative advantage in calculators? In radios? Now draw the combined curves for the two plants. Suppose the firm decides to produce 100 radios. Where will it produce them? How many calculators will it be able to produce? Where will it produce the calculators?

Check your Answer



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Answer to Try It! Problem Figure 2.11 Text Version

Figure depicts three separate graphs: the production possibilities curves for Plant R and Plant S, along with the combined curve for both plants (Plant R+S). All three graphs have the vertical axis calculators per day and the horizontal axis radios per day.

Plant R has a comparative advantage in producing calculators. It has a straight steep downward sloping curve left to right starting from Point R1 (100 calculators, 0 radios) going through Point R2 (50 calculators, 25 radios) and ending at Point R3 (0 calculators, 50 radios).

Plant S has a comparative advantage in producing radios, so if the firm goes from producing 150 calculators and no radios to producing 100 radios it will produce them at Plant S. It has a straight gradual downward sloping curve left to right starting from Point S1 (50 calculators, 0 radios) going through Point S2 (25 calculators, 50 radios) and ending at Point S3 (0 calculators, 100 radios).

In the production possibilities curve for both plants, the firm would be at M, producing 100 calculators at Plant R. Plant R is the first part and then Plant S is the second part. Plant R occurs first in the first part of the production possibilities curve gradually sloping straight from Point RS1 (150 calculators, 0 radios) going through Point RS2 (125 calculators, 50 radios) and ending at Point M (100 calculators, 100 radios). Plant S occurs next continuing from Point M (100 calculators, 100 radios) going through Point RS3 (50 calculators, 125 radios) and ending at Point RS4 (0 calculators, 150 radios). This part of the curve has a steeper straight downward sloping curve.

Figure 2.11 (seen above) depicts the production possibilities curves for the two plants are shown, along with the combined curve for both plants. Plant R has a comparative advantage in producing calculators. Plant S has a comparative advantage in producing radios, so if the firm goes from producing 150 calculators and no radios to producing 100 radios it will produce them at Plant S. In the production possibilities curve for both plants, the firm would be at M, producing 100 calculators at Plant R.

Case in Point: The Cost of the Great Depression

Figure 2.6i. Crowd at New York's American Union Bank during a bank run early in the Great Depression. The Bank opened in 1917 and went out of business on June 30, 1931. Crowd at New York's American Union Bank during a bank run early in the Great Depression [National Archives Photo, NLR-PHOCO-A-7420(1007)] archived by National Archives, licensed under Public Domain.

The U.S. economy looked very healthy in the beginning of 1929. It had enjoyed seven years of dramatic growth and unprecedented prosperity. Its resources were fully employed; it was operating quite close to its production possibilities curve. In the summer of 1929, however, things started going wrong. Production and employment fell. They continued to fall for several years. By 1933, more than 25% of the nation's workers had lost their jobs. Production had plummeted by almost 30%. The economy had moved well within its production possibilities curve.Output began to grow after 1933, but the economy continued to have vast numbers of idle workers, idle factories, and idle farms. These resources were not put back to work fully until 1942, after the U.S. entry into World War II demanded mobilization of the economy's factors of production. Between 1929 and 1942, the

economy produced 25% fewer goods and services than it would have if its resources had been fully employed. That was a loss, measured in today's dollars, of well over $3 trillion. In material terms, the forgone output represented a greater cost than the United States would ultimately spend in World War II. The Great Depression was a costly experience indeed.

Key Concepts & Summary

A production possibilities curve shows the combinations of two goods an economy is capable of producing. The downward slope of the production possibilities curve is an implication of scarcity. The bowed-out shape of the production possibilities curve results from allocating resources based on comparative advantage. Such an allocation implies that the law of increasing opportunity cost will hold. An economy that fails to make full and efficient use of its factors of production will operate inside its production possibilities curve. Specialization means that an economy is producing the goods and services in which it has a comparative advantage.

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- Crowd at New York's American Union Bank during a bank run early in the Great Depression. © National Archives is licensed under a Public Domain license

2.7 - APPLICATIONS OF THE PRODUCTION POSSIBILITIES MODEL

Learning Objectives

- Define economic growth in terms of the production possibilities model and discuss factors that make such growth possible.
- Explain the classification of economic systems, the role of government in different economic systems, and the strengths and weaknesses of different systems.

The production possibilities curve gives us a model of an economy. The model provides powerful insights about the real world, insights that help us to answer some important questions: What determines the rate at which production will increase over time? What is the role of economic freedom in the economy? In this section we explore applications of the model to questions of economic growth and the choice of an economic system.

Economic Growth

An increase in the physical quantity or in the quality of factors of production available to an economy or a technological gain will allow the economy to produce more goods and services; it will shift the economy's production possibilities curve outward. The process through which an economy achieves an outward shift in its production possibilities curve is called economic growth. An outward shift in a production possibilities curve is illustrated in Figure 2.7a "Economic Growth and the Production Possibilities Curve". In Panel (a), a point such as N is not attainable; it lies outside the production possibilities curve. Growth shifts the curve outward, as in Panel (b), making previously unattainable levels of production possible.

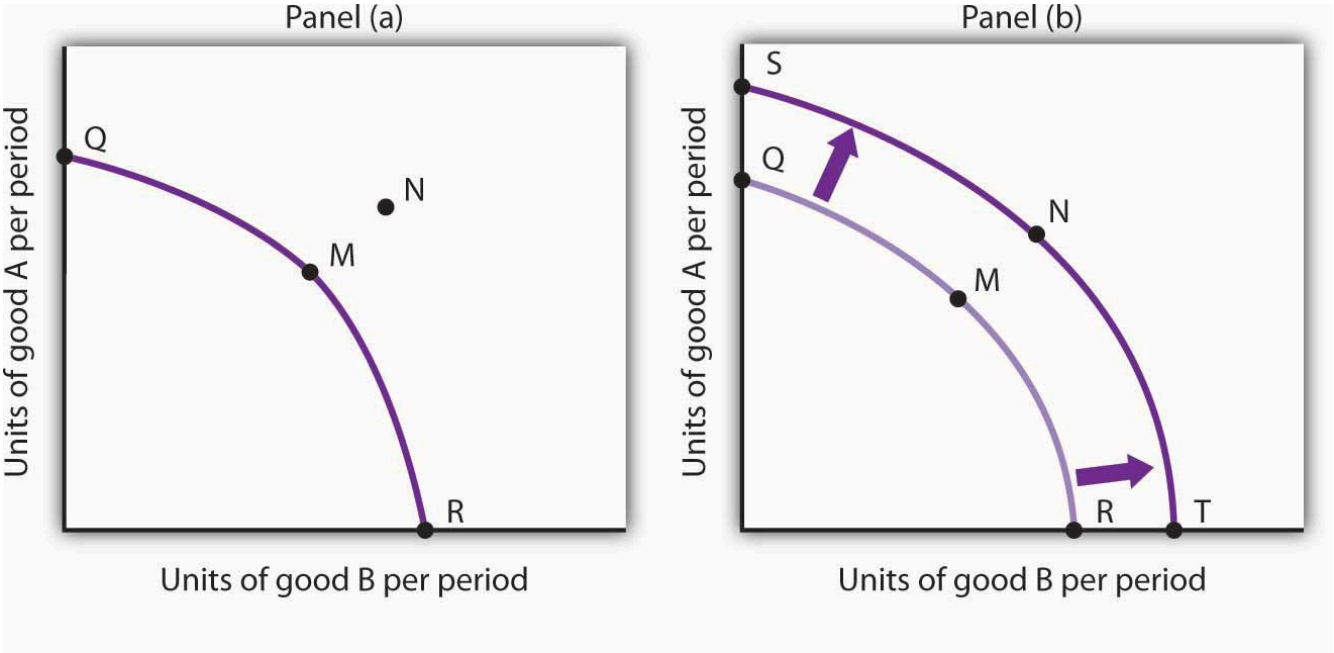

Figure 2.7a Economic Growth and the Production Possibilities Curve. In the first graph, Panel (a), a point such as N is not attainable; it lies outside the production possibilities curve. The second graph shows growth that shifts the curve outward, as in Panel (b), making previously unattainable levels of production possible. Economic Growth and the Production Possibilities Curve by University of Minnesota, licensed under CC BY-NC-SA 4.0.

Figure 2.7a Economic Growth and the Production Possibilities Curve (Text version)

Figure 2.7a depits two graphs, both have a vertical axis of Units of goods A per period and a horizontal axis Units of good B per period.

Panel A, has a downward sloping convex curve which slopes from left to right starting midway up the vertical axis at Point Q goes through Point M and ending at R on the horizontal axis. Point N lays outside and above the curve; therefore, a point such as N is not attainable as it lies outside the production possibilities curve.

Panel B shows growth that shifts the curve outward, making previously unattainable levels of production possible. Panel B is the same graph as Panel A but depicts the curve shifting outwards to obtain Point N. The curve shifts outward: Point Q shifts upwards to Point S, Point M shift to Point N and Point R shift to the left to Point T.

An economy capable of producing two goods, A and B, is initially operating at point M on production possibilities curve OMR in Panel (a). Given this production possibilities curve, the economy could not produce a combination such as shown by point N, which lies outside the curve. An increase in the factors of production available to the economy would shift the curve outward to SNT, allowing the choice of a point such as N, at which more of both goods will be produced.

The Sources of Economic Growth

Economic growth implies an outward shift in an economy's production possibilities curve. Recall that when we draw such a curve, we assume that the quantity and quality of the economy's factors of production and its technology are unchanged. Changing these will shift the curve. Anything that increases the quantity or quality of the factors of production available to the economy or that improves the technology available to the economy contributes to economic growth.

Consider, for example, the dramatic gains in human capital that have occurred in the United States since the beginning of the past century. In 1900, about 3.5% of U.S. workers had completed a high school education. By 2006, that percentage rose almost to 92. Fewer than 1% of the workers in 1900 had graduated from college; as late as 1940 only 3.5% had graduated from college. By 2006, nearly 32% had graduated from college. In addition to being better educated, today's workers have received more and better training on the job. They bring far more economically useful knowledge and skills to their work than did workers a century ago.

Moreover, the technological changes that have occurred within the past 100 years have greatly reduced the time and effort required to produce most goods and services. Automated production has become commonplace. Innovations in transportation (automobiles, trucks, and airplanes) have made the movement of goods and people cheaper and faster. A dizzying array of new materials is available for manufacturing. And the development of modern information technology—including computers, software, and communications equipment—that seemed to proceed at breathtaking pace especially during the final years of the last century and continuing to the present has transformed the way we live and work.

Look again at the technological changes of the last few years described in the Case in Point on advances in technology. Those examples of technological progress through applications of computer technology—from new ways of mapping oil deposits to new methods of milking cows—helped propel the United States and other economies to dramatic gains in the ability to produce goods and services. They have helped shift the countries' production possibilities curve outward. They have helped fuel economic growth.

Waiting for Growth

One key to growth is, in effect, the willingness to wait, to postpone current consumption in order to enhance future productive capability. When Stone Age people fashioned the first tools, they were spending time building capital rather than engaging in consumption. They delayed current consumption to enhance their future consumption; the tools they made would make them more productive in the future.

Resources society could have used to produce consumer goods are being used to produce new capital goods and new knowledge for production instead—all to enhance future production. An even more important

source of growth in many nations has been increased human capital. Increases in human capital often require the postponement of consumption. If you are a college student, you are engaged in precisely this effort. You are devoting time to study that could have been spent working, earning income, and thus engaging in a higher level of consumption. If you are like most students, you are making this choice to postpone consumption because you expect it will allow you to earn more income, and thus enjoy greater consumption, in the future.

Think of an economy as being able to produce two goods, capital and consumer goods (those destined for immediate use by consumers). By focusing on the production of consumer goods, the people in the economy will be able to enjoy a higher standard of living today. If they reduce their consumption—and their standard of living—today to enhance their ability to produce goods and services in the future, they will be able to shift their production possibilities curve outward. That may allow them to produce even more consumer goods. A decision for greater growth typically involves the sacrifice of present consumption.

Arenas for Choice: A Comparison of Economic Systems

Under what circumstances will a nation achieve efficiency in the use of its factors of production? The discussion above suggested that Christie Ryder would have an incentive to allocate her plants efficiently because by doing so she could achieve greater output of skis and snowboards than would be possible from inefficient production. But why would she want to produce more of these two goods—or of any goods? Why would decision makers throughout the economy want to achieve such efficiency?

Economists assume that privately owned firms seek to maximize their profits. The drive to maximize profits will lead firms such as Alpine Sports to allocate resources efficiently to gain as much production as possible from their factors of production. But whether firms will seek to maximize profits depends on the nature of the economic system within which they operate.

Classifying Economic Systems

Each of the world's economies can be viewed as operating somewhere on a spectrum between market capitalism and command socialism. In a market capitalist economy, resources are generally owned by private individuals who have the power to make decisions about their use. A market capitalist system is often referred to as a free enterprise economic system. In a command socialist economy, the government is the primary owner of capital and natural resources and has broad power to allocate the use of factors of production. Between these two categories lie mixed economies that combine elements of market capitalist and of command socialist economic systems.

No economy represents a pure case of either market capitalism or command socialism. To determine where

an economy lies between these two types of systems, we evaluate the extent of government ownership of capital and natural resources and the degree to which government is involved in decisions about the use of factors of production.

Figure 2.7b "Economic Systems" suggests the spectrum of economic systems. Market capitalist economies lie toward the left end of this spectrum; command socialist economies appear toward the right. Mixed economies lie in between. The market capitalist end of the spectrum includes countries such as the United States, the United Kingdom, and Canada. Hong Kong, though now part of China, has a long history as a market capitalist economy and is generally regarded as operating at the market capitalist end of the spectrum. Countries at the command socialist end of the spectrum include North Korea and Cuba.

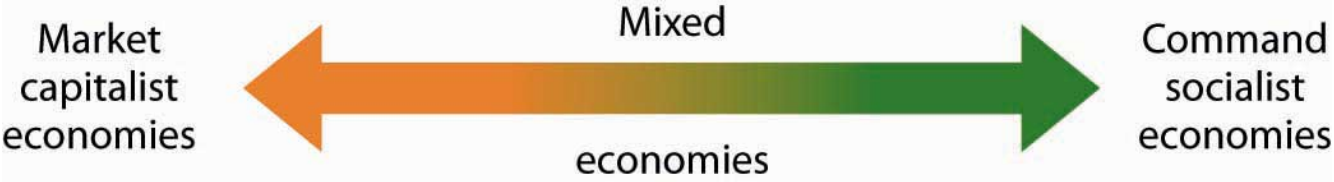

Figure 2.7b Economic Systems. Economic Systems by University of Minnesota, licensed under CC BY-NC-SA 4.0.

Some European economies, such as France, Germany, and Sweden, have a sufficiently high degree of regulation that we consider them as operating more toward the center of the spectrum. Russia and China, which long operated at the command socialist end of the spectrum, can now be considered mixed economies. Most economies in Latin America once operated toward the right end of the spectrum. While their governments did not exercise the extensive ownership of capital and natural resources that are one characteristic of command socialist systems, their governments did impose extensive regulations. Many of these nations are in the process of carrying out economic reforms that will move them further in the direction of market capitalism.

The global shift toward market capitalist economic systems that occurred in the 1980s and 1990s was in large part the result of three important features of such economies. First, the emphasis on individual ownership and decision-making power has generally yielded greater individual freedom than has been available under command socialist or some more heavily regulated mixed economic systems that lie toward the command socialist end of the spectrum. People seeking political, religious, and economic freedom have thus gravitated toward market capitalism. Second, market economies are more likely than other systems to allocate resources on the basis of comparative advantage. They thus tend to generate higher levels of production and income than do other economic systems. Third, market capitalist-type systems appear to be the most conducive to entrepreneurial activity.

Suppose Christie Ryder had the same three plants we considered earlier in this chapter but was operating in a

mixed economic system with extensive government regulation. In such a system, she might be prohibited from transferring resources from one use to another to achieve the gains possible from comparative advantage. If she were operating under a command socialist system, she would not be the owner of the plants and thus would be unlikely to profit from their efficient use. If that were the case, there is no reason to believe she would make any effort to assure the efficient use of the three plants. Generally speaking, it is economies toward the market capitalist end of the spectrum that offer the greatest inducement to allocate resources on the basis of comparative advantage. They tend to be more productive and to deliver higher material standards of living than do economies that operate at or near the command socialist end of the spectrum.

Government in a Market Economy

The production possibilities model provides a menu of choices among alternative combinations of goods and services. Given those choices, which combinations will be produced?

In a market economy, this question is answered in large part through the interaction of individual buyers and sellers. As we have already seen, government plays a role as well. It may seek to encourage greater consumption of some goods and discourage consumption of others. In the United States, for example, taxes imposed on cigarettes discourage smoking, while special treatment of property taxes and mortgage interest in the federal income tax encourages home ownership. Government may try to stop the production and consumption of some goods altogether, as many governments do with drugs such as heroin and cocaine. Government may supplement the private consumption of some goods by producing more of them itself, as many U.S. cities do with golf courses and tennis courts. In other cases, there may be no private market for a good or service at all. In the choice between security and defense versus all other goods and services outlined at the beginning of this chapter, government agencies are virtually the sole providers of security and national defense.

All nations also rely on government to provide defense, enforce laws, and redistribute income. Even market economies rely on government to regulate the activities of private firms, to protect the environment, to provide education, and to produce a wide range of other goods and services. Government's role may be limited in a market economy, but it remains fundamentally important.

Key Takeaways

- The ideas of comparative advantage and specialization suggest that restrictions on international trade are likely to reduce production of goods and services.
- Economic growth is the result of increasing the quantity or quality of an economy's factors of production and of advances in technology.
- Policies to encourage growth generally involve postponing consumption to increase capital and human capital.
- Market capitalist economies have generally proved more productive than mixed or command socialist economies.
- Government plays a crucial role in any market economy.

Try It!

Draw a production possibilities curve for an economy that can produce two goods, CD players and jackets. You do not have numbers for this one—just draw a curve with the usual bowed-out shape. Put the quantity of CD players per period on the vertical axis and the quantity of jackets per period on the horizontal axis. Now mark a point A on the curve you have drawn; extend dotted lines from this point to the horizontal and vertical axes. Mark the initial quantities of the two goods as CDA and JA, respectively. Explain why, in the absence of economic growth, an increase in jacket production requires a reduction in the production of CD players. Now show how economic growth could lead to an increase in the production of both goods.

Check your Answers

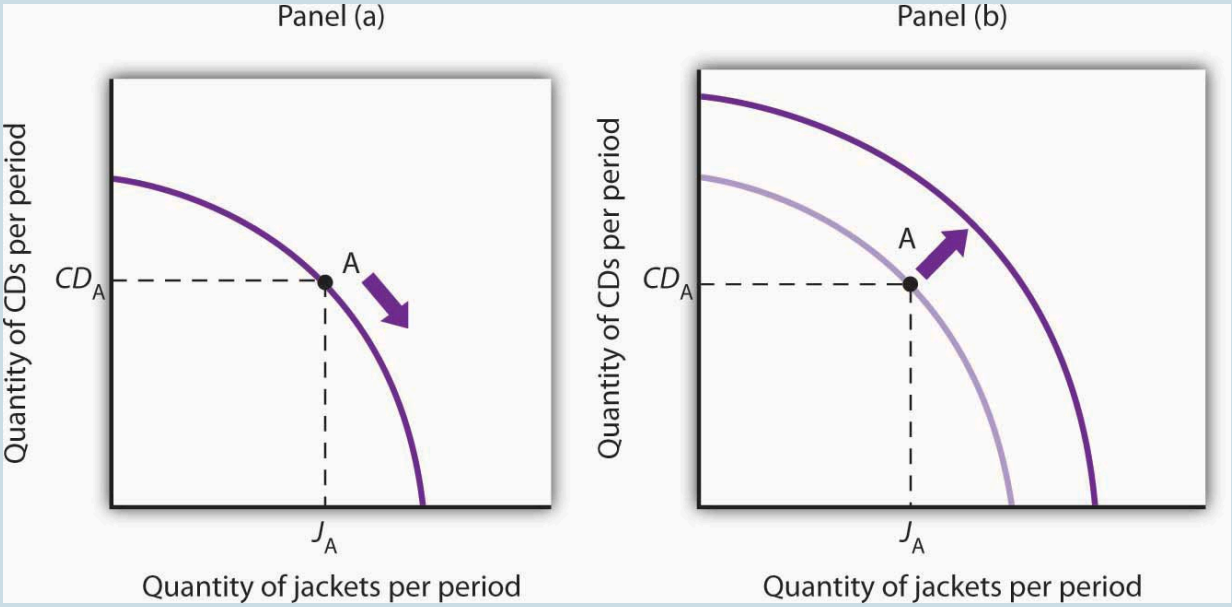

Figure 2.7c. Figure by University of Minnesota, licensed under CC BY-NC-SA 4.0.

Your first production possibilities curve should resemble the one in Panel (a). Starting at point A, an increase in jacket production requires a move down and to the right along the curve, as shown by the arrow, and thus a reduction in the production of CD players. Alternatively, if there is economic growth, it shifts the production possibilities curve outward, as in Panel (b). This shift allows an increase in production of both goods, as suggested by the arrow.

Figure 2.7c Answer to Try it! Problem Text Version

Figure 2.7c depicts two graphs that have the horizontal axis Quantity of CDs per period and a vertical axis Quantity of jackets per period.

Panel A depicts a downward sloping convex curve which slopes from left to right, intersecting Point A is located at (JA, CDA). Starting at point A, an increase in jacket production requires a move down and to the right along the curve (shown downward arrow) and thus a reduction in the production of CD players.

Panel B depicts the same base figure as Panel A, a downward sloping convex curve which slopes from left to right, intersecting Point A is located at (JA, CDA). The curve shifts outward from Point A, shifting from left to right (shown by arrow pointing left to right).

Case in Point: The European Union and the Production Possibilities Curve

Figure 2.7d. Found euros by Dana McMahan, licensed under CC BY-NC 2.0.

Formed by the Maastricht Treaty of 1993, The European Union represents one of the boldest efforts of our time to exploit the theory of comparative advantage. The Treaty sought to eliminate all trade barriers between the European Union's members. It established a European Parliament and a European Central Bank. The Bank introduced the euro in 1999, a currency that replaced national currencies such as the German deutsche mark and the French franc. At first, the euro was used only for transactions between banks. 320 million people in 15 EU nations (Austria, Belgium, Cyprus, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Malta, the Netherlands, Portugal, Slovenia, and Spain) used the euro by 2008. While the dollar continues to be more widely used, the total value of euros in circulation exceeds that of dollars.

The movement toward European integration can be dated back more than half a century. In 1950, just five years after a war that had devastated much of the world, Robert Schuman, the French Minister of Foreign Affairs, proposed a union between France and Germany to cooperate in the production of iron and steel. In the context of the time, Schuman's proposal was a radical one. World War II had begun with Germany's attempt to seize control of Europe—and ultimately the world. Japan and Italy joined Germany in this effort. Germany had captured France; France had been liberated in 1944 by the Allied invasion in Normandy. The proposal for cooperation between

two countries that had been the most bitter of enemies was a revolutionary one. Schuman's speech, delivered on May 9, 1950, is celebrated throughout Europe as "Europe Day."

In effect, the European Union has created an entity very much like the United States. Countries within the European Union retain their own languages and cultural differences, but they have ceded a remarkable degree of sovereignty to the Union. Members of the European Union can trade as freely with each other as can states within the United States. Just as the U.S. Constitution prohibits states from restricting trade with other states, the European Union has dismantled all forms of restrictions that countries within the Union used to impose on one another. Just as restrictions on specialization among Ms. Ryder's plants in Alpine Sports would have forced it to operate inside its production possibilities curve, restrictions that had existed among members of the European Union once put the members of the Union inside their collective production possibilities curve.

The experiment appears to have been a success. Trade among member nations has expanded sharply. A study by Carmen Diaz Mora, an economist at the University of Castilla-La Mancha in Spain, found that the bulk of the expanded trade within the Union was trade within industries and that it was driven by comparative advantage. In particular, she found that countries in the northern part of the Union, such as France and Germany, tended to specialize in relatively high-valued goods—office equipment and electrical goods—while countries in the southern part of the Union specialized in relatively low-valued goods such as food and textile products. In trade within the clothing industry, countries such as Italy tend to specialize in the production of higher-valued clothing, while lower-income countries such as Portugal specialize in the production of cheaper clothing. In sparkling wines, France specializes in the higher-quality end of the spectrum, while Spain specializes in the low-quality end. Similarly, Germany specializes in the production of higher-quality cars while Spain specializes in lower-quality vehicles. Similar exchanges occur across a wide range of goods and services.

Diaz Mora found that comparative advantage tended to correspond to income levels. Countries in the northern part of the European Union tend to have high per capita incomes and high levels of human capital and technology—these countries gained by specializing in the production of high-valued goods. Countries in the southern part of the Union also gained by specialization—in the production of low-valued goods. This specialization has increased the welfare of people throughout the Union.

Sources: Carmen Diaz Mora, "The Role of Comparative Advantage in Trade Within Industries: A Panel Data Approach for the European Union," Weltwirtschaftliches Archiv 138:2 (2002), 291–316.

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- Table 2.1 Sources of U.S. Economic Growth, 1948–2002 and accompanying content
- Figure 2.15 Economic Freedom and Income and accompanying content.

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2.8 - OPPORTUNITY COSTS & SUNK COSTS

Learning Objectives

- Understand the three step process for making binary decisions
- Calculate the opportunity cost of an action
- Understand how sunk costs influence our decision making

Economics looks at how rational individuals make decisions. An important part of being a rational decision maker is considering **opportunity costs**. In our introductory section we identified the concept of scarcity. Normally we are quite good at considering scarcity when it comes to resources and money. What we are less good at considering is scarcity of time.

Consider the following image that shows the number of weeks an average human lives. Sometimes it kind of feels like our lives are made up of a countless number of weeks. But there they are—fully countable—staring you in the face. This isn't meant to scare you, but rather to emphasize that a rational consumer doesn't ignore time, but incorporates it into the analysis of any decision they make.

So how do you 'spend' your time? In economics, we want to place a value on each different opportunity we have so we can compare them.

What if your friends were to ask you if you want to go out to the club? How much do you value it? As economists, we want to measure the happiness you will get from this experience by finding your maximum **willingness to pay.** Let's say that for a 5 hour night at the club, the MOST you are willing to pay is $100. Seem high? If you have gone clubbing, this is likely close to what you paid for it.

Suppose the costs of going clubbing are $50 ($15 cover, $20 for drinks and $15 for a ride home). With that analysis it seems like you should go, but so far we have only considered the **explicit costs** of the experience.

An explicit cost represents a clear direct payment of cash (whether actual cash or from debit, credit, etc). But what about our time? We must consider time as another cost of the action.

How do we measure time? Simple – what else could we be doing with that time? Assume you also work as a server at the campus pub, where you get paid $15 an hour (including tips). This makes it easy to put a dollar amount on your time. For 5 hours of clubbing, you are forgoing the opportunity to earn $\$75(\$15 \times 5)$. This is your **implicit cost** for clubbing, or the cost that has been incurred but does not result in a direct payment.

It is important to note that the implicit costs are the benefit of the next best option. There are an infinite number of things we could be doing with our time, from watching a movie to studying economics, but for implicit costs we only consider the next best. If we took them all into account our costs would be infinite.

Consider the two options side by side as shown in Table 2.8a.

	Clubbing	Working
Willingness to Pay/Total Benefit	$100	$75
Explicit Costs	$50	$0
Total 'Happiness'	$50	$75

Table 2.8a. Comparison between clubbing and working. Image by Dr. Emma Hutchinson, University of Victoria, licensed under CC BY 4.0.

Table 2.8a Comparison between clubbing and working Text Version

Table 2.8a depicts the side by side comparison between clubbing and working to illustrate explicit costs. The equation is the Willingness to Pay/Total Benefit + Explicit Costs = Total 'Happiness' where clubbing is $\$100 - \$50 = \$50$and working is $\$75 - \$0 = \$75$.

Table 2.8a. Comparison between clubbing and working

	Clubbing	**Working**
Willingness to Pay/Total Benefit	$100	$75
Explicit Costs	$50	$0
Total 'Happiness'	$50	$75

Table 2.8aThis shows us something interesting. Even though we are willing to pay $100 to go out clubbing, our 'happiness' from working is greater. A rational consumer would chose to work. The $75 we could be

earning from working is equal to our implicit costs of going out since, rather than going clubbing, we could be making money for the 5 hours. To truly consider costs we must always consider our **opportunity costs** which include the implicit and explicit costs of an action.

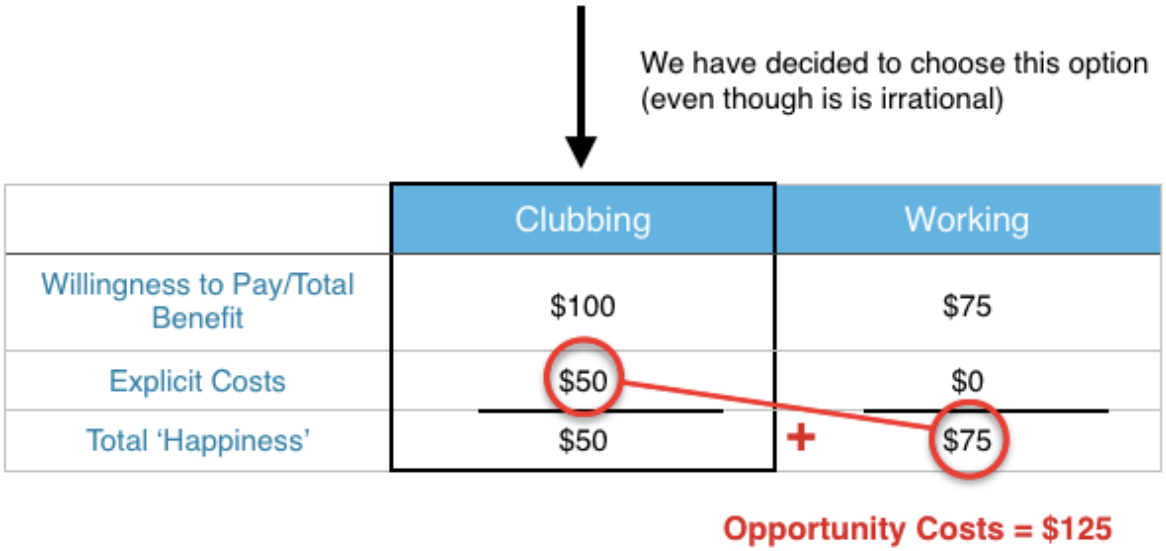

Table 2.8b Opportunity cost with clubbing and working. Image by Dr. Emma Hutchinson, University of Victoria, licensed under CC BY 4.0.

Table 2.8b Opportunity cost with clubbing and working Text Version

Table 2.8 b considers the opportunity cost with clubbing and working. We have decided to choose the clubbing option (even though it is irrational). Using the same data as Table 2.8a add the Explicit Costs from the Clubbing column and the Total 'Happiness' from the Working column to obtain the Opportunity Costs. In other words Explicit Costs (cover, drinks and ride home) + Implicit Costs (forgone income from 5 hours) = Opportunity Costs. $\$50 + \$75 = \$125$.

Table 2.8b Data for the comparison between clubbing and working Tables 1.2a & 1.2b

	Clubbing ($)	**Working ($)**
Willingness to Pay/Total Benefit	$100	$75
Explicit Costs	$50	$0
Total 'Happiness'	$50	$75

In this example if you were to go clubbing opportunity costs are: Explicit Costs (cover, drinks and ride home) $50 Implicit Costs (forgone income from 5 hours) : $75 Opportunity Costs : $125 Should you go clubbing?

You are only willing to pay $100, and your opportunity costs are $125 so no! Does this mean you should never go out? Not at all. You just may be surprised that your willingness to pay may be well over $100.

How to measure 'Happiness'

In our previous analysis we refer to the concept of "Total Happiness." The problem is, happiness is not an easy value to measure. Daniel Bernoulli, an economist, first introduced the concept of **utility** as a means of measuring happiness. Classical economists will often assume that utilities can be measured as a hard number. In reality, it is must harder to measure the happiness a consumer receives from a good. Often, we will use the measurement of how much a consumer is *willing to pay,* but even this information can be difficult to assess. For the remainder of Topic 1, we will refer to happiness as something that can be measured, recognizing that this is rarely as easy as it will appear here.

Scarcity

This consideration of opportunity cost is rooted in an understanding that all resources are scarce. The first image paints a compelling picture of the scarcity of time, and our financial resources are also scarce. Being a rational decision maker means considering the scarcity of all resources associated with an action. As decision makers, we have to make **trade-offs** on what we do with finite resources.

This leads us to a fairly simple conclusion. We should do something if the benefits outweigh the costs. The key insight is that the *costs* we are referring to are *opportunity costs,* which consider the next best alternative use of our resources.

Making Decisions

We have now looked at how to analyze two options, but how do we make the decision? We can lay the process out in three steps:

1. Find your **willingness to pay** (or wage you would earn) from the option you are considering and the next best alternative
2. Subtract the explicit costs from each option to find your happiness
3. Choose the option with that makes you happier

If we want to change this into the process for a binary decision (yes or no):

1. Add up all the benefits of an action
2. Subtract all costs explicit and implicit
3. If benefits > costs, this is the right choice

It is important to note that not all decisions are binary.

Sunk Costs

Just as it is important to understand the costs that should be considered in decision making, it is important to understand what costs should not. Consider the two options you may have when you wake up – do you work out or sleep in? Have you ever convinced yourself to get out of bed by reminding yourself that you paid $60 for your monthly gym membership? Well, you fell victim to a common logical fallacy.

A **sunk cost** is a cost that no matter what is unrecoverable. As such it should have no impact on future decision making. This may sound strange, but consider the your two options using the analysis learned above for making decisions.

This option provides more happiness

	Work-out	Sleep-In
Willingness to Pay/Total Benefit	$20	$30
Explicit Costs	$0	$0
Total 'Happiness'	$20	$30

Table 2.8c. Sunk Costs Work-Out vs. Sleep-In. Image by Dr. Emma Hutchinson, University of Victoria, licensed under CC BY 4.0.

The Table2.8c above, Sunk Costs Work-Out vs. Sleep-In, depicts the side by side comparison between working out and sleeping in to illustrate sunk costs. Following our steps we find the maximum willingness to pay for each option, subtract the explicit costs, and compare the happiness from each. Working-out would be $\$20 - \$0 = \$20$ and Sleeping-in would be $\$30 - \$0 = \$30$; therefore, Sleeping-in would provide more happiness. It does not matter that we spend $60 on a gym membership because no matter what we do we

can't get that money back. With this willingness to pay reflected in the table, the better option is to Sleep-In, with an opportunity cost of $20.

Notice that the $60 is not included as an explicit costs because it is not an additional cost we have to incur as a result of working out. Since we have already paid the $60, it is no longer something we consider.

Why Buy a Gym Membership?

Figure 2.8a Image (https://unsplash.com/photos/JNPvv1u8yRg) by Scott Webb, licensed under Unsplash License.

Why would one ever buy a gym membership? Well in this case, it might be a bad idea. The 'willingness to pay' represents how badly someone might want to go to the gym. If you knew that every morning you would wake up and value sleeping more than working out, then a gym pass might not be for you.

If that was the case you would need to find a way to increase your willingness to go to the gym, for example, if you committed to a work out plan with a friend, the social cost of sleeping in may be high, incentivizing you to get out of bed.

The important lesson here is to be mindful of your future motivation when you are incurring a sunk cost.

Sunk Costs & Business

Sunk costs aren't exclusive to gym memberships, in fact, the sunk cost fallacy is common in big business and government. Ever heard the expression "we've invested too much in this project to back out now?" Even if you have not, it sounds fairly logical – unfortunately it is not.

Consider a mining company that has invested $5 million in the infrastructure of a mine. After new information, they learn of another, richer mine site that they can mine for $4million, with projected revenues of $8 million. The current mine site will cost $1 million to extract the remaining resources ($4 million projected revenue). What should the company do?

Sunk Costs

	Continue Mining	Mine in New Site
Investment in Project to Date	$5 million	-
Projected Revenues	$4 million	$8 million
Explicit Costs	$1 million	$4 million
Total Profits	$3 million	$4 million

Table 2.8d .Table of sunk costs and business comparing continuing to mine and mining in a new site. Image by Dr. Emma Hutchinson, University of Victoria, licensed under CC BY 4.0.

Table 2.8d. Table of sunk costs and business comparing continuing to mine and mining in a new site Text version

Table 2.8d. Table of sunk costs and business comparing continuing to mine and mining in a new site

	Continue Mining	**Mine in a New Site**
Investment in Project to Date	$5 million	No figure available
Project Revenues	$4 million	$8 million
Explicit Costs	$1 million	$4 million
Total Profits	$3 million	$4 million

Investment in Project to Date is reflective of sunk costs: $5 million to continue mining and an unknown figure to mine in a new site.

Project revenues subtract explicit costs equal the total profits for the project. As shown the total profits from

the new site are higher, so despite the fact they have invested $5 million in the old site, they should abandon it and mine the new. The conclusion: sunk costs are irrelevant for decision making.

Want to know how you can avoid the sunk cost fallacy in your decision making? Take a look at Sunk Cost Bias: How It Hinders Your Life and 4 Ways to Overcome It [New Tab] (https://litemind.com/sunk-cost-bias/).

Exercises 1.2

1. Which of the following statements about opportunity cost is TRUE?

    I. Opportunity cost is equal to implicit costs plus explicit costs.
    II. Opportunity cost only measures direct monetary costs.
    III. Opportunity cost accounts for alternative uses of resources such as time and money.

    a. I, II and III.
    b. I
    c. III only.
    d. I and III only.

2. Which of the following statements about opportunity costs is TRUE?

    I. I. The opportunity cost of a given action is equal to the value foregone of all feasible alternative actions.
    II. II. Opportunity costs only measure direct out of pocket expenditures.
    III. III. To calculate accurately the opportunity cost of an action we need to first identify the next best alternative to that action.

    a. III only.
    b. I and III only.
    c. II only.
    d. None of the statements is true.

3. Suppose that you deciding between seeing a move and going to a concert on a particular

Saturday evening. You are willing to pay $20 to see the movie and the movie ticket costs $5. You are willing to pay $80 for the concert and the concert ticket costs $50. The opportunity cost of going to the movie is:

a. $5
b. $30
c. $35
d. $65

4. Suppose that you are willing to pay $20 to see a movie on Saturday night. A ticket costs $10, and the next-best alternative use of your time would be to go to dinner with a friend. The cost of the dinner is $20 and you value the experience of having dinner with your friend at $60. The opportunity cost of seeing the movie is equal to:

a. $50
b. $30
c. $20
d. $10

5. Suppose that you are willing to pay $50 to see a movie on Saturday night. A ticket costs $15 , and the next-best alternative use of your time would be to go to a concert which costs $80 and you value at $100. The opportunity cost of seeing the movie is equal to:

a. $15
b. $20
c. $35
d. $70

6. Suppose you play a round of golf costing $75. The golf takes four hours to play. If you were not playing golf you could be working and earning $40 per hour. The opportunity cost of your golf game is:

a. $75.
b. $235.
c. $155.
d. $160.

7. Suppose you have bought and paid for a ticket to see Lady Gaga in concert. You were willing to pay up to $200 for this ticket, but it only cost you $110. On the day of the concert, a friend

offers you a free ticket to the opera instead. Assuming that it is impossible to resell the Lady Gaga ticket, what is the minimum value you would have to place on a night at the opera, in order for you to choose the opera over Lady Gaga?

a. $200.
b. $110.
c. $90.
d. $0.

8. Suppose that you are willing to pay $350 to see Leonard Cohen play at the Save-On-Foods Arena. Tickets cost $100, and the next-best alternative use of your time would be to work in paid employment earning $50 over the evening. The opportunity cost of seeing Leonard Cohen is equal to:

a. $50.
b. $100.
c. $150.
d. $200.

9. I am considering loaning my brother $10,000 for one year. He has agreed to pay 10% interest on the loan. If I don't loan my brother the $10,000, it will stay in my bank account for the year, where it will earn 2% interest. What is the opportunity cost to me of the loan to my brother?

a. $200.
b. $800.
c. $1,000.
d. $1,200.

10. In January, in an attempt to commit to getting fit, I signed a year-long, binding contract at a local gym, agreeing to pay $40 per month in membership fees. I also spent $300 on extremely stylish gym clothes. This morning, I was trying to decide whether or not to actually go to the gym. Which of the following was relevant to this decision?

a. The $40 that I paid the gym this month.
b. The $300 I spent on gym clothes.
c. The fact that I also had to write a 103 midterm exam today.
d. All of the above were relevant.

11. Suppose you have bought and paid for a ticket to see Kanye in concert. You were willing to pay up to $350 for this ticket, but it only cost you $100. On the day of the concert, a friend offers you a free ticket to Lady Gaga instead. You can resell your Kanye ticket for $80. What do your sunk costs equal?

    a. $0.
    b. $20.
    c. $80.
    d. $100.

12. As a member of UVic's University Club, I pay $30 per month in membership fees. In a typical month I spend about $50 on beer at the Club. Every month I also have the option of attending a meeting of the whiskey club (open only to Club members), at a cost per meeting of $15, payable at the beginning of each meeting. Given this, what do my monthly SUNK COSTS equal?

    a. $15.
    b. $30.
    c. $45.
    d. $95.

Check your answer[1]

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1. **Question 1)** D , **Question 2)** A , **Question 3)** C , **Question 4)** A , **Question 5)** C , **Question 6)** B , **Question 7)** A , **Question 8)** C , **Question 9)**A , **Question 10)** C , **Question 11)** B , **Question 12)** B

- image describing spending/ scheduling time throughout your life
- removal of question 12 from Exercises 1.2.

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2.9 - ECONOMIC MODELS

Learning Objectives

- Review basic algebra and calculus' concepts relevant in introductory economics
- Assess the benefits and drawbacks of using simplifying assumptions in economics
- Apply the steps of the scientific method to economic questions
- Recognize the uses and limitations of economic models
- Contrast normative and positive statements about economic policy

Math Review

Mathematical economics uses mathematical methods, such as algebra and calculus, to represent theories and analyze problems in economics.

As a social science, economics analyzes the production, distribution, and consumption of goods and services. The study of economics requires the use of mathematics in order to analyze and synthesize complex information.

Mathematical Economics

Mathematical economics is the application of mathematical methods to represent theories and analyze problems in economics. Using mathematics allows economists to form meaningful, testable propositions about complex subjects that would be hard to express informally. Math enables economists to make specific and positive claims that are supported through formulas, models, and graphs. Mathematical disciplines, such as algebra and calculus, allow economists to study complex information and clarify assumptions.

Algebra

Algebra is the study of operations and their application to solving equations. It provides structure and a definite direction for economists when they are analyzing complex data. Math deals with specified numbers, while algebra introduces quantities without fixed numbers (known as **variables**). Using variables to denote quantities allows general relationships between quantities to be expressed concisely. **Quantitative** results in science, economics included, are expressed using algebraic equations.

Concepts in algebra that are used in economics include variables and algebraic expressions. Variables are letters that represent general, non-specified numbers. Variables are useful because they can represent numbers whose values are not yet known, they allow for the description of general problems without giving quantities, they allow for the description of relationships between quantities that may vary, and they allow for the description of mathematical properties. Algebraic expressions can be simplified using basic math operations including addition, subtraction, multiplication, division, and exponentiation.

In economics, theories need the flexibility to formulate and use general structures. By using algebra, economists are able to develop theories and structures that can be used with different scenarios regardless of specific quantities.

Calculus

Calculus is the mathematical study of change. Economists use calculus in order to study economic change whether it involves the world or human behavior.

Calculus has two main branches:

- Differential calculus is the study of the definition, properties, and applications of the derivative of a function (rates of change and slopes of curves). By finding the derivative of a function, you can find the rate of change of the original function.
- Integral calculus is the study of the definitions, properties, and applications of two related concepts, the indefinite and definite integral (accumulation of quantities and the areas under curves).

Calculus is widely used in economics and has the ability to solve many problems that algebra cannot. In economics, calculus is used to study and record complex information – commonly on graphs and curves. Calculus allows for the determination of a maximal profit by providing an easy way to calculate marginal cost and marginal revenue. It can also be used to study supply and demand curves.

Common Mathematical Terms

Economics utilizes a number of mathematical concepts on a regular basis such as:

- **Dependent Variable:** The output or the effect variable. Typically represented as yy, the dependent variable is graphed on the yy-axis. It is the variable whose change you are interested in seeing when you change other variables.
- **Independent or Explanatory Variable:** The inputs or causes. Typically represented as x1x1, x2x2, x3x3, etc., the independent variables are graphed on the xx-axis. These are the variables that are changed in order to see how they affect the dependent variable.
- **Slope:** The direction and steepness of the line on a graph. It is calculated by dividing the amount the line increases on the yy-axis (vertically) by the amount it changes on the xx-axis (horizontally). A positive slope means the line is going up toward the right on a graph, and a negative slope means the line is going down toward the right. A horizontal line has a slope of zero, while a vertical line has an undefined slope. The slope is important because it represents a rate of change.
- **Tangent:** The single point at which two curves touch. The derivative of a curve, for example, gives the equation of a line tangent to the curve at a given point.

Assumptions

Economists use **assumptions** in order to **simplify** economics processes so that they are easier to understand.

As a field, economics deals with complex processes and studies substantial amounts of information. Economists use assumptions in order to simplify economic processes so that it is easier to understand. Simplifying assumptions are used to gain a better understanding about economic issues with regards to the world and human behavior.

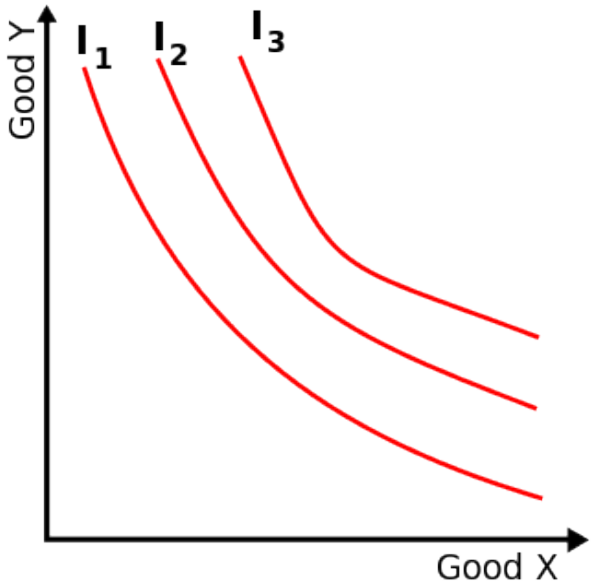

Figure 2.9a Simple indifference curve. Simple indifference curve (https://commons.wikimedia.org/wiki/File:Simple-indifference-curves.svg#/media/File:Simple-indifference-curves.svg) by SilverStar, licensed under CC BY 2.5.

Illustrates three indifference curves, with I3 having highest utility, and I1 lowest.

Simple indifference curve: An indifference curve is used to show potential demand patterns. It is an example of a graph that works with simplifying assumptions to gain a better understanding of the world and human behavior in relation to economics.

Economic Assumptions

Neo-classical economics works with three basic assumptions:

1. People have rational preferences among outcomes that can be identified and associated with a value.
2. Individuals maximize utility (as consumers) and firms maximize profit (as producers).
3. People act independently on the basis of full and relevant information.

Benefits of Economic Assumptions

Assumptions provide a way for economists to simplify economic processes and make them easier to study and understand. An assumption allows an economist to break down a complex process in order to develop a

theory and realm of understanding. Good simplification will allow the economists to focus only on the most relevant variables. Later, the theory can be applied to more complex scenarios for additional study.

For example, economists assume that individuals are rational and maximize their utilities. This simplifying assumption allows economists to build a structure to understand how people make choices and use resources. In reality, all people act differently. However, using the assumption that all people are rational enables economists study how people make choices.

Criticisms of Economic Assumptions

Although, simplifying assumptions help economists study complex scenarios and events, there are criticisms to using them. Critics have stated that assumptions cause economists to rely on unrealistic, unverifiable, and highly simplified information that in some cases simplifies the proofs of desired conclusions. Examples of such assumptions include perfect information, profit maximization, and rational choices. Economists use the simplified assumptions to understand complex events, but criticism increases when they base theories off the assumptions because assumptions do not always hold true. Although simplifying can lead to a better understanding of complex phenomena, critics explain that the simplified, unrealistic assumptions cannot be applied to complex, real world situations.

Hypotheses and Tests

Economics, as a science, follows the scientific method in order to study data, observe patterns, and predict results of stimuli. There are specific steps that must be followed when using the scientific method. Economics follows these steps in order to study data and build principles:

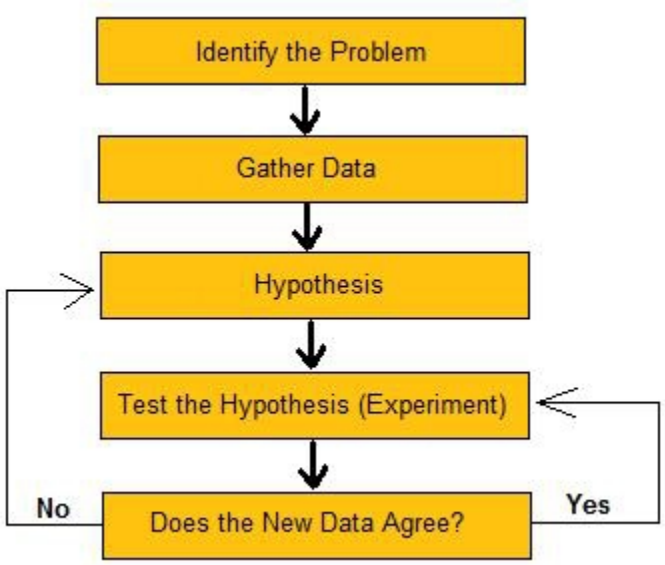

Figure 2.9b. Flowchart of the steps in the Scientific Method. Flowchart of the steps in the Scientific Method (https://commons.wikimedia.org/wiki/File:The_Scientific_Method.jpg) by CK-12 Foundation, licensed under CC BY-SA 3.0.

Scientific Method: The scientific method is used in economics to study data, observe patterns, and predict results.

1. **Identify the problem** – in the case of economics, this first step of the scientific method involves determining the focus or intent of the work. What is the economist studying? What is he trying to prove or show through his work?
2. **Gather data** – economics involves extensive amounts of data. For this reason, it is important that economists can break down and study complex information. The second step of the scientific method involves selecting the data that will be used in the study.
3. **Hypothesis** – the third step of the scientific method involves creating a model that will be used to make sense of all of the data. A **hypothesis** is simply a prediction. What does the economist think the overall outcome of the study will be?
4. **Test hypothesis** – the fourth step of the scientific method involves testing the hypothesis to determine if it is true. This is a critical stage within the scientific method. The observations must be tested to make sure they are unbiased and reproducible. In economics, extensive testing and observation is required because the outcome must be obtained more than once in order for it to be valid. It is not unusual for testing to take some time and for economists to make adjustments throughout the testing process.
5. **Analyze the results** – the final step of the scientific method is to analyze the results. First, an economist will ask himself if the data agrees with the hypothesis. If the answer is "yes," then the hypothesis was

accurate. If the answer is "no," then the economist must go back to the original hypothesis and adjust the study accordingly. A negative result does not mean that the study is over. It simply means that more work and analysis is required.

Observation of data is critical for economists because they take the results and interpret them in a meaningful way. Cause and effect relationships are used to establish economic theories and principles. Over time, if a theory or principle becomes accepted as universally true, it becomes a law. In general, a law is always considered to be true. The scientific method provides the framework necessary for the progression of economic study. All economic theories, principles, and laws are generalizations or abstractions. Through the use of the scientific method, economists are able to break down complex economic scenarios in order to gain a deeper understanding of critical data.

Economic Models

A model is simply a framework that is designed to show complex economic processes.

Economic Models

In economics, a model is defined as a theoretical construct that represents economic processes through a set of variables and a set of logical or quantitative relationships between the two. A model is simply a framework that is designed to show complex economic processes. Most models use mathematical techniques in order to investigate, theorize, and fit theories into economic situations.

Uses of an Economic Model

Economists use models in order to study and portray situations. The focus of a model is to gain a better understanding of how things work, to observe patterns, and to predict the results of stimuli. Models are based on theory and follow the rules of **deductive** logic.

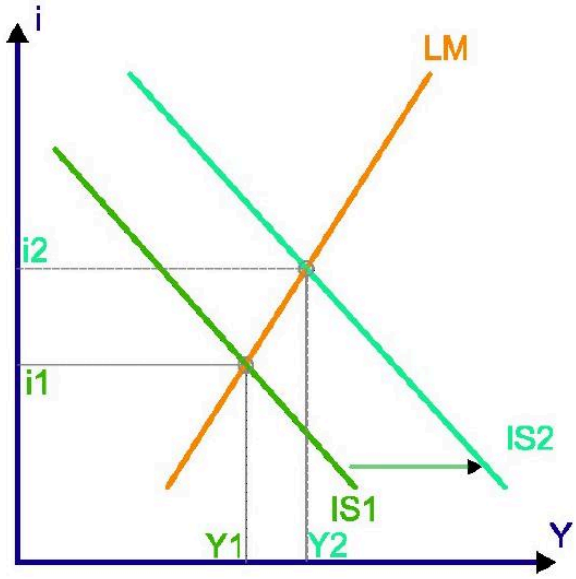

Figure 2.9c. Economic model diagram. Islm (https://commons.wikimedia.org/wiki/File:Islm.svg) by [[:en:User: {{{1}}}|{{{1}}}]], licensed under CC BY-SA 3.0. A derivative Thomas Steiner's Islm.

In economics, economic model diagrams are used in order to study and portray situations and gain a better understand of how things work. Economic models have two functions:

1. to simplify and abstract from observed data,
2. to serve as a means of selection of data based on a paradigm of econometric study.

Economic processes are known to be enormously complex, so simplification to gain a clearer understanding is critical. Selecting the correct data is also very important because the nature of the model will determine what economic facts are studied and how they will be compiled. Examples of the uses of economic models include: professional academic interest, forecasting economic activity, proposing economic policy, presenting reasoned arguments to politically justify economic policy, as well as economic planning and allocation.

Constructing a Model

The construction and use of a model will vary according to the specific situation. However, creating a model does have two basic steps: 1) generate the model, and 2) checking the model for accuracy – also known as

diagnostics. The diagnostic step is important because a model is only useful if the data and analysis is accurate.

Limitations of a Model

Due to the complexity of economic models, there are obviously limitations that come into account. First, all of the data provided must be complete and accurate in order for the analysis to be successful. Also, once the data is entered, it must be analyzed correctly. In most cases, economic models use mathematical or quantitative analysis. Within this realm of observation, accuracy is very important. During the construction of a model, the information will be checked and updated as needed to ensure accuracy. Some economic models also use **qualitative** analysis. However, this kind of analysis is known for lacking precision. Furthermore, models are fundamentally only as good as their founding assumptions.

The use of economic models is important in order to further study and understand economic processes. Steps must be taken throughout the construction of the model to ensure that the data provided and analyzed is correct.

Normative and Positive Economics

Positive economics is defined as the "what is" of economics, while **normative economics** focuses on the "what ought to be".

Positive and normative economic thought are two specific branches of economic reasoning. Although they are associated with one another, positive and normative economic thought have different focuses when analyzing economic scenarios.

Positive Economics

Positive economics is a branch of economics that focuses on the description and explanation of phenomena, as well as their casual relationships. It focuses primarily on facts and cause-and-effect behavioral relationships, including developing and testing economic theories. As a science, positive economics focuses on analyzing economic behavior. It avoids economic value judgments. For example, positive economic theory would describe how money supply growth impacts inflation, but it does not provide any guidance on what policy should be followed. "The unemployment rate in France is higher than that in the United States" is a positive economic statement. It gives an overview of an economic situation without providing any guidance for necessary actions to address the issue.

Normative Economics

Normative economics is a branch of economics that expresses value or normative judgments about economic fairness. It focuses on what the outcome of the economy or goals of public policy *should* be. Many normative judgments are conditional. They are given up if facts or knowledge of facts change. In this instance, a change in values is seen as being purely scientific. Welfare economist Amartya Sen explained that basic (normative) judgments rely on knowledge of facts.

An example of a normative economic statement is "The price of milk should be $6 a gallon to give dairy farmers a higher living standard and to save the family farm. " It is a normative statement because it reflects value judgments. It states facts, but also explains what should be done. Normative economics has subfields that provide further scientific study including social choice theory, cooperative game theory, and mechanism design.

Relationship Between Positive and Normative Economics

Positive economics does impact normative economics because it ranks economic policies or outcomes based on acceptability (normative economics). Positive economics is defined as the "what is" of economics, while normative economics focuses on the "what ought to be. " Positive economics is utilized as a practical tool for achieving normative objectives. In other words, positive economics clearly states an economic issue and normative economics provides the value-based solution for the issue.

Key Takeaways

- Using mathematics allows economists to form meaningful, testable propositions about complex subjects that would be hard to express informally.
- Algebra is the study of operations and their application to solving equations. It provides structure and a definite direction for economists when they are analyzing complex data.
- Concepts in algebra that are used in economics include variables and algebraic expressions.
- Calculus is the mathematical study of change. Economists use calculus in order to study economic change whether it involves the world or human behavior.
- In economics, calculus is used to study and record complex information – commonly on

graphs and curves.

- Neo-classical economics employs three basic assumptions: people have rational preferences among outcomes that can be identified and associated with a value, individuals maximize utility and firms maximize profit, and people act independently on the basis of full and relevant information.
- An assumption allows an economist to break down a complex process in order to develop a theory and realm of understanding. Later, the theory can be applied to more complex scenarios for additional study.
- Critics have stated that assumptions cause economists to rely on unrealistic, unverifiable, and highly simplified information that in some cases simplifies the proofs of desired conclusions.
- Although simplifying can lead to a better understanding of complex phenomena, critics explain that the simplified, unrealistic assumptions cannot be applied to complex, real world situations.
- The scientific method involves identifying a problem, gathering data, forming a hypothesis, testing the hypothesis, and analyzing the results.
- A hypothesis is simply a prediction.
- In economics, extensive testing and observation is required because the outcome must be obtained more than once in order to be valid.
- Cause and effect relationships are used to establish economic theories and principles. Over time, if a theory or principle becomes accepted as universally true, it becomes a law. In general, a law is always considered to be true.
- The scientific method provides the framework necessary for the progression of economic study.
- Many models use mathematical techniques in order to investigate, theorize, and fit theories into economic situations.
- Economic models have two functions: 1) to simplify and abstract from observed data, and 2) to serve as a means of selection of data based on a paradigm of econometric study.
- Creating a model has two basic steps: 1) generate the model, and 2) checking the model for accuracy – also known as diagnostics.
- Examples of the uses of economic models include: professional academic interest, forecasting economic activity, proposing economic policy, presenting reasoned arguments to politically justify economic policy, as well as economic planning and allocation.
- Positive economics is a branch of economics that focuses on the description and explanation of phenomena, as well as their casual relationships.
- Positive economics clearly states an economic issue and normative economics provides the

value-based solution for the issue.

- Normative economics is a branch of economics that expresses value or normative judgments about economic fairness. It focuses on what the outcome of the economy or goals of public policy should be.
- Positive economics does impact normative economics because it ranks economic polices or outcomes based on acceptability (normative economics).

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2.10 - WHY IT MATTERS: LABOUR MARKETS

Why understand labour markets?

Figure 2.10a. What determines incomes? In the U.S., income is based on one's value to an employer, which depends in part on education. Image by Steven A. Greenlaw & David Shapiro (OpenStax), licesned under CC BY 4.0. Modification of work by AFL-CIO America's Unions/Flickr Creative Commons and COD Newsroom/Flickr Creative Commons.

Working your way through college used to be fairly common in the United States. According to a 2015 study by the Georgetown Center on Education and the Workforce, 40% of college students work 30 hours or more per week.

At the same time, the cost of college seems to rise every year. The data show that the cost of tuition, fees, room and board has more than doubled since 1984. Thus, even full time employment may not be enough to cover college expenses anymore. Working full time at minimum wage–40 hours per week, 52 weeks per year—earns $15,080 before taxes, which is less than the $19,548 the College Board estimates it cost in 2016 for a year of college at a public university. The result of these costs is that student loan debt topped $1.3 trillion this year.

Despite these disheartening figures, the value of a bachelor's degree has never been higher. How do we explain this? This module will tell us. We will learn about:

- The theory of labour markets
- How wages are determined in an imperfectly competitive labour market
- How unions affect wages and employment
- How labour market outcomes are determined under bilateral monopoly
- Theories of employment discrimination
- How Immigration affects labour market outcomes

In a market economy like the United States, income comes from ownership of the means of production: resources or assets. More precisely, one's income is a function of two things: the quantity of each resource one owns, and the value society places on those resources.

Recall from the module on production and costs that each factor of production has an associated factor payment. For the majority of us, the most important resource we own is our labour. Thus, most of our income is wages, salaries, commissions, tips and other types of labour income. Your labour income depends on how many hours you have to work and the wage rate an employer will pay you for those hours. At the same time, some people own real estate, which they can either use themselves or rent out to other users. Some people have financial assets like bank accounts, stocks and bonds, for which they earn interest, dividends or some other form of income. Each of these factor payments, like wages for labour and interest for financial capital, is determined in their respective factor markets.

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2.11 - SELF-CHECK, CRITICAL THINKING & REVIEW QUESTIONS

Self-Check Questions

1. Suppose Alphonso's town raised the price of bus tickets to $1 per trip (while the price of burgers stayed at $2 and his budget remained $10 per week.) Draw Alphonso's new budget constraint. What happens to the opportunity cost of bus tickets?
2. Return to the example in Figure 2.2b[New Tab]. Suppose there is an improvement in medical technology that enables more healthcare with the same amount of resources. How would this affect the production possibilities curve and, in particular, how would it affect the opportunity cost of education?
3. Could a nation be producing in a way that is allocatively efficient, but productively inefficient?
4. What are the similarities between a consumer's budget constraint and society's production possibilities frontier, not just graphically but analytically?
5. Individuals may not act in the rational, calculating way described by the economic model of decision making, measuring utility and costs at the margin, but can you make a case that they behave approximately that way?
6. Would an op-ed piece in a newspaper urging the adoption of a particular economic policy be a positive or normative statement?
7. Would a research study on the effects of soft drink consumption on children's cognitive development be a positive or normative statement?

Check your answers

1. The opportunity cost of bus tickets is the number of burgers that must be given up to obtain one more bus ticket. Originally, when the price of bus tickets was 50 cents per trip, this opportunity cost was $0.50 \div 2 = 0.25 \text{ burgers}$. The reason for this is that at the original prices,

one burger ($2) costs the same as four bus tickets ($0.50), so the opportunity cost of a burger is four bus tickets, and the opportunity cost of a bus ticket is 0.25 (the inverse of the opportunity cost of a burger). With the new, higher price of bus tickets, the opportunity cost rises to {\scriptsize \$1 \div \$2 \scriptsize} or 0.50. You can see this graphically since the slope of the new budget constraint is steeper than the original one. If Alphonso spends all of his budget on burgers, the higher price of bus tickets has no impact so the vertical intercept of the budget constraint is the same. If he spends his entire budget on bus tickets, he can now afford only half as many, so the horizontal intercept is half as much. In short, the budget constraint rotates clockwise around the vertical intercept, steepening as it goes and the opportunity cost of bus tickets increases.

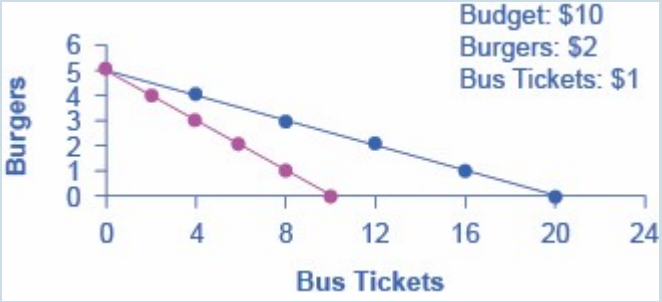

Figure 2.11a Question 1 Graph: Alphonso's New Budget Constraint Figure by Steven A. Greenlaw & David Shapiro (OpenStax), licensed under CC BY 4.0.

Figure 2.11a. Question 1 Graph: Alphonso's New Budget Constraint Text Version
The x-axis is number of burgers and the y-axis is number of bus tickets ($). The first line charts original number of bus tickets ($0.50) and number of burgers, a gradual curve downward from left to right. The second line charts the new cost of bus tickets ($1) and number of burgers, a sharper curve downward from left to right.

Question 1 Table 2.11a: Alphonso's New Budget Constraints

Points	Number of Burgers	Original Number of Bus Tickets	Number of Bus Tickets Increased Cost
1	5	0	0
2	4	4	2
3	3	8	4
4	2	12	6
5	1	16	8
6	0	20	10

2. Because of the improvement in technology, the vertical intercept of the PPF would be at a higher level of healthcare. In other words, the PPF would rotate clockwise around the horizontal intercept. This would make the PPF steeper, corresponding to an increase in the opportunity cost of education, since resources devoted to education would now mean forgoing a greater quantity of healthcare.
3. No. Allocative efficiency requires productive efficiency, because it pertains to choices along the production possibilities frontier.
4. Both the budget constraint and the PPF show the constraint that each operates under. Both show a tradeoff between having more of one good but less of the other. Both show the opportunity cost graphically as the slope of the constraint (budget or PPF).
5. When individuals compare cost per unit in the grocery store, or characteristics of one product versus another, they are behaving approximately like the model describes.
6. Since an op-ed makes a case for what should be, it is considered normative.
7. Assuming that the study is not taking an explicit position about whether soft drink consumption is good or bad, but just reporting the science, it would be considered positive.

Critical Thinking Questions

1. Suppose Alphonso's town raises the price of bus tickets from $0.50 to $1 and the price of burgers rises from $2 to $4. Why is the opportunity cost of bus tickets unchanged? Suppose Alphonso's weekly spending money increases from $10 to $20. How is his budget constraint affected from all three changes? Explain.
2. During the Second World War, Germany's factories were decimated. It also suffered many human casualties, both soldiers and civilians. How did the war affect Germany's production possibilities curve?
3. It is clear that productive inefficiency is a waste since resources are used in a way that produces less goods and services than a nation is capable of. Why is allocative inefficiency also wasteful?
4. What assumptions about the economy must be true for the invisible hand to work? To what extent are those assumptions valid in the real world?
5. Do economists have any particular expertise at making normative arguments? In other words, they have expertise at making positive statements (i.e., what *will* happen) about some economic policy, for example, but do they have special expertise to judge whether or not the policy *should* be undertaken?

Review Questions

1. Explain why scarcity leads to tradeoffs.
2. Explain why individuals make choices that are directly on the budget constraint, rather than inside the budget constraint or outside it.
3. What is comparative advantage?

4. What does a production possibilities frontier illustrate?
5. Why is a production possibilities frontier typically drawn as a curve, rather than a straight line?
6. Explain why societies cannot make a choice above their production possibilities frontier and should not make a choice below it.
7. What are diminishing marginal returns?
8. What is productive efficiency? Allocative efficiency?
9. What is the difference between a positive and a normative statement?
10. Is the economic model of decision-making intended as a literal description of how individuals, firms, and the governments actually make decisions?
11. What are four responses to the claim that people should not behave in the way described in this chapter?

Problems

Use this information to answer the following 4 questions: Marie has a weekly budget of $24, which she likes to spend on magazines and pies.

1. If the price of a magazine is $4 each, what is the maximum number of magazines she could buy in a week?
2. If the price of a pie is $12, what is the maximum number of pies she could buy in a week?
3. Draw Marie's budget constraint with pies on the horizontal axis and magazines on the vertical axis. What is the slope of the budget constraint?
4. What is Marie's opportunity cost of purchasing a pie?

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2.12 - REVIEW AND PRACTICE

Summary

Economics deals with choices. In this chapter we have examined more carefully the range of choices in production that must be made in any economy. In particular, we looked at choices involving the allocation of an economy's factors of production: labour, capital, and natural resources.

In addition, in any economy, the level of technology plays a key role in determining how productive the factors of production will be. In a market economy, entrepreneurs organize factors of production and act to introduce technological change.

The production possibilities model is a device that assists us in thinking about many of the choices about resource allocation in an economy. The model assumes that the economy has factors of production that are fixed in both quantity and quality. When illustrated graphically, the production possibilities model typically limits our analysis to two goods. Given the economy's factors of production and technology, the economy can produce various combinations of the two goods. If it uses its factors of production efficiently and has full employment, it will be operating on the production possibilities curve.

Two characteristics of the production possibilities curve are particularly important. First, it is downward sloping. This reflects the scarcity of the factors of production available to the economy; producing more of one good requires giving up some of the other. Second, the curve is bowed out. Another way of saying this is to say that the curve gets steeper as we move from left to right; the absolute value of its slope is increasing. Producing each additional unit of the good on the horizontal axis requires a greater sacrifice of the good on the vertical axis than did the previous units produced. This fact, called the law of increasing opportunity cost, is the inevitable result of efficient choices in production—choices based on comparative advantage.

The production possibilities model has important implications for international trade. It suggests that free trade will allow countries to specialize in the production of goods and services in which

they have a comparative advantage. This specialization increases the production of all goods and services.

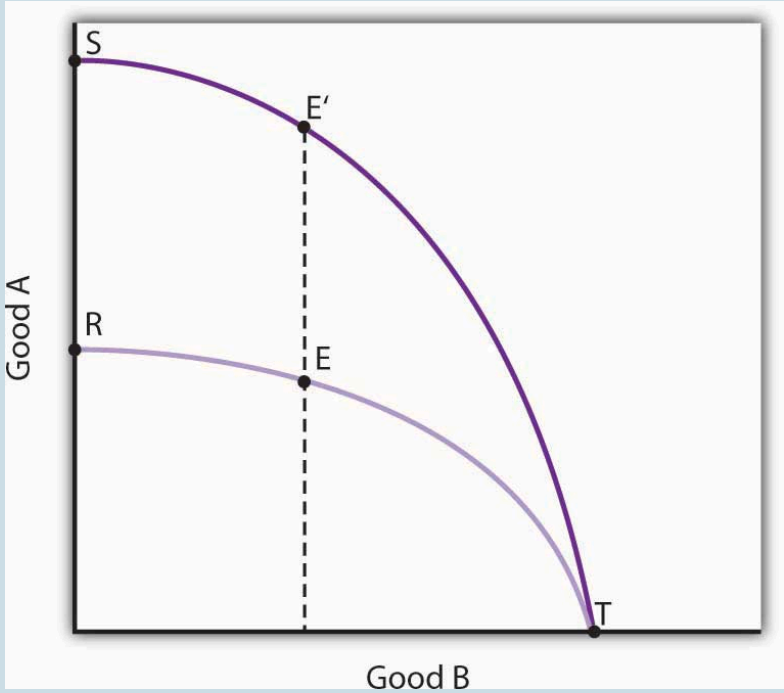
Increasing the quantity or quality of factors of production and/or improving technology will shift the production possibilities curve outward. This process is called economic growth. In the last 50 years, economic growth in the United States has resulted chiefly from increases in human capital and from technological advance.

Choices concerning the use of scarce resources take place within the context of a set of institutional arrangements that define an economic system. The principal distinctions between systems lie in the degree to which ownership of capital and natural resources and decision making authority over scarce resources are held by government or by private individuals. Economic systems include market capitalist, mixed, and command socialist economies. An increasing body of evidence suggests that market capitalist economies tend to be most productive; many command socialist and mixed economies are moving in the direction of market capitalist systems.

The presumption in favour of market-based systems does not preclude a role for government. Government is necessary to provide the system of laws on which market systems are founded. It may also be used to provide certain goods and services, to help individuals in need, and to regulate the actions of individuals and firms.

Concept Problems

1. How does a college education increase one's human capital?
2. Why does the downward-sloping production possibilities curve imply that factors of production are scarce?
3. In what ways are the bowed-out shape of the production possibilities curve and the law of increasing opportunity cost related?
4. Suppose an economy can produce two goods, A and B. It is now operating at point E on production possibilities curve RT. An improvement in the technology available to produce good A shifts the curve to ST, and the economy selects point E'. How does this change affect the opportunity cost of producing an additional unit of good B?



Question 4 Figure 2.12a. Figure by University of Minnesota, licensed under CC BY-NC-SA 4.0.

Question 4 Figure 2.12a (Text version)

Graph depicts two Goods, Good A is on the vertical axis and Good B is on the horizontal axis. Line 1 connects Points R and T. Point E in the middle of the trending slope between Good A and B.

Line 1: Point R is located at 0 B Goods and half way up the vertical axis and is a curved slope trending downwards toward Point T, which is located at 0 A Goods and the top end of B Goods scale.

Line 2: Depicts a steeper downward curve. Good A has now doubled and represented by Point S, which is located at 0 B Goods and the top of the vertical axis. Point T remains the same – located at 0 A Goods and the top end of B Goods scale. Point E remains in the middle of the trending slope between Good A and B, but has increased.

5. Could a nation's production possibilities curve ever shift inward? Explain what such a shift would mean, and discuss events that might cause such a shift to occur.
6. Suppose blue-eyed people were banned from working. How would this affect a nation's production possibilities curve?
7. Evaluate this statement: "The Canadian economy could achieve greater growth by devoting fewer resources to consumption and more to investment; it follows that such a shift would

be desirable."

8. Two countries, Sportsland and Foodland, have similar total quantities of labour, capital, and natural resources. Both can produce two goods, figs and footballs. Sportsland's resources are particularly well suited to the production of footballs but are not very productive in producing figs. Foodland's resources are very productive when used for figs but are not capable of producing many footballs. In which country is the cost of additional footballs generally greater? Explain.
9. Suppose a country is committed to using its resources based on the reverse of comparative advantage doctrine: it first transfers those resources for which the cost is greatest, not lowest. Describe this country's production possibilities curve.
10. The U.S. Constitution bans states from restricting imports of goods and services from other states. Suppose this restriction did not exist and that states were allowed to limit imports of goods and services produced in other states. How do you think this would affect U.S. output? Explain.
11. By 1993, nations in the European Union (EU) had eliminated all barriers to the flow of goods, services, labour, and capital across their borders. Even such things as consumer protection laws and the types of plugs required to plug in appliances have been standardized to ensure that there will be no barriers to trade. How do you think this elimination of trade barriers affected EU output?
12. How did the technological changes described in the Case in Point "Technology Cuts Costs, Boosts Productivity and Profits" affect the production possibilities curve for the United States?

Numerical Problems

1. Nathan can mow four lawns in a day or plant 20 trees in a day.

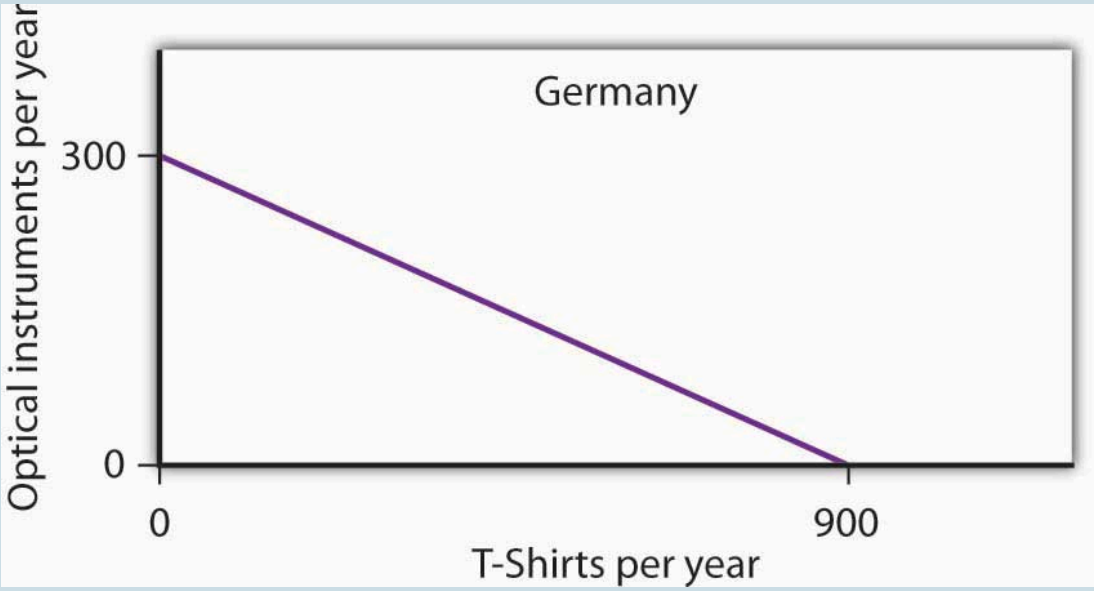
    1. Draw Nathan's production possibilities curve for mowing lawns and planting trees. Assume the production possibilities curve is linear and put the quantity of lawns

mowed per day on the horizontal axis and the quantity of trees planted per day on the vertical axis.
   2. What is Nathan's opportunity cost of planting trees?
   3. What is Nathan's opportunity cost of mowing lawns?

2. David can mow four lawns in a day or plant four trees in a day.

   1. Draw David's production possibilities curve for mowing lawns and planting trees. Again, assume a linear production possibilities curve and put the quantity of lawns mowed per day on the horizontal axis.
   2. What is David's opportunity cost of planting trees?
   3. What is David's opportunity cost of mowing lawns?

3. Given the production information in problems 1 and 2 above, who has the comparative advantage in planting trees? Mowing lawns?
4. The following graphs describe the production possibilities for Germany and Turkey. Use these graphs to answer the questions listed below:



Question 4 Figure 2.12b. The production possibilities for Germany. Figure by University of Minnesota, licensed under CC BY-NC-SA 4.0.

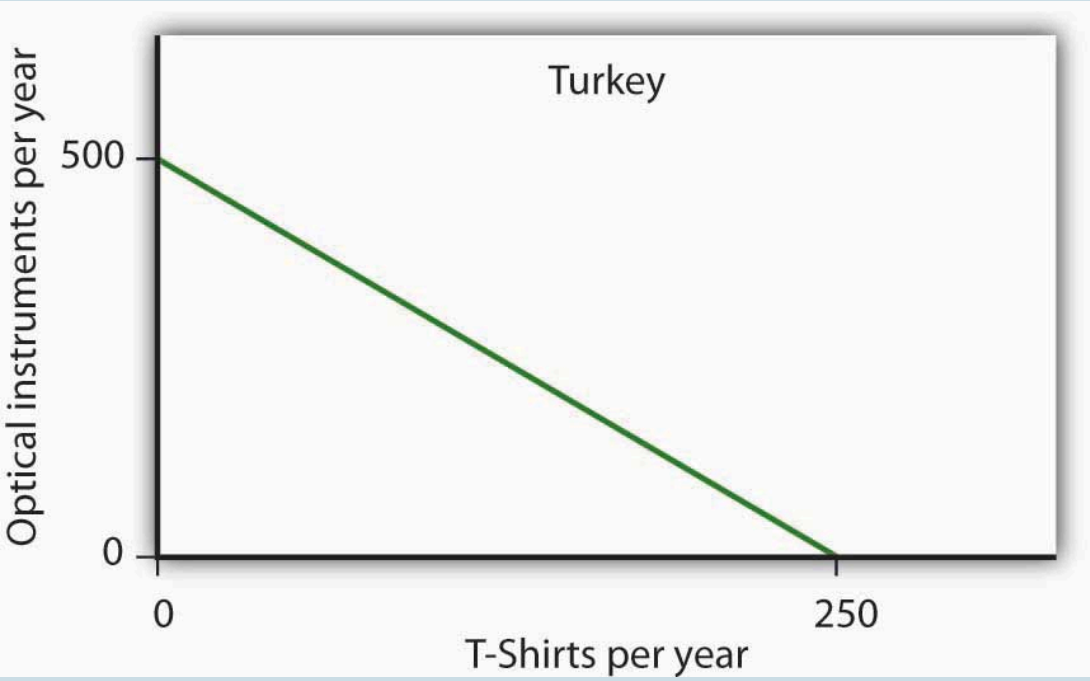


Figure 2.12c. The production possibilities for Turkey. Figure by University of Minnesota, licensed under CC BY-NC-SA 4.0.

1. What is the slope of Germany's production possibilities curve?
2. What is the slope of Turkey's production possibilities curve?
3. What is the opportunity cost of producing T-shirts in Germany?
4. What is the opportunity cost of producing T-shirts in Turkey?
5. What is the opportunity cost of producing optical instruments in Germany?
6. What is the opportunity cost of producing optical instruments in Turkey?
7. In which good does Germany have a comparative advantage?
8. In which good does Turkey have a comparative advantage?

5. The nation of Leisureland can produce two goods, bicycles and bowling balls. The western region of Leisureland can, if it devotes all its resources to bicycle production, produce 100 bicycles per month. Alternatively, it could devote all its resources to bowling balls and produce 400 per month—or it could produce any combination of bicycles and bowling balls lying on a straight line between these two extremes.

    1. Draw a production possibilities curve for western Leisureland (with bicycles on the vertical axis).

2. What it is the opportunity cost of producing an additional bowling ball measured in terms of forgone bicycles in western Leisureland?
3. Suppose that eastern Leisureland can, if it devotes all its resources to the production of bicycles, produce 400. If it devotes all its resources to bowling ball production, though, it can produce only 100. Draw the production possibilities curve for eastern Leisureland (again, assume it is linear and put bicycles on the vertical axis).
4. What is the opportunity cost of producing an additional bowling ball measured in terms of forgone bicycles in eastern Leisureland?
5. Explain the difference in opportunity cost between western and eastern Leisureland. Which region has a comparative advantage in producing bowling balls? Bicycles?
6. Draw the production possibilities curve for Leisureland, one that combines the curves for western and eastern Leisureland.
7. Suppose it is determined that 400 bicycles must be produced. How many bowling balls can be produced?
8. Where will these goods be produced?

6. The table below shows the production possibilities schedule for an economy.

Table 2.12a: Production possibilities schedule for an economy

Production Alternatives	Capital goods per period	Consumer goods per period
A	0	40
B	1	36
C	2	28
D	3	16
E	4	0

1. Putting capital goods per period on the horizontal axis and consumer goods per period on the vertical axis, graph the production possibilities curve for the economy.
2. If the economy is producing at alternative B, what is the opportunity cost to it of producing at alternative C instead?
3. If the economy is producing at alternative C, what is the opportunity cost to it of producing at alternative D instead?
4. Is it possible for this economy to produce 30 units of consumer goods per period while producing 1 unit of capital goods? Would this combination of goods represent efficient or inefficient production? Explain.
5. Which point, B or C, would lead to higher economic growth? Explain your answer.

Figure 2.12d shows the sources of growth in the United States between 1909 and 1929 and between 1950 and 1979, according to a study by Edward Denison (Denison, 1962). (Note: The sources of economic growth are cumulative and, taken collectively, explain 100% of total growth over the period.) Figure 2.12d data was extrapolated into two tables: Table 1 contains data for 1909 and 1929 and Table 2 contains data for 1909 and 1929.

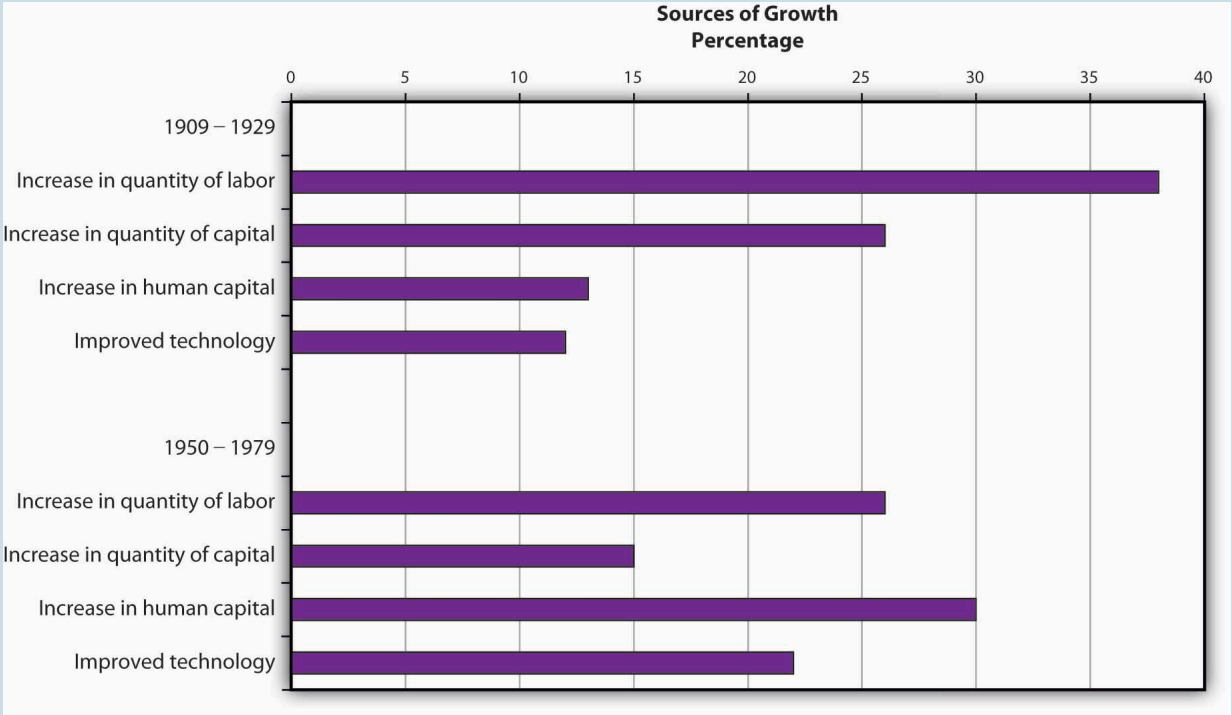


Figure 2.12d. Sources of growth in the United States between 1909 and 1929 and between 1950 and 1979. Figure by University of Minnesota, licensed under CC BY-NC-SA 4.0. Data obtained from study by Edward Denison (Denison, 1962).

Figure 2.12d. Sources of growth in the United States between 1909 and 1929 and between 1950 and 1979 (Text Version)

The tables below are an approximation of data reflected in Figure 2.12d. Sources of growth in the United States between 1909 and 1929 and between 1950 and 1979

Table 2.12b: Sources of growth in the United States between 1909 and 1929. Data obtained from study by Edward Denison (Denison, 1962).

Source of Economic Growth	Source of Growth Percentage
Increase in quantity of labour	38
Increase in quantity of capital	26
Increase in human capital	13
Improved technology	12

Table 2.12c: Sources of growth in the United States between between 1950 and 1979. Data obtained from study by Edward Denison (Denison, 1962).

Source of Economic Growth	Source of Growth Percentage
Increase in quantity of labour	26
Increase in quantity of capital	15
Increase in human capital	30
Improved technology	23

1. Approximately what percentage of U.S. growth between 1909 and 1929 was due to increases in quantities of factors of production?
2. Approximately what percentage of U.S. growth between 1909 and 1929 was due to increases in quality of factors of production and technological improvement?
3. Approximately what percentage of U.S. growth between 1950 and 1979 was due to increases in quantities of factors of production?
4. Approximately what percentage of U.S. growth between 1950 and 1979 was due to increases in quality of factors of production and technological improvement?

Watch It!

Watch the video Production Possibility Opportunity Cost Examples (https://www.youtube.com/watch?v=CKDtHPR5zd0)(9 mins)

One or more interactive elements has been excluded from this version of the text. You can view them online here: https://ecampusontario.pressbooks.pub/laboureconomics/?p=844#oembed-1

Video Source: Economics tutoring ASU department of economics. (2016, January 24). P*roduction possibility opportunity cost examples* [Video]. YouTube. https://www.youtube.com/watch?v=CKDtHPR5zd0

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Original Source References

Denison, E., *The Sources of Economic Growth in the United States* (New York: Committee for Economic Development, 1962) and Edward Denison, *Trends in American Growth 1929–1982* (Washington, D.C.: Brookings Institutions, 1985).

Economics Tutoring ASU Department of Economics. (2016, January 24). Production Possibility Opportunity Cost Examples [Video]. YouTube. https://www.youtube.com/watch?v=CKDtHPR5zd0 . Licensed under YouTube license.

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2.13 - READING LIST

1. Current Population Survey (Household Survey) FRED [New Tab] (https://fred.stlouisfed.org/categories/12)
2. Statistics Canada [New Tab] (https://www.statcan.gc.ca/en/start)

Reading List compiled by Norm Smith.

CHAPTER 3: INTRODUCTION TO SUPPLY & DEMAND

Learning Objectives

- Demand, Supply, and Equilibrium in Markets for Goods and Services
- Shifts in Demand and Supply for Goods and Services
- Changes in Equilibrium Price and Quantity: The Four-Step Process
- Price Ceilings and Price Floors

Bring It Home

Why Can We Not Get Enough of Organic?

Organic food is increasingly popular, not just in the United States, but worldwide. At one time, consumers had to go to specialty stores or farmers' markets to find organic produce. Now it is available in most grocery stores. In short, organic is part of the mainstream.

Ever wonder why organic food costs more than conventional food? Why, say, does an organic Fuji apple cost $1.99 a pound, while its conventional counterpart costs $1.49 a pound? The same price relationship is true for just about every organic product on the market. If many organic foods are locally grown, would they not take less time to get to market and therefore be cheaper? What are the forces that keep those prices from coming down? Turns out those forces have quite a bit to do with this chapter's topic: demand and supply.

An auction bidder pays thousands of dollars for a dress Whitney Houston wore. A collector spends a small fortune for a few drawings by John Lennon. People usually react to purchases like these in two ways: their jaw

drops because they think these are high prices to pay for such goods or they think these are rare, desirable items and the amount paid seems right.

Link It Up

Weirdest Celebrity Items Sold At Auction: Britney Spears' Gum, Brad Pitt's Breath And More [New Tab] (https://www.huffpost.com/entry/weirdest-celebrity-items-sold-at-auction_n_1791850) lists the bizarre items that have been purchased for their ties to celebrities. These examples represent an interesting facet of demand and supply.

When economists talk about prices, they are less interested in making judgments than in gaining a practical understanding of what determines prices and why prices change. Consider a price most of us contend with weekly: that of a gallon of gas. Why was the average price of gasoline in the United States $3.71 per gallon in June 2014? Why did the price for gasoline fall sharply to $1.96 per gallon by January 2016? To explain these price movements, economists focus on the determinants of what gasoline buyers are willing to pay and what gasoline sellers are willing to accept.

As it turns out, the price of gasoline in June of any given year is nearly always higher than the price in January of that same year. Over recent decades, gasoline prices in midsummer have averaged about 10 cents per gallon more than their midwinter low. The likely reason is that people drive more in the summer, and are also willing to pay more for gas, but that does not explain how steeply gas prices fell. Other factors were at work during those 18 months, such as increases in supply and decreases in the demand for crude oil.

This chapter introduces the economic model of demand and supply—one of the most powerful models in all of economics. The discussion here begins by examining how demand and supply determine the price and the quantity sold in markets for goods and services, and how changes in demand and supply lead to changes in prices and quantities.

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3.1 - DEMAND

Learning Objectives

- Define the quantity demanded of a good or service and illustrate it using a demand schedule and a demand curve.
- Distinguish between the following pairs of concepts: demand and quantity demanded, demand schedule and demand curve, movement along and shift in a demand curve.
- Identify demand shifters and determine whether a change in a demand shifter causes the demand curve to shift to the right or to the left.

How many pizzas will people eat this year? How many doctor visits will people make? How many houses will people buy?

Each good or service has its own special characteristics that determine the quantity people are willing and able to consume. One is the price of the good or service itself. Other independent variables that are important determinants of demand include consumer preferences, prices of related goods and services, income, demographic characteristics such as population size, and buyer expectations. The number of pizzas people will purchase, for example, depends very much on whether they like pizza. It also depends on the prices for alternatives such as hamburgers or spaghetti. The number of doctor visits is likely to vary with income—people with higher incomes are likely to see a doctor more often than people with lower incomes. The demands for pizza, for doctor visits, and for housing are certainly affected by the age distribution of the population and its size.

While different variables play different roles in influencing the demands for different goods and services, economists pay special attention to one: the price of the good or service. Given the values of all the other variables that affect demand, a higher price tends to reduce the quantity people demand, and a lower price tends to increase it. A medium pizza typically sells for $5 to $10. Suppose the price were $30. Chances are, you

would buy fewer pizzas at that price than you do now. Suppose pizzas typically sold for $2 each. At that price, people would be likely to buy more pizzas than they do now.

We will discuss first how price affects the quantity demanded of a good or service and then how other variables affect demand.

Price and the Demand Curve

Because people will purchase different quantities of a good or service at different prices, economists must be careful when speaking of the "demand" for something. They have therefore developed some specific terms for expressing the general concept of demand.

The quantity demanded of a good or service is the quantity buyers are willing and able to buy at a particular price during a particular period, all other things unchanged. (As we learned, we can substitute the Latin phrase "ceteris paribus" for "all other things unchanged.") Suppose, for example, that 100,000 movie tickets are sold each month in a particular town at a price of $8 per ticket. That quantity—100,000—is the quantity of movie admissions demanded per month at a price of $8. If the price were $12, we would expect the quantity demanded to be less. If it were $4, we would expect the quantity demanded to be greater. The quantity demanded at each price would be different if other things that might affect it, such as the population of the town, were to change. That is why we add the qualifier that other things have not changed to the definition of quantity demanded.

A demand schedule is a table that shows the quantities of a good or service demanded at different prices during a particular period, all other things unchanged. To introduce the concept of a demand schedule, let us consider the demand for coffee in the United States. We will ignore differences among types of coffee beans and roasts, and speak simply of coffee. The table in Figure 3.1a. A Demand Schedule and a Demand Curve shows quantities of coffee that will be demanded each month at prices ranging from $9 to $4 per pound; the table is a demand schedule. We see that the higher the price, the lower the quantity demanded.

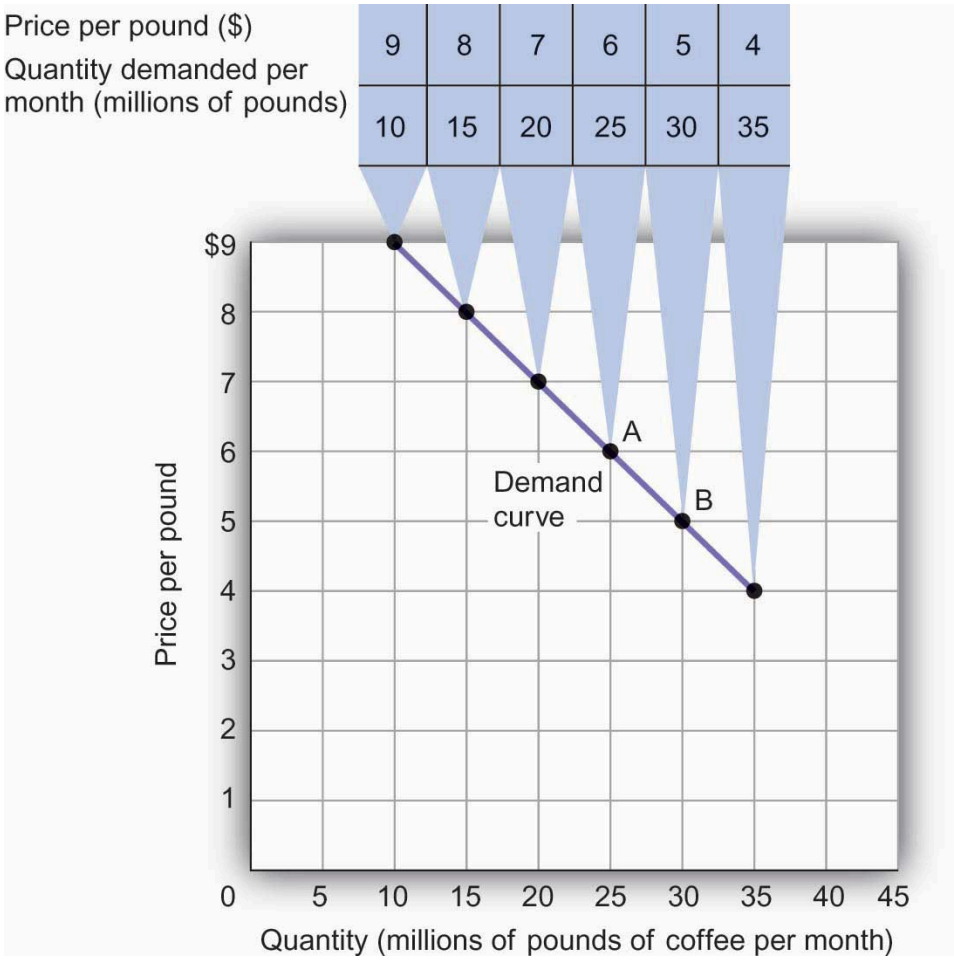

Figure 3.1a A Demand Schedule and a Demand Curve. The table is a demand schedule; it shows quantities of coffee demanded per month in the United States at particular prices, all other things unchanged. These data are then plotted on the demand curve. At point A on the curve, 25 million pounds of coffee per month are demanded at a price of $6 per pound. At point B, 30 million pounds of coffee per month are demanded at a price of $5 per pound. Figure by University of Minnesota, licensed under CC BY-NC-SA 4.0.

Figure 3.1a A Demand Schedule and a Demand Curve Text Version

The vertical axis Price Per Pound and the horizontal axis is Quantity (Millions of pounds of coffee per month). These data are then plotted on the demand curve. The demand curve slopes downward from left to right. Table 3.1a contains data for Figure 3.1. A Demand Schedule and a Demand Curve.

Table 3.1a. A Demand Schedule and a Demand Curve

Price Per Pound ($)	Quantity Demanded Per Month (Millions of Pounds)
9	10
8	15
7	20
6	25
5	30
4	35

The information given in a demand schedule can be presented with a demand curve, which is a graphical representation of a demand schedule. A demand curve thus shows the relationship between the price and quantity demanded of a good or service during a particular period, all other things unchanged. The demand curve in Figure 3.1a A Demand Schedule and a Demand Curve shows the prices and quantities of coffee demanded that are given in the demand schedule. At point A, for example, we see that 25 million pounds of coffee per month are demanded at a price of $6 per pound. By convention, economists graph price on the vertical axis and quantity on the horizontal axis.

Price alone does not determine the quantity of coffee or any other good that people buy. To isolate the effect of changes in price on the quantity of a good or service demanded, however, we show the quantity demanded at each price, assuming that those other variables remain unchanged. We do the same thing in drawing a graph of the relationship between any two variables; we assume that the values of other variables that may affect the variables shown in the graph (such as income or population) remain unchanged for the period under consideration.

A change in price, with no change in any of the other variables that affect demand, results in a movement *along* the demand curve. For example, if the price of coffee falls from $6 to $5 per pound, consumption rises from 25 million pounds to 30 million pounds per month. That is a movement from point A to point B along the demand curve in Figure 3.1a A Demand Schedule and a Demand Curve. A movement along a demand curve that results from a change in price is called a change in quantity demanded. Note that a change in quantity demanded is not a change or shift in the demand curve; it is a movement *along* the demand curve.

The negative slope of the demand curve in Figure 3.1a A Demand Schedule and a Demand Curve suggests a key behavioral relationship of economics. All other things unchanged, the law of demand holds that, for virtually all goods and services, a higher price leads to a reduction in quantity demanded and a lower price leads to an increase in quantity demanded.

The law of demand is called a law because the results of countless studies are consistent with it. Undoubtedly, you have observed one manifestation of the law. When a store finds itself with an overstock of some item, such as running shoes or tomatoes, and needs to sell these items quickly, what does it do? It typically has a sale, expecting that a lower price will increase the quantity demanded. In general, we expect the law of demand to hold. Given the values of other variables that influence demand, a higher price reduces the quantity demanded. A lower price increases the quantity demanded. Demand curves, in short, slope downward.

Changes in Demand

Of course, price alone does not determine the quantity of a good or service that people consume. Coffee consumption, for example, will be affected by such variables as income and population. Preferences also play a role. The story at the beginning of the chapter illustrates as much. Starbucks "turned people on" to coffee. We also expect other prices to affect coffee consumption. People often eat doughnuts or bagels with their coffee, so a reduction in the price of doughnuts or bagels might induce people to drink more coffee. An alternative to coffee is tea, so a reduction in the price of tea might result in the consumption of more tea and less coffee. Thus, a change in any one of the variables held constant in constructing a demand schedule will change the quantities demanded at each price. The result will be a *shift* in the entire demand curve rather than a movement along the demand curve. A *shift* in a demand curve is called a change in demand.

Suppose, for example, that something happens to increase the quantity of coffee demanded at each price. Several events could produce such a change: an increase in incomes, an increase in population, or an increase in the price of tea would each be likely to increase the quantity of coffee demanded at each price. Any such change produces a new demand schedule. Figure 3.1b An Increase in Demand shows such a change in the demand schedule for coffee. We see that the quantity of coffee demanded per month is greater at each price than before. We show that graphically as a shift in the demand curve. The original curve, labeled D_1, shifts to the right to D_2. At a price of $6 per pound, for example, the quantity demanded rises from 25 million pounds per month (point A) to 35 million pounds per month (point A′).

Price	Old quantity demanded	New quantity demanded
$9	10	20
8	15	25
7	20	30
6	25	35
5	30	40
4	35	45

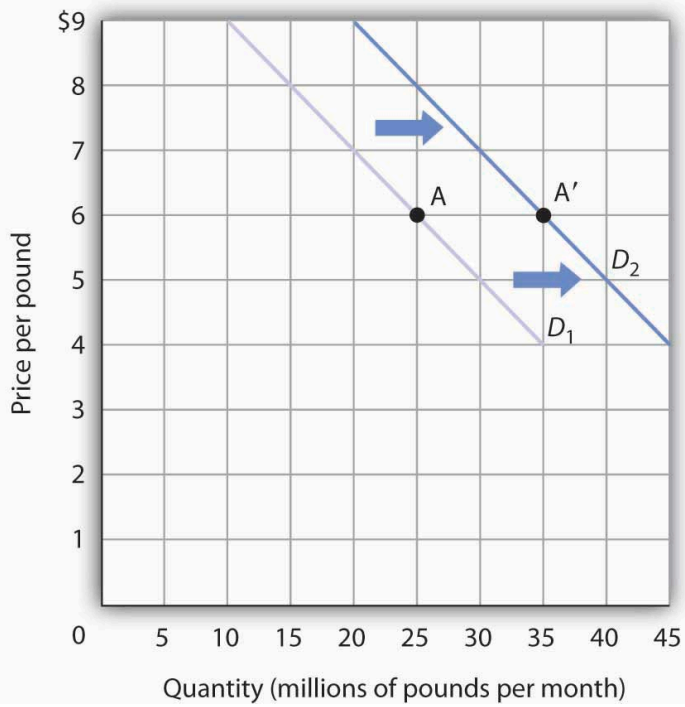

Figure 3.1b An Increase in Demand. Figure by University of Minnesota, licensed under CC BY-NC-SA 4.0.

Figure 3.1b An Increase in Demand Textual Version

Figure 3.1b graph: The vertical axis is Price per pound and the horizontal axis is the Quantity (millions of pounds per month). An increase in the quantity of a good or service demanded at each price is shown as an increase in demand. The original demand curve D1 shifts to the right to D2. Point A on D1 corresponds to a price of $6 per pound and a quantity demanded of 25 million pounds of coffee per month. On the new demand curve D2, the quantity demanded at this price rises to 35 million pounds of coffee per month (point A′). The demand curve is linear and trends downward left to right. Table 3.2 An contains data for Figure 3.2 An Increase in Demand.

Table 3.1b An Increase in Demand

Price (per pound)	Old quantity demanded (D_1)	New quantity demanded (D_2)
$9	10	20
$8	15	25
$7	20	30
$6	25 (Point A)	35 (Point A')
$5	30	40
$4	35	45

Just as demand can increase, it can decrease. In the case of coffee, demand might fall as a result of events such as a reduction in population, a reduction in the price of tea, or a change in preferences. For example, a definitive finding that the caffeine in coffee contributes to heart disease, which is currently being debated in the scientific community, could change preferences and reduce the demand for coffee.

A reduction in the demand for coffee is illustrated in Figure 3.1c A Reduction in Demand. The demand schedule shows that less coffee is demanded at each price than in Figure 3.1a A Demand Schedule and a Demand Curve. The result is a shift in demand from the original curve D_1 to D_3. The quantity of coffee demanded at a price of $6 per pound falls from 25 million pounds per month (point A) to 15 million pounds per month (point A″). Note, again, that a change in quantity demanded, ceteris paribus, refers to a movement *along* the demand curve, while a change in demand refers to a *shift* in the demand curve.

Price	Old quantity demanded	New quantity demanded
$9	10	0
8	15	5
7	20	10
6	25	15
5	30	20
4	35	25

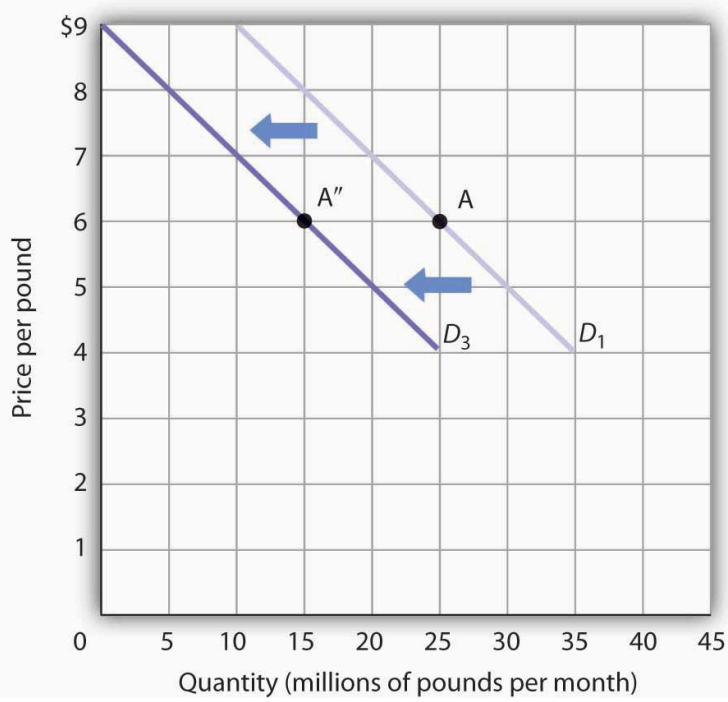

Figure 3.3 A Reduction in Demand Figure by University of Minnesota, licensed under CC BY-NC-SA 4.0.

Figure 3.1c A Reduction in Demand Textual Version

Figure 3.1c Graph: The vertical axis is Price per pound and the horizontal axis is the Quantity (millions of pounds per month). The demand curve slopes downward from left to right. The reduction in demand shifts the demand curve for coffee to the left, from the original demand curve (D_1) to new demand curve (D_3). The quantity demanded at a price of $6 per pound, for example, falls from 25 million pounds per month (point A) to 15 million pounds of coffee per month (point A″).

Table 3.1c A Reduction in Demand

Price (per pound)	Old quantity demanded (D_1)	New quantity demanded (D_3)
$9	10	0
$8	15	5
$7	20	10
$6	25 (Point A)	15 (Point A”)
$5	30	20
$4	35	25

A reduction in the demand for coffee is illustrated in Figure 3.1c. A Reduction in Demand. The demand schedule shows that less coffee is demanded at each price than in Figure 3.1a. A Demand Schedule and a Demand Curve. The result is a shift in demand from the original curve D_1 to D_3. The quantity of coffee demanded at a price of $6 per pound falls from 25 million pounds per month (point A) to 15 million pounds per month (point A″). Note, again, that a change in quantity demanded, ceteris paribus, refers to a movement *along* the demand curve, while a change in demand refers to a *shift* in the demand curve.

A variable that can change the quantity of a good or service demanded at each price is called a demand shifter. When these other variables change, the all-other-things-unchanged conditions behind the original demand curve no longer hold. Although different goods and services will have different demand shifters, the demand shifters are likely to include:

1. consumer preferences
2. the prices of related goods and services
3. income
4. demographic characteristics
5. buyer expectations.

Next we look at each of these.

Preferences

Changes in preferences of buyers can have important consequences for demand. We have already seen how Starbucks supposedly increased the demand for coffee. Another example is reduced demand for cigarettes caused by concern about the effect of smoking on health. A change in preferences that makes one good or service more popular will shift the demand curve to the right. A change that makes it less popular will shift the demand curve to the left.

Prices of Related Goods and Services

Suppose the price of doughnuts were to fall. Many people who drink coffee enjoy dunking doughnuts in their coffee; the lower price of doughnuts might therefore increase the demand for coffee, shifting the demand curve for coffee to the right. A lower price for tea, however, would be likely to reduce coffee demand, shifting the demand curve for coffee to the left.

In general, if a reduction in the price of one good increases the demand for another, the two goods are called complements. If a reduction in the price of one good reduces the demand for another, the two goods are called substitutes. These definitions hold in reverse as well: two goods are complements if an increase in the price of one reduces the demand for the other, and they are substitutes if an increase in the price of one increases the demand for the other. Doughnuts and coffee are complements; tea and coffee are substitutes.

Complementary goods are goods used in conjunction with one another. Tennis rackets and tennis balls, eggs and bacon, and stationery and postage stamps are complementary goods. Substitute goods are goods used instead of one another. iPODs, for example, are likely to be substitutes for CD players. Breakfast cereal is a substitute for eggs. A file attachment to an e-mail is a substitute for both a fax machine and postage stamps.

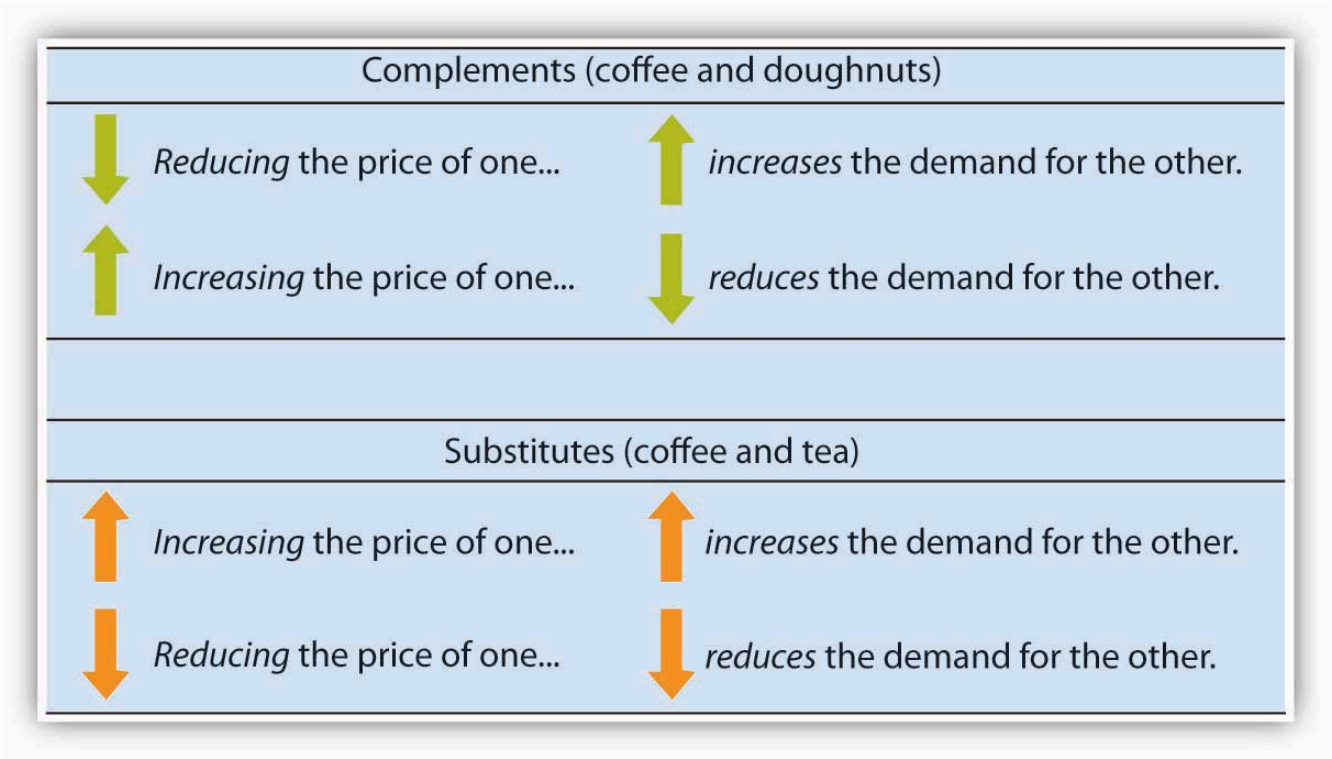

Figure 3.1d. Figure by University of Minnesota, licensed under CC BY-NC-SA 4.0.

Income

As incomes rise, people increase their consumption of many goods and services, and as incomes fall, their consumption of these goods and services falls. For example, an increase in income is likely to raise the demand for gasoline, ski trips, new cars, and jewelry. There are, however, goods and services for which consumption falls as income rises—and rises as income falls. As incomes rise, for example, people tend to consume more fresh fruit but less canned fruit.

A good for which demand increases when income increases is called a normal good. A good for which demand decreases when income increases is called an inferior good. An increase in income shifts the demand curve for fresh fruit (a normal good) to the right; it shifts the demand curve for canned fruit (an inferior good) to the left.

Demographic Characteristics

The number of buyers affects the total quantity of a good or service that will be bought; in general, the greater the population, the greater the demand. Other demographic characteristics can affect demand as well. As the share of the population over age 65 increases, the demand for medical services, ocean cruises, and motor homes increases. The birth rate in the United States fell sharply between 1955 and 1975 but has gradually increased since then. That increase has raised the demand for such things as infant supplies, elementary school teachers, soccer coaches, in-line skates, and college education. Demand can thus shift as a result of changes in both the number and characteristics of buyers.

Buyer Expectations

The consumption of goods that can be easily stored, or whose consumption can be postponed, is strongly affected by buyer expectations. The expectation of newer TV technologies, such as high-definition TV, could slow down sales of regular TVs. If people expect gasoline prices to rise tomorrow, they will fill up their tanks today to try to beat the price increase. The same will be true for goods such as automobiles and washing machines: an expectation of higher prices in the future will lead to more purchases today. If the price of a good is expected to fall, however, people are likely to reduce their purchases today and await tomorrow's lower prices. The expectation that computer prices will fall, for example, can reduce current demand.

Heads Up!

It is crucial to distinguish between a change in quantity demanded, which is a movement along the demand curve caused by a change in price, and a change in demand, which implies a shift of the demand curve itself. A change in demand is caused by a change in a demand shifter- a change in price causes a movement along the demand curve. An increase in demand is a shift of the demand curve to the right. A decrease in demand is a shift in the demand curve to the left. This drawing of a demand curve highlights the difference.

Key Takeaways

- The quantity demanded of a good or service is the quantity buyers are willing and able to buy at a particular price during a particular period, all other things unchanged.
- A demand schedule is a table that shows the quantities of a good or service demanded at different prices during a particular period, all other things unchanged.
- A demand curve shows graphically the quantities of a good or service demanded at different prices during a particular period, all other things unchanged.
- All other things unchanged, the law of demand holds that, for virtually all goods and services, a higher price induces a reduction in quantity demanded and a lower price induces an increase in quantity demanded.
- A change in the price of a good or service causes a change in the quantity demanded—a movement along the demand curve.
- A change in a demand shifter causes a change in demand, which is shown as a shift of the demand curve. Demand shifters include preferences, the prices of related goods and services, income, demographic characteristics, and buyer expectations.

- Two goods are substitutes if an increase in the price of one causes an increase in the demand for the other. Two goods are complements if an increase in the price of one causes a decrease in the demand for the other.
- A good is a normal good if an increase in income causes an increase in demand. A good is an inferior good if an increase in income causes a decrease in demand.

Try It!

All other things unchanged, what happens to the demand curve for DVD rentals if there is (a) an increase in the price of movie theater tickets, (b) a decrease in family income, or (c) an increase in the price of DVD rentals? In answering this and other "Try It!" problems in this chapter, draw and carefully label a set of axes. On the horizontal axis of your graph, show the quantity of DVD rentals. It is necessary to specify the time period to which your quantity pertains (e.g., "per period," "per week," or "per year"). On the vertical axis show the price per DVD rental. Since you do not have specific data on prices and quantities demanded, make a "free-hand" drawing of the curve or curves you are asked to examine. Focus on the general shape and position of the curve(s) before and after events occur. Draw new curve(s) to show what happens in each of the circumstances given. The curves could shift to the left or to the right, or stay where they are.

Check your answers

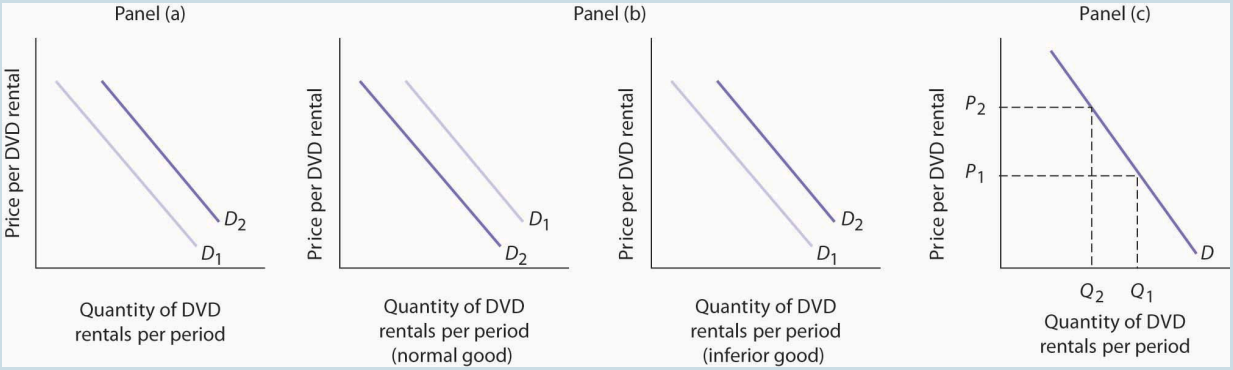

Figure 3.1f Figure by University of Minnesota, licensed under CC BY-NC-SA 4.0.

Figure 3.1f. Textual Version

Figure 3.1f depicts the changes in demand curve in 4 scenarios panel A, panel B, and panel C. The graphs all have Price per DVD rental on the vertical axis and the Quantity of DVD rentals per period on the horizontal axis. The demand curve is linear sloping downwards left to right and the original curve is denoted by D_1 and change in the demand curve by D_2 in Panels A and B.

Panel A illustrates that since going to the movies is a substitute for watching a DVD at home, an increase in the price of going to the movies should cause more people to switch from going to the movies to staying at home and renting DVDs. Thus, the demand curve for DVD rentals will shift to the right from D_1 to D_2 when the price of movie theater tickets increases.

Panel B contains 2 graphs: the first graph shows the shift in the demand curve for normal goods and the second graph shows the shift in the demand curve for the inferior goods. A decrease in family income will cause the demand curve to shift to the left if DVD rentals are a normal good but to the right if DVD rentals are an inferior good. The latter may be the case for some families, since staying at home and watching DVDs is a cheaper form of entertainment than taking the family to the movies. For most others, however, DVD rentals are probably a normal good.
Panel C depicts the increase in the price of DVD rentals. An increase in the price of DVD rentals does not shift the demand curve for DVD rentals at all; rather, an increase in price, say from P_1 to P_2, is a movement upward to the left along the demand curve. At a higher price people will rent fewer DVDs causing Q_1 to shift to the left to Q_2 ,ceteris paribus.

Case in Point: Solving Campus Parking Problems Without Adding

More Parking Spaces

Figure 3.1g. The Parking Lot (https://www.flickr.com/photos/autohistorian/16598201447/) by Alden Jewell, licensed under CC BY 2.0.

Unless you attend a "virtual" campus, chances are you have engaged in more than one conversation about how hard it is to find a place to park on campus. Indeed, according to Clark Kerr, a former president of the University of California system, a university is best understood as a group of people "held together by a common grievance over parking."

Clearly, the demand for campus parking spaces has grown substantially over the past few decades. In surveys conducted by Daniel Kenney, Ricardo Dumont, and Ginger Kenney, who work for the campus design company Sasaki and Associates, it was found that 7 out of 10 students own their own cars. They have interviewed "many students who confessed to driving from their dormitories to classes that were a five-minute walk away," and they argue that the deterioration of college environments is largely attributable to the increased use of cars on campus and that colleges could better service their missions by not adding more parking spaces.

Since few universities charge enough for parking to even cover the cost of building and maintaining parking lots, the rest is paid for by all students as part of tuition. Their research shows that "for every 1,000 parking spaces, the median institution loses almost $400,000 a year for surface parking, and more than $1,200,000 for structural parking." Fear of a backlash from students and

their parents, as well as from faculty and staff, seems to explain why campus administrators do not simply raise the price of parking on campus.

While Kenney and his colleagues do advocate raising parking fees, if not all at once then over time, they also suggest some subtler, and perhaps politically more palatable, measures—in particular, shifting the demand for parking spaces to the left by lowering the prices of substitutes.

Two examples they noted were at the University of Washington and the University of Colorado at Boulder. At the University of Washington, car poolers may park for free. This innovation has reduced purchases of single-occupancy parking permits by 32% over a decade. According to University of Washington assistant director of transportation services Peter Dewey, "Without vigorously managing our parking and providing commuter alternatives, the university would have been faced with adding approximately 3,600 parking spaces, at a cost of over $100 million...The university has created opportunities to make capital investments in buildings supporting education instead of structures for cars." At the University of Colorado, free public transit has increased use of buses and light rail from 300,000 to 2 million trips per year over the last decade. The increased use of mass transit has allowed the university to avoid constructing nearly 2,000 parking spaces, which has saved about $3.6 million annually.

Source: Kenney, D. R. (2004, March 26). How to solve campus parking problems without adding more parking. *The Chronicle of Higher Education, 50*(29), B22-B23.

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3.2 - SUPPLY

Learning Objectives

- Define the quantity supplied of a good or service and illustrate it using a supply schedule and a supply curve.
- Distinguish between the following pairs of concepts: supply and quantity supplied, supply schedule and supply curve, movement along and shift in a supply curve.
- Identify supply shifters and determine whether a change in a supply shifter causes the supply curve to shift to the right or to the left.

What determines the quantity of a good or service sellers are willing to offer for sale? Price is one factor; ceteris paribus, a higher price is likely to induce sellers to offer a greater quantity of a good or service. Production cost is another determinant of supply. Variables that affect production cost include the prices of factors used to produce the good or service, returns from alternative activities, technology, the expectations of sellers, and natural events such as weather changes. Still another factor affecting the quantity of a good that will be offered for sale is the number of sellers—the greater the number of sellers of a particular good or service, the greater will be the quantity offered at any price per time period.

Price and the Supply Curve

The quantity supplied of a good or service is the quantity sellers are willing to sell at a particular price during a particular period, all other things unchanged. Ceteris paribus, the receipt of a higher price increases profits and induces sellers to increase the quantity they supply.

In general, when there are many sellers of a good, an increase in price results in an increase in quantity supplied, and this relationship is often referred to as the law of supply. We will see, though, through our exploration of microeconomics, that there are a number of exceptions to this relationship. There are cases in

which a higher price will not induce an increase in quantity supplied. Goods that cannot be produced, such as additional land on the corner of Park Avenue and 56th Street in Manhattan, are fixed in supply—a higher price cannot induce an increase in the quantity supplied. There are even cases, which we investigate in microeconomic analysis, in which a higher price induces a reduction in the quantity supplied.

Generally speaking, however, when there are many sellers of a good, an increase in price results in a greater quantity supplied. The relationship between price and quantity supplied is suggested in a supply schedule, a table that shows quantities supplied at different prices during a particular period, all other things unchanged. Figure 3.2a "A Supply Schedule and a Supply Curve" gives a supply schedule for the quantities of coffee that will be supplied per month at various prices, ceteris paribus. At a price of $4 per pound, for example, producers are willing to supply 15 million pounds of coffee per month. A higher price, say $6 per pound, induces sellers to supply a greater quantity—25 million pounds of coffee per month.

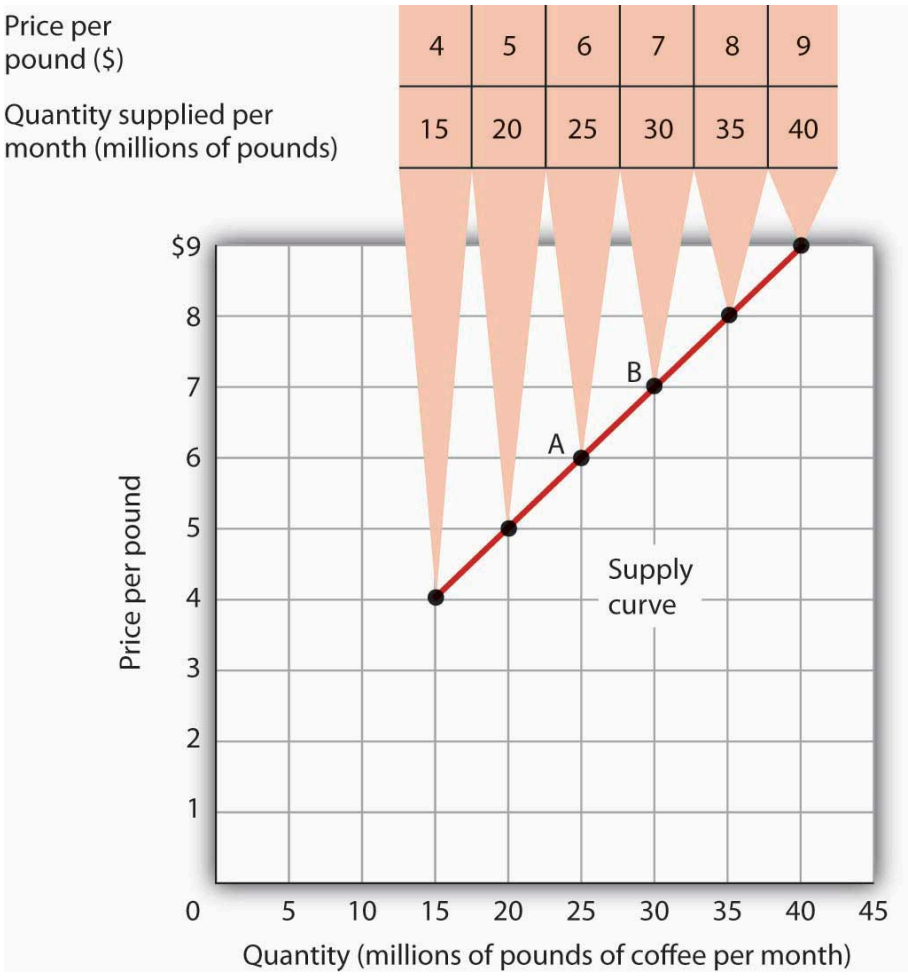

Figure 3.2a A Supply Schedule and a Supply Curve. Figure by University of Minnesota, licensed under CC BY-NC-SA 4.0.

Figure 3.2a A Supply Schedule and a Supply Curve Textual Version

Figure 3.2a: The vertical axis is price per pound ($)and the horizontal axis is quantity of coffee supplied per month. The supply curve slopes upward from left to right. The values given here suggest a positive relationship between price and quantity supplied. Table 3.2a A Supply Schedule and a Supply Curve contains data from Figure 3.2a.

Table 3.2a A Supply Schedule and a Supply Curve

Price per pound ($)	**Quantity supplied per month (millions per pounds of coffee per month)**
4	15
5	20
6	25
7	30
8	35
9	40

The supply schedule shows the quantity of coffee that will be supplied in the United States each month at particular prices, all other things unchanged. The same information is given graphically in the supply curve. The values given here suggest a positive relationship between price and quantity supplied. A supply curve is a graphical representation of a supply schedule. It shows the relationship between price and quantity supplied during a particular period, all other things unchanged. Because the relationship between price and quantity supplied is generally positive, supply curves are generally upward sloping. The supply curve for coffee in Figure 3.2a "A Supply Schedule and a Supply Curve" shows graphically the values given in the supply schedule.

A change in price causes a movement *along* the supply curve; such a movement is called a change in quantity supplied. As is the case with a change in quantity demanded, a change in quantity supplied does not shift the supply curve. By definition, it is a movement along the supply curve. For example, if the price rises from $6 per pound to $7 per pound, the quantity supplied rises from 25 million pounds per month to 30 million pounds per month. That's a movement from point A to point B along the supply curve in Figure 3.2a "A Supply Schedule and a Supply Curve".

Changes in Supply

When we draw a supply curve, we assume that other variables that affect the willingness of sellers to supply a good or service are unchanged. It follows that a change in any of those variables will cause a change in supply, which is a shift in the supply curve. A change that increases the quantity of a good or service supplied at each

price shifts the supply curve to the right. Suppose, for example, that the price of fertilizer falls. That will reduce the cost of producing coffee and thus increase the quantity of coffee producers will offer for sale at each price. The supply schedule in Figure 3.2b "An Increase in Supply" shows an increase in the quantity of coffee supplied at each price. Table 3.9 An Increase in Supply details data from Figure 3.9 An Increase in Supply.

If there is a change in supply that increases the quantity supplied at each price, as is the case in the supply schedule here, the supply curve shifts to the right from S_1 to S_2. At a price of $6 per pound, for example, the quantity supplied rises from the previous level of 25 million pounds per month on supply curve S_1 (point A) to 35 million pounds per month on supply curve S_2 (point A′).

Price	Old quantity supplied	New quantity supplied
$4	15	25
5	20	30
6	25	35
7	30	40
8	35	45
9	40	50

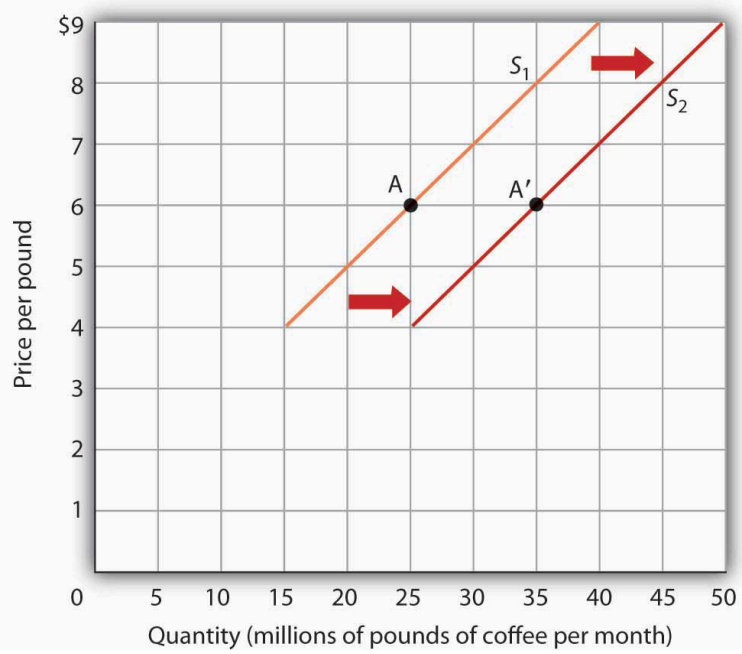

Figure 3.2b An Increase in Supply. Figure by University of Minnesota, licensed under CC BY-NC-SA 4.0.

Figure 3.2b An Increase in Supply Textual Version

The vertical axis is price per pound and the horizontal axis is quantity of coffee per month. The supply curve slopes upward left to right. There is a change in supply that increases the quantity supplied at each price causing the supply curve shifts to the right from original supply curve (S_1) to the new supply curve S_2. At a price of $6 per pound, for example, the quantity supplied rises from the previous level of 25 million pounds per month on supply curve S_1 (point A) to 35 million pounds per month on supply curve S_2 (point A′). Table 3.9 An Increase in Supply contains data from Figure 3.9.

Table 3.2b An Increase in Supply

Price ($)	Old quantity supplied (S_1)	New quantity supplied (S_2)
4	15	25
5	20	30
6	25	35
7	30	40
8	35	45
9	40	50

We show that increase graphically as a shift in the supply curve from S_1 to S_2. We see that the quantity supplied at each price increases by 10 million pounds of coffee per month. At point A on the original supply curve S_1, for example, 25 million pounds of coffee per month are supplied at a price of $6 per pound. After the increase in supply, 35 million pounds per month are supplied at the same price (point A′ on curve S_2).

An event that reduces the quantity supplied at each price shifts the supply curve to the left. An increase in production costs and excessive rain that reduces the yields from coffee plants are examples of events that might reduce supply. Figure 3.2c "A Reduction in Supply" shows a reduction in the supply of coffee. We see in the supply schedule that the quantity of coffee supplied falls by 10 million pounds of coffee per month at each price. The supply curve thus shifts from S_1 to S_3.

Price	Old quantity supplied	New quantity supplied
$4	15	5
5	20	10
6	25	15
7	30	20
8	35	25
9	40	30

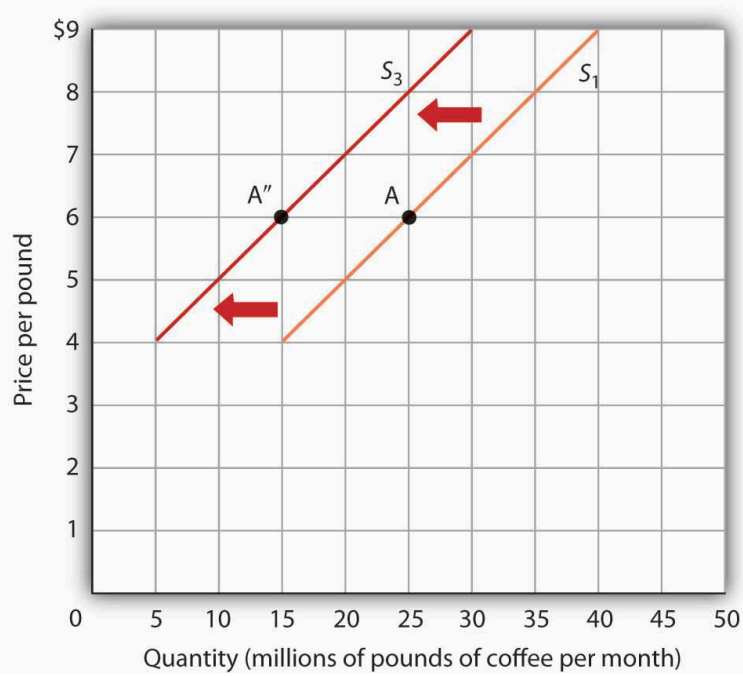

Figure 3.2c A Reduction in Supply. Figure by University of Minnesota, licensed under CC BY-NC-SA 4.0.

Figure 3.2c A Reduction in Supply Textual Version

Figure 3.2c Graph: The vertical axis is price per pound ($) and horizontal axis is quantity (millions of pounds of coffee per month). The supply curve slopes upwards left to right. A change in supply that reduces the quantity supplied at each price shifts the original supply curve (S1) to the left to the new supply curve (S3). At a price of $6 per pound, for example, the original quantity supplied was 25 million pounds of coffee per month (point A). With a new supply curve S3, the quantity supplied at that price falls to 15 million pounds of coffee per month (point A″).Table 3.2c A Reduction in Supply contains data from Figure 3.2c.

Table 3.2c A Reduction in Supply

Price ($)	Old quantity supplied	New quantity supplied
4	15	5
5	20	10
6	25	15
7	30	20
8	35	25
9	40	30

Figure 3.2c A Reduction in Supply. A change in supply that reduces the quantity supplied at each price shifts the supply curve to the left. At a price of $6 per pound, for example, the original quantity supplied was 25 million pounds of coffee per month (point A). With a new supply curve S_3, the quantity supplied at that price falls to 15 million pounds of coffee per month (point A″).

A variable that can change the quantity of a good or service supplied at each price is called a supply shifter. Supply shifters include:

1. prices of factors of production
2. returns from alternative activities
3. technology
4. seller expectations
5. natural events
6. the number of sellers.

When these other variables change, the all-other-things-unchanged conditions behind the original supply curve no longer hold. Let us look at each of the supply shifters.

Prices of Factors of Production

A change in the price of labour or some other factor of production will change the cost of producing any given quantity of the good or service. This change in the cost of production will change the quantity that suppliers are willing to offer at any price. An increase in factor prices should decrease the quantity suppliers will offer at any price, shifting the supply curve to the left. A reduction in factor prices increases the quantity suppliers will offer at any price, shifting the supply curve to the right.

Suppose coffee growers must pay a higher wage to the workers they hire to harvest coffee or must pay more for fertilizer. Such increases in production cost will cause them to produce a smaller quantity at each price, shifting the supply curve for coffee to the left. A reduction in any of these costs increases supply, shifting the supply curve to the right.

Returns from Alternative Activities

To produce one good or service means forgoing the production of another. The concept of opportunity cost in economics suggests that the value of the activity forgone is the opportunity cost of the activity chosen; this cost should affect supply. For example, one opportunity cost of producing eggs is not selling chickens. An increase in the price people are willing to pay for fresh chicken would make it more profitable to sell chickens and would thus increase the opportunity cost of producing eggs. It would shift the supply curve for eggs to the left, reflecting a decrease in supply.

Technology

A change in technology alters the combinations of inputs or the types of inputs required in the production process. An improvement in technology usually means that fewer and/or less costly inputs are needed. If the cost of production is lower, the profits available at a given price will increase, and producers will produce more. With more produced at every price, the supply curve will shift to the right, meaning an increase in supply.

Impressive technological changes have occurred in the computer industry in recent years. Computers are much smaller and are far more powerful than they were only a few years ago—and they are much cheaper to produce. The result has been a huge increase in the supply of computers, shifting the supply curve to the right.

While we usually think of technology as enhancing production, declines in production due to problems in technology are also possible. Outlawing the use of certain equipment without pollution-control devices has

increased the cost of production for many goods and services, thereby reducing profits available at any price and shifting these supply curves to the left.

Seller Expectations

All supply curves are based in part on seller expectations about future market conditions. Many decisions about production and selling are typically made long before a product is ready for sale. Those decisions necessarily depend on expectations. Changes in seller expectations can have important effects on price and quantity.

Consider, for example, the owners of oil deposits. Oil pumped out of the ground and used today will be unavailable in the future. If a change in the international political climate leads many owners to expect that oil prices will rise in the future, they may decide to leave their oil in the ground, planning to sell it later when the price is higher. Thus, there will be a decrease in supply; the supply curve for oil will shift to the left.

Natural Events

Storms, insect infestations, and drought affect agricultural production and thus the supply of agricultural goods. If something destroys a substantial part of an agricultural crop, the supply curve will shift to the left. The terrible cyclone that killed more than 50,000 people in Myanmar in 2008 also destroyed some of the country's prime rice growing land. That shifted the supply curve for rice to the left. If there is an unusually good harvest, the supply curve will shift to the right.

The Number of Sellers

The supply curve for an industry, such as coffee, includes all the sellers in the industry. A change in the number of sellers in an industry changes the quantity available at each price and thus changes supply. An increase in the number of sellers supplying a good or service shifts the supply curve to the right; a reduction in the number of sellers shifts the supply curve to the left.

The market for cellular phone service has been affected by an increase in the number of firms offering the service. Over the past decade, new cellular phone companies emerged, shifting the supply curve for cellular phone service to the right.

Heads Up!

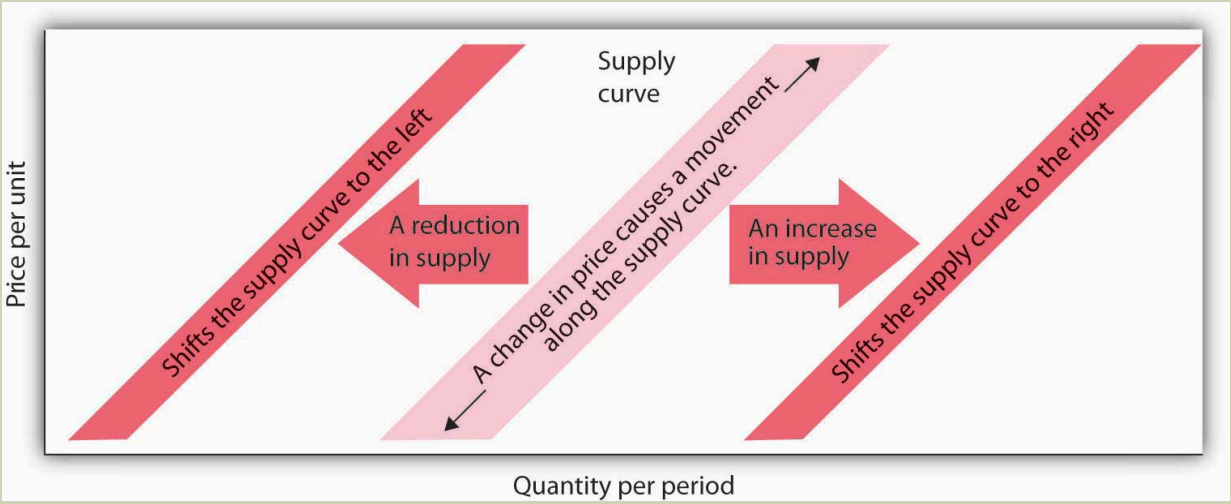

Figure 3.2d Figure by University of Minnesota, licensed under CC BY-NC-SA 4.0.

There are two special things to note about supply curves. First, it is important to distinguish carefully between changes in supply and changes in quantity supplied. A change in supply results from a change in a supply shifter and implies a shift of the supply curve to the right or left. A change in price produces a change in quantity supplied and induces a movement along the supply curve. A change in price does not shift the supply curve.

The second caution relates to the interpretation of increases and decreases in supply. Notice that in Figure 3.2b "An Increase in Supply" an increase in supply is shown as a shift of the supply curve to the right; the curve shifts in the direction of increasing quantity with respect to the horizontal axis. In Figure 3.2c "A Reduction in Supply" a reduction in supply is shown as a shift of the supply curve to the left; the curve shifts in the direction of decreasing quantity with respect to the horizontal axis.

Because the supply curve is upward sloping, a shift to the right produces a new curve that in a sense lies "below" the original curve. Students sometimes make the mistake of thinking of such a shift as a shift "down" and therefore as a reduction in supply. Similarly, it is easy to make the

mistake of showing an increase in supply with a new curve that lies "above" the original curve. But that is a reduction in supply!

To avoid such errors, focus on the fact that an increase in supply is an increase in the quantity supplied at each price and shifts the supply curve in the direction of increased quantity on the horizontal axis. Similarly, a reduction in supply is a reduction in the quantity supplied at each price and shifts the supply curve in the direction of a lower quantity on the horizontal axis.

Key Takeaways

- The quantity supplied of a good or service is the quantity sellers are willing to sell at a particular price during a particular period, all other things unchanged.
- A supply schedule shows the quantities supplied at different prices during a particular period, all other things unchanged. A supply curve shows this same information graphically.
- A change in the price of a good or service causes a change in the quantity supplied—a movement along the supply curve.
- A change in a supply shifter causes a change in supply, which is shown as a shift of the supply curve. Supply shifters include prices of factors of production, returns from alternative activities, technology, seller expectations, natural events, and the number of sellers.
- An increase in supply is shown as a shift to the right of a supply curve; a decrease in supply is shown as a shift to the left.

Try It!

If all other things are unchanged, what happens to the supply curve for DVD rentals if there is (a) an increase in wages paid to DVD rental store clerks, (b) an increase in the price of DVD rentals, or (c) an increase in the number of DVD rental stores? Draw a graph that shows what happens to the supply curve in each circumstance. The supply curve can shift to the left or to the right, or stay where it is. Remember to label the axes and curves, and remember to specify the time period (e.g., "DVDs rented per week").

Check your Answer

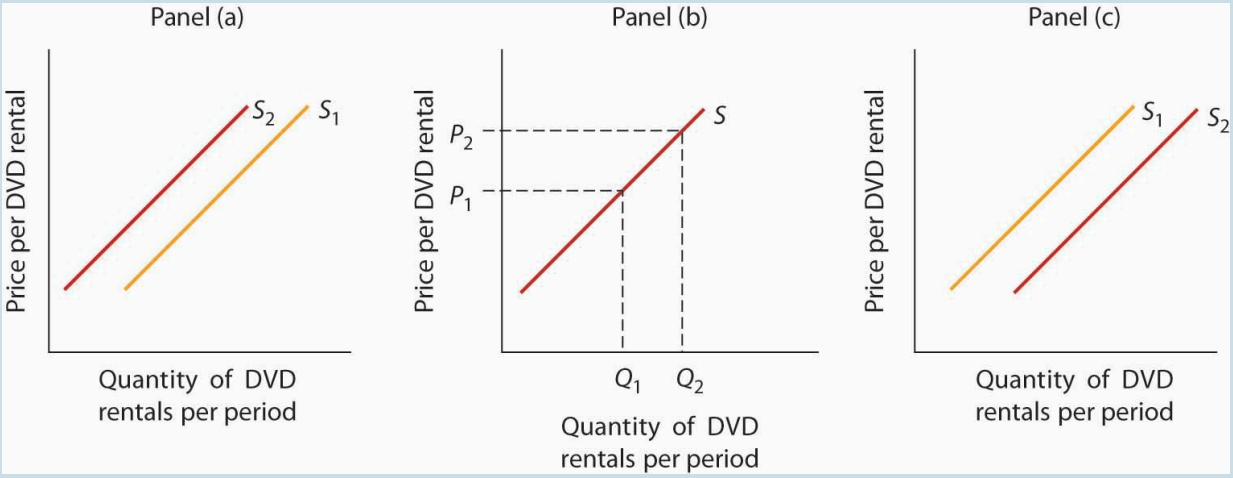

Figure 3.2e. Figure by University of Minnesota, licensed under CC BY-NC-SA 4.0

Figure 3.2e Textual Version

Figure 3.2e depicts the changes in supply curve in 4 scenarios: panel A, panel B, and panel C. The graphs all have Price per DVD rental on the vertical axis and the Quantity of DVD rentals per period on the horizontal axis. The supply curve is linear sloping upwards left to right and the original curve is denoted by S_1 and change in the Supply curve by S_2.

Panel A: DVD rental store clerks are a factor of production in the DVD rental market. An increase in their wages raises the cost of production, thereby causing the supply curve of DVD rentals to shift to the left. (*Caution*: It is possible that you thought of the wage increase as an increase in

income, a demand shifter, that would lead to an increase in demand, but this would be incorrect. The question refers only to wages of DVD rental store clerks. They may rent some DVD, but their impact on total demand would be negligible. Besides, we have no information on what has happened overall to incomes of people who rent DVDs. We do know, however, that the cost of a factor of production, which is a supply shifter, increased.)

Panel B: An increase in the price of DVD rentals does not shift the supply curve at all; rather, it corresponds to a movement upward to the right along the supply curve. At a higher price of P_2 instead of P_1, a greater quantity of DVD rentals, say Q_2 instead of Q_1, will be supplied.

Panel C: An increase in the number of stores renting DVDs will cause the supply curve to shift to the right.

Case in Point: The Monks of St. Benedict's Get Out of the Egg Business

Figure 3.2f St. Benedict's Abbey, Atchison, Kansas (https://www.flickr.com/photos/mariya_umama_wethemba_monastery/3668526533/in/photolist-6Aba8t-VGhZjf-s5YhPQ-rLMfkr-s5XDPh-rLLAJK-BHYq9y-cZL8ru-s3Pbvm-r9iRYD-28xWAdr-woGian-c4MNp-8vSZ1P-d6Avg1-Yudryw-j4cqq-5kGhgP-G6QckY-k9jW1o-p2f6RX-dWdG15-Xx4ija-YJDuvP-xFtJKP-LabUW2-2mswfqC-Lrd1vd-s66ACp-26KZAtt-2n5wjVv-2n8v8uK-2n5HYQj-2dtwmSV-R6S7or-2dLhjbY-2c9e4rz-e3dZBY-qHh7Qk-eRREoq-7KnRyF-n861NB-2iBN9R-dQAmE9-SJ7TTJ-d7HKFs-d7HEBf-4qA3kS-2gYsN1r-2n8v8Wg) by Randy Greve, licensed under CC BY 2.0.

It was cookies that lured the monks of St. Benedict's out of the egg business, and now private retreat sponsorship is luring them away from cookies.St. Benedict's is a Benedictine monastery, nestled on a ranch high in the Colorado Rockies, about 20 miles down the road from Aspen. The monastery's 15 monks operate the ranch to support themselves and to provide help for poor people in the area. They lease out about 3,500 acres of their land to cattle and sheep grazers, produce cookies, and sponsor private retreats. They used to produce eggs.

Attracted by potential profits and the peaceful nature of the work, the monks went into the egg business in 1967. They had 10,000 chickens producing their Monastery Eggs brand. For a while,

business was good. Very good. Then, in the late 1970s, the price of chicken feed started to rise rapidly.

"When we started in the business, we were paying $60 to $80 a ton for feed—delivered," recalls the monastery's abbot, Father Joseph Boyle. "By the late 1970s, our cost had more than doubled. We were paying $160 to $200 a ton. That really hurt, because feed represents a large part of the cost of producing eggs."

The monks adjusted to the blow. "When grain prices were lower, we'd pull a hen off for a few weeks to molt, then return her to laying. After grain prices went up, it was 12 months of laying and into the soup pot," Father Joseph says.

Grain prices continued to rise in the 1980s and increased the costs of production for all egg producers. It caused the supply of eggs to fall. Demand fell at the same time, as Americans worried about the cholesterol in eggs. Times got tougher in the egg business.

"We were still making money in the financial sense," Father Joseph says. "But we tried an experiment in 1985 producing cookies, and it was a success. We finally decided that devoting our time and energy to the cookies would pay off better than the egg business, so we quit the egg business in 1986."

The mail-order cookie business was good to the monks. They sold 200,000 ounces of Monastery Cookies in 1987.

By 1998, however, they had limited their production of cookies, selling only locally and to gift shops. Since 2000, they have switched to "providing private retreats for individuals and groups—about 40 people per month," according to Brother Charles.

The monks' calculation of their opportunity costs revealed that they would earn a higher return through sponsorship of private retreats than in either cookies or eggs. This projection has proved correct.

And there is another advantage as well.

"The chickens didn't stop laying eggs on Sunday," Father Joseph chuckles. "When we shifted to cookies we could take Sundays off. We weren't hemmed in the way we were with the chickens." The move to providing retreats is even better in this regard. Since guests provide their own meals, most of the monastery's effort goes into planning and scheduling, which frees up even more of their time for other worldly as well as spiritual pursuits.

Source: Personal interviews.

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3.3 - DEMAND AND SUPPLY

Start Up: Crazy for Coffee

Starbucks Coffee Company revolutionized the coffee-drinking habits of millions of people. Starbucks, whose bright green-and-white logo is almost as familiar as the golden arches of McDonald's, began in Seattle in 1971. Fifteen years later it had grown into a chain of four stores in the Seattle area. Then in 1987 Howard Schultz, a former Starbucks employee, who had become enamored with the culture of Italian coffee bars during a trip to Italy, bought the company from its founders for $3.8 million. In 2008, Americans were willingly paying $3 or more for a cappuccino or a latté, and Starbuck's had grown to become an international chain, with over 16,000 stores around the world.

The change in consumers' taste for coffee and the profits raked in by Starbucks lured other companies to get into the game. Retailers such as Seattle's Best Coffee and Gloria Jean's Coffees entered the US market, and today there are thousands of coffee bars, carts, drive-throughs, and kiosks in downtowns, malls, and airports all around the country. Even McDonald's began selling specialty coffees.

But over the last decade the price of coffee beans has been quite volatile. Just as consumers were growing accustomed to their cappuccinos and lattés, in 1997, the price of coffee beans shot up. Excessive rain and labour strikes in coffee-growing areas of South America had reduced the supply of coffee, leading to a rise in its price. In the early 2000s, Vietnam flooded the market with coffee, and the price of coffee beans plummeted. More recently, weather conditions in various coffee-growing countries reduced supply, and the price of coffee beans went back up.

Markets, the institutions that bring together buyers and sellers, are always responding to events, such as bad harvests and changing consumer tastes that affect the prices and quantities of particular goods. The demand for some goods increases, while the demand for others decreases. The supply of some goods rises, while the supply of others falls. As such events unfold, prices adjust to keep markets in balance. This chapter explains how the market forces of demand and supply interact to determine equilibrium prices and equilibrium quantities of goods and services. We will see how prices and quantities adjust to changes in demand and supply and how changes in prices serve as signals to buyers and sellers.

The model of demand and supply that we shall develop in this chapter is one of the most powerful tools in all of economic analysis. You will be using it throughout your study of economics. We will first look at the variables that influence demand. Then we will turn to supply, and finally we will put demand and supply

together to explore how the model of demand and supply operates. As we examine the model, bear in mind that demand is a representation of the behavior of buyers and that supply is a representation of the behavior of sellers. Buyers may be consumers purchasing groceries or producers purchasing iron ore to make steel. Sellers may be firms selling cars or households selling their labour services. We shall see that the ideas of demand and supply apply, whatever the identity of the buyers or sellers and whatever the good or service being exchanged in the market. In this chapter, we shall focus on buyers and sellers of goods and services.

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3.4 - DEMAND, SUPPLY, AND EQUILIBRIUM

Learning Objectives

- Use demand and supply to explain how equilibrium price and quantity are determined in a market.
- Understand the concepts of surpluses and shortages and the pressures on price they generate.
- Explain the impact of a change in demand or supply on equilibrium price and quantity.
- Explain how the circular flow model provides an overview of demand and supply in product and factor markets and how the model suggests ways in which these markets are linked.

In this section we combine the demand and supply curves we have just studied into a new model. The model of demand and supply uses demand and supply curves to explain the determination of price and quantity in a market.

The Determination of Price and Quantity

The logic of the model of demand and supply is simple. The demand curve shows the quantities of a particular good or service that buyers will be willing and able to purchase at each price during a specified period. The supply curve shows the quantities that sellers will offer for sale at each price during that same period. By putting the two curves together, we should be able to find a price at which the quantity buyers are willing and able to purchase equals the quantity sellers will offer for sale.

Figure 3.4a "The Determination of Equilibrium Price and Quantity" combines the demand and supply data introduced in Figure 3.1a "A Demand Schedule and a Demand Curve" and Figure 3.2a "A Supply Schedule and a Supply Curve" Notice that the two curves intersect at a price of $6 per pound—at this price the quantities demanded and supplied are equal. Buyers want to purchase, and sellers are willing to offer for sale,

25 million pounds of coffee per month. The market for coffee is in **equilibrium**. Unless the demand or supply curve shifts, there will be no tendency for price to change. The equilibrium price in any market is the price at which quantity demanded equals quantity supplied. The equilibrium price in the market for coffee is thus $6 per pound. The equilibrium quantity is the quantity demanded and supplied at the equilibrium price.

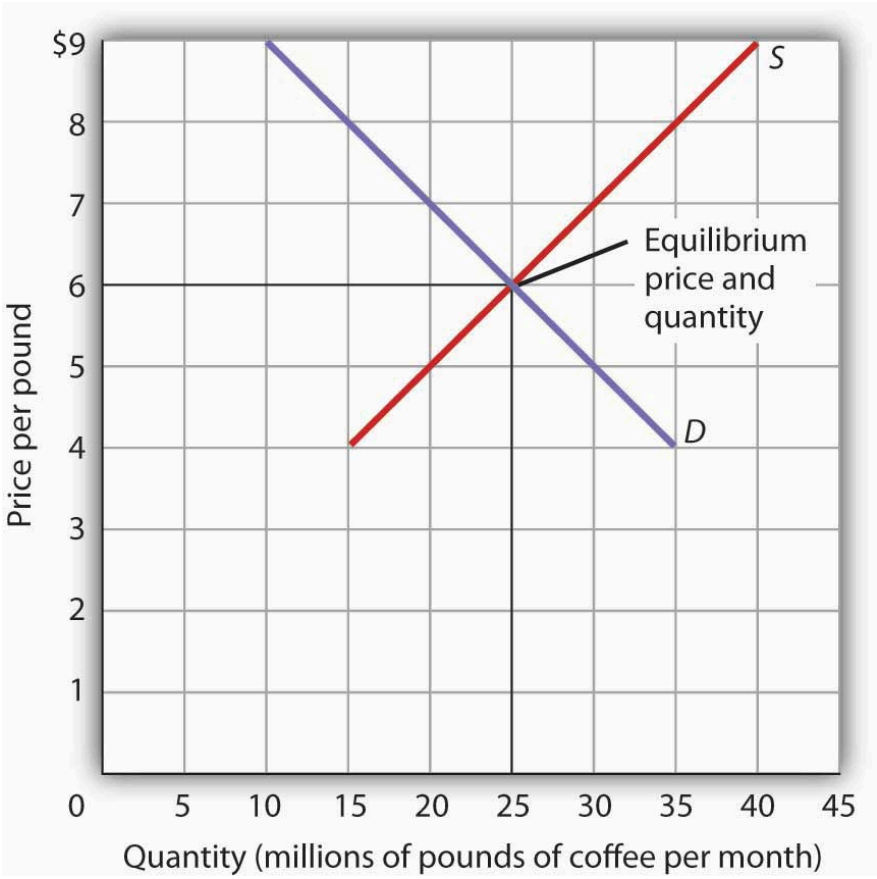

Figure 3.4a The Determination of Equilibrium Price and Quantity. Figure by University of Minnesota, licensed under CC BY-NC-SA 4.0.

Figure 3.4a The Determination of Equilibrium Price and Quantity Textual Version

Figure 3.4a has a vertical axis of Price per pound ($) and horizontal axis of Quantity (millions of pounds of coffee per month). The supply curve (S) slopes upward from left to right and the demand curve (D) slopes downward left to right. The equilibrium price and quantity occurs at the point where the supply curve (S) and the demand curve (D) intersect, 25 millions of pounds of coffee per month at $6 per pound. Table 3.4a contains data for the supply and demand curves for the Figure 3.4a.

Table 3.4a The Determination of Equilibrium Price and Quantity Data

Points	Supply Curve (S) (Quantity, Price)	Demand Curve (D) (Quantity, Price)
1	(15 million, $4)	(10 million, $9)
2	(20 million, $5)	(15 million, $8)
3	(25 million, $6)	(20 million, $7)
4	(30 million, $7)	(25 million, $6)
5	(35 million, $8)	(30 million, $5)
6	(40 million, $9)	(35 million, $4)

When we combine the demand and supply curves for a good in a single graph, the point at which they intersect identifies the equilibrium price and equilibrium quantity. Here, the equilibrium price is $6 per pound. Consumers demand, and suppliers supply, 25 million pounds of coffee per month at this price. With an upward-sloping supply curve (S) and a downward-sloping demand curve (D), there is only a single price at which the two curves intersect. This means there is only one price at which equilibrium is achieved. It follows that at any price other than the equilibrium price, the market will not be in equilibrium. We next examine what happens at prices other than the equilibrium price.

Surpluses

Figure 3.4b A Surplus in the Market for Coffee shows the same demand and supply curves we have just examined, but this time the initial price is $8 per pound of coffee. Because we no longer have a balance between **quantity demanded** and **quantity supplied**, this price is not the equilibrium price. At a price of $8, we read over to the demand curve to determine the quantity of coffee consumers will be willing to buy—15 million pounds per month. The supply curve tells us what sellers will offer for sale—35 million pounds per month. The difference, 20 million pounds of coffee per month, is called a surplus. More generally, a surplus is the amount by which the quantity supplied exceeds the quantity demanded at the current price. There is, of course, no surplus at the equilibrium price; a surplus occurs only if the current price exceeds the equilibrium price.

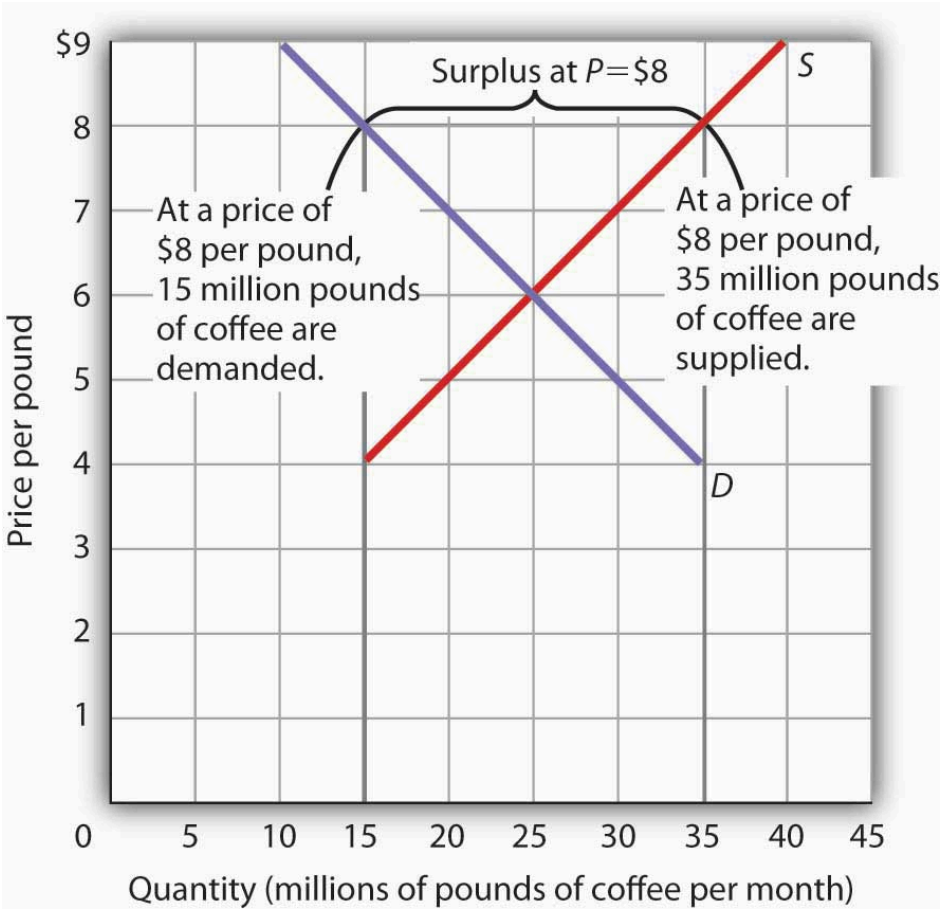

Figure 3.4b A Surplus in the Market for Coffee. Figure by University of Minnesota, licensed under CC BY-NC-SA 4.0.

Figure 3.4b A Surplus in the Market for Coffee

Figure 3.4b has a vertical axis of Price per pound ($) and horizontal axis of Quantity (millions of pounds of coffee per month). An upward sloping supply curve (S) and and downward sloping demand curve (D) intersecting at 15 millions of pounds of coffee per month and $6 per pound. At a price of $8, the quantity supplied is 35 million pounds of coffee per month and the quantity demanded is 15 million pounds per month; there is a surplus of 20 million pounds of coffee per month. The surplus is at price of $8. Given a surplus, the price will fall quickly toward the equilibrium level of $6.

Table 3.4b A Surplus in the Market for Coffee

Points	Supply Curve (S) (Quantity, Price)	Demand Curve (D) (Quantity, Price)
1	(15 million, $4)	(10 million, $9)
2	(20 million, $5)	(15 million, $8)
3	(25 million, $6)	(20 million, $7)
4	(30 million, $7)	(25 million, $6)
5	(35 million, $8)	(30 million, $5)
6	(40 million, $9)	(35 million, $4)

At a price of $8, the quantity supplied is 35 million pounds of coffee per month and the quantity demanded is 15 million pounds per month; there is a surplus of 20 million pounds of coffee per month. The surplus is at price of $8. Given a surplus, the price will fall quickly toward the equilibrium level of $6.

A surplus in the market for coffee will not last long. With unsold coffee on the market, sellers will begin to reduce their prices to clear out unsold coffee. As the price of coffee begins to fall, the quantity of coffee supplied begins to decline. At the same time, the quantity of coffee demanded begins to rise. Remember that the reduction in quantity supplied is a movement *along* the supply curve—the curve itself does not shift in response to a reduction in price. Similarly, the increase in quantity demanded is a movement *along* the demand curve—the demand curve does not shift in response to a reduction in price. Price will continue to fall until it reaches its equilibrium level, at which the demand and supply curves intersect. At that point, there will be no tendency for price to fall further. In general, surpluses in the marketplace are short-lived. The prices of most goods and services adjust quickly, eliminating the surplus. Later on, we will discuss some markets in which adjustment of price to equilibrium may occur only very slowly or not at all.

Shortages

Just as a price above the equilibrium price will cause a surplus, a price below equilibrium will cause a shortage. A shortage is the amount by which the quantity demanded exceeds the quantity supplied at the current price.

Figure 3.4c "A Shortage in the Market for Coffee" shows a shortage in the market for coffee. Suppose the price is $4 per pound. At that price, 15 million pounds of coffee would be supplied per month, and 35 million pounds would be demanded per month. When more coffee is demanded than supplied, there is a shortage.

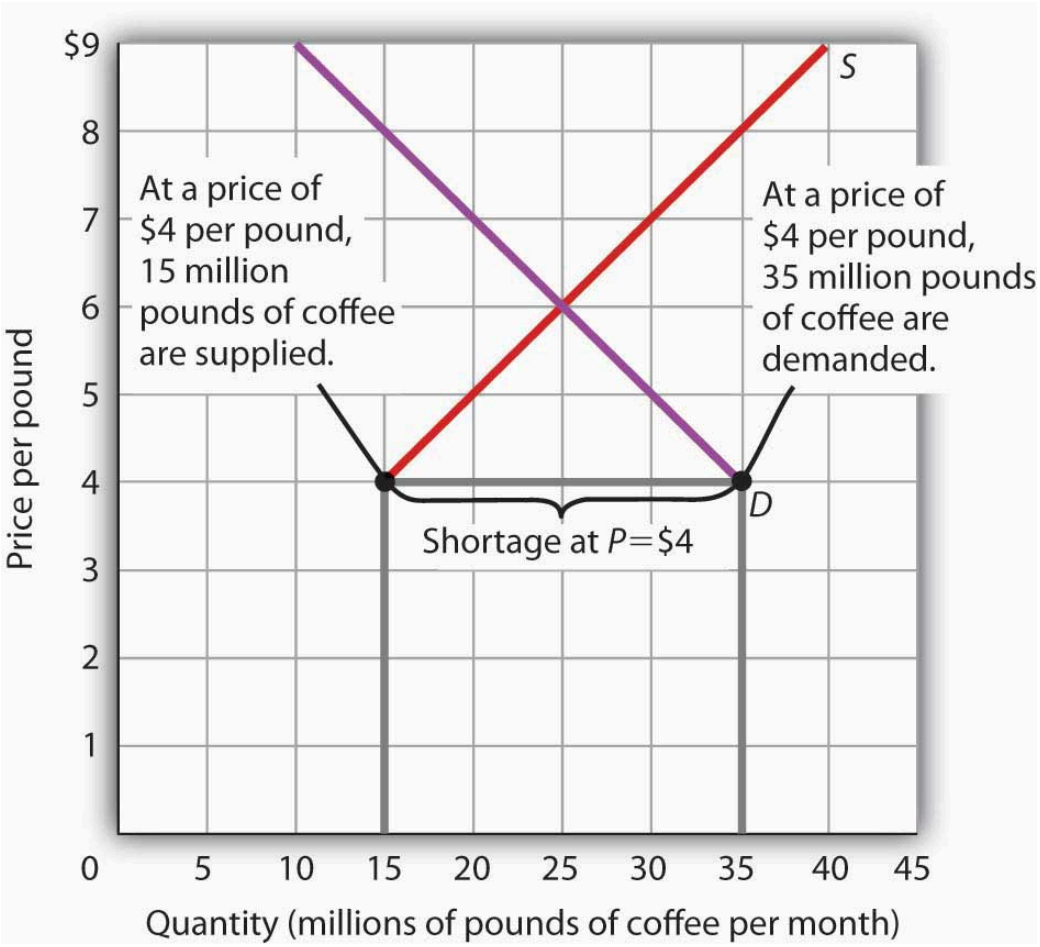

Figure 3.4c A Shortage in the Market for Coffee. Figure by University of Minnesota, licensed under CC BY-NC-SA 4.0.

Figure 3.4c A Shortage in the Market for Coffee Textual Version

Figure 3.4c has a vertical axis of Price per pound ($) and horizontal axis of Quantity (millions of pounds of coffee per month). An upward sloping supply curve (S) and and downward sloping demand curve (D) intersect at 15 million and $6 per pound. At a price of $4 per pound, the quantity of coffee demanded is 35 million pounds per month and the quantity supplied is 15 million pounds per month. The shortage is at price of $4. The result is a shortage of 20 million pounds of coffee per month.

Table 3.4c A Shortage in the Market for Coffee

Points	Supply Curve (S) (Quantity millions of pounds per month, Price per pound)	Demand Curve (D) (Quantity millions of pounds per month, Price per pound)
1	15 million, 4 dollars	10 million, 9 dollars
2	20 million, 5 dollars	15 million, 8 dollars
3	25 million, 6 dollar	20 million, 7 dollars
4	30 million, 7 dollars	25 million, 6 dollars
5	35 million, 8 dollars	30 million, 5 dollars
6	40 million, 9 dollars	35 million, 4 dollars

At a price of $4 per pound, the quantity of coffee demanded is 35 million pounds per month and the quantity supplied is 15 million pounds per month. The shortage is at price of $4. The result is a shortage of 20 million pounds of coffee per month.

In the face of a shortage, sellers are likely to begin to raise their prices. As the price rises, there will be an increase in the quantity supplied (but not a change in supply) and a reduction in the quantity demanded (but not a change in demand) until the equilibrium price is achieved.

Shifts in Demand and Supply

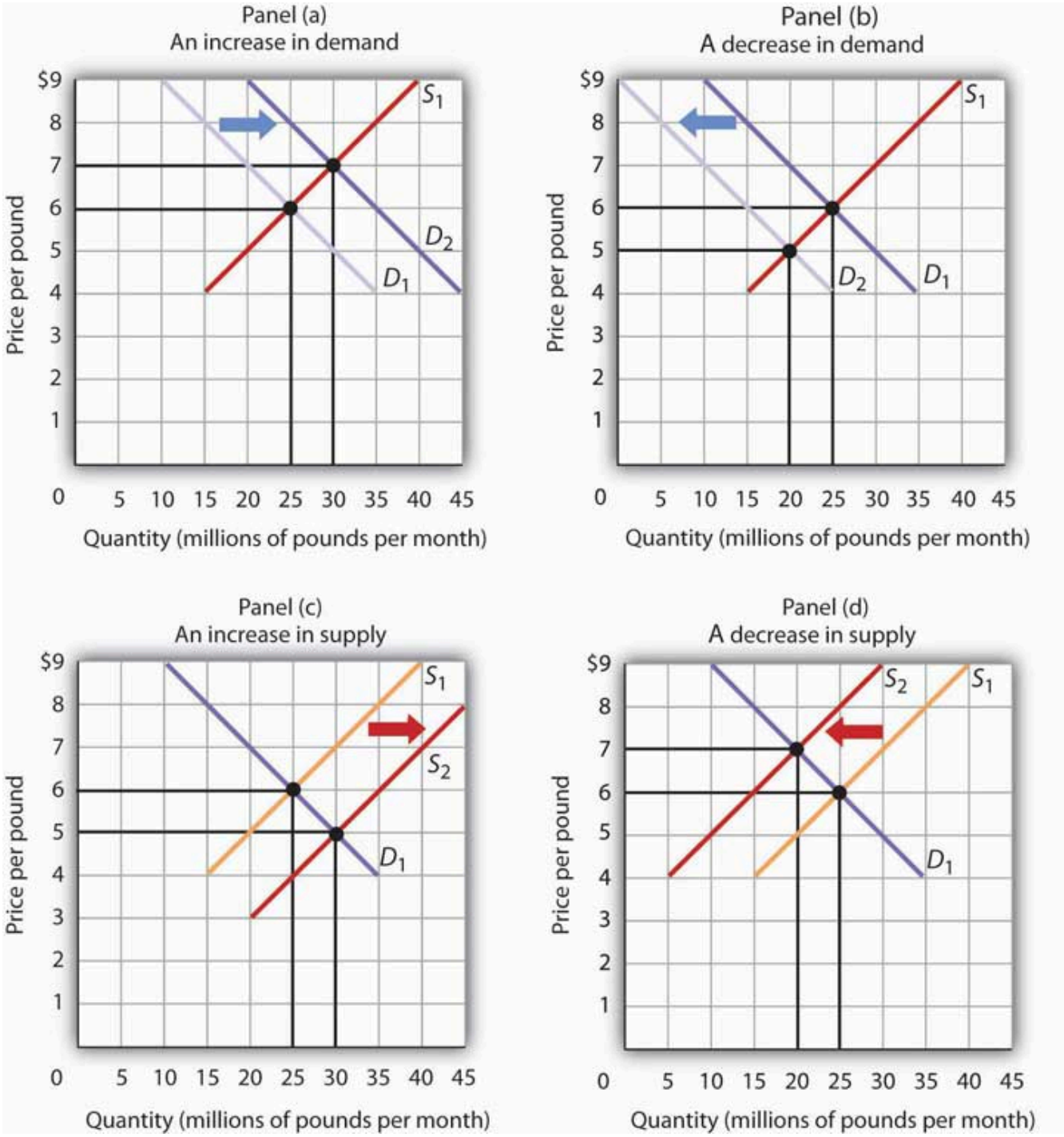

Figure 3.4d Changes in Demand and Supply. A change in demand or in supply changes the equilibrium solution in the model. Panels (a) and (b) show an increase and a decrease in demand, respectively; Panels (c) and (d) show an increase and a decrease in supply, respectively. Figure by University of Minnesota, licensed under CC BY-NC-SA 4.0.

Figure 3.4d Changes in Demand and Supply Textual Version

Figure depicts four graphs. The vertical axis is Price per pound (dollars) and a horizontal axis Quantity (millions of pounds per month). The equilibrium occurs where supply and demand curves intersect.

Panel (a) depicts an increase in demand. Supply Curve (S_1) is linear sloping upward from left to right. The Demand Curve (D1) is linear sloping downward left to right and intersects with S1 at 25 million pounds per month and 6 dollars per pound. D1 shifts to the right to D2 and now intersects S1 at 30 million pounds per month and 7 dollars per pound.

Table 3.4d Panel A: Changes in Demand and Supply

Points	**Supply Curve (S_1) (Quantity millions of pounds per month, Price per pound)**	**Demand Curve (D_1) (Quantity millions of pounds per month, Price per pound)**	**Demand Curve (D_2) (Quantity millions of pounds per month, Price per pound)**
1	15 million pounds , 4 dollars	35 million pounds , 4 dollars	45 million pounds , 4 dollars
2	20 million pounds, 5 dollars	30 million pounds , 5 dollars	40 million pounds , 5 dollars
3	25 million pounds , 6 dollars	25 million pounds , 6 dollars	35 million pounds , 6 dollars
4	30 million pounds , 7 dollars	20 million pounds , 7 dollars	30 million pounds , 7 dollars
5	35 million pounds , 8 dollars	15 million pounds , 8 dollars	25 million pounds , 8 dollars
6	40 million pounds , 9 dollars	10 million pounds , 9 dollars	20 million pounds , 9 dollars

Panel (b) depicts a decrease in demand. Supply Curve (S_1) is linear sloping upward from left to right. The Demand Curve (D_1) is linear sloping downward left to right and intersects with S_1 at 25 million pounds per month and 6 dollars per pound. D1 shifts to the left to D_2 and now intersects S_1 at 20 million pounds per month and 5 dollars per pound.

Table 3.4e Panel B: Changes in Demand and Supply

Points	Supply Curve (S_1) (Quantity millions of pounds per month, Price per pound)	Demand Curve (D_1) (Quantity millions of pounds per month, Price per pound)	Demand Curve (D_2) (Quantity millions of pounds per month, Price per pound)
1	15 million pounds , 4 dollars	35 million pounds , 4 dollars	25 million pounds , 4 dollars
2	20 million pounds , 5 dollars	30 million pounds , 5 dollars	20 million pounds , 5 dollars
3	25 million pounds , 6 dollars	25 million pounds , 6 dollars	15 million pounds , 6 dollars
4	30 million pounds , 7 dollars	20 million pounds , 7 dollars	10 million pounds , 7 dollars
5	35 million pounds , 8 dollars	15 million pounds , 8 dollars	5 million pounds , 8 dollars
6	40 million pounds , 9 dollars	10 million pounds , 9 dollars	0 million pounds , 9 dollars

Panel (c) depicts an increase in supply. The Demand Curve (D_1) is linear sloping downward left to right and intersects with S1 at 25 million pounds per month and 6 dollars per pound. Supply Curve (S_1) is linear sloping upward from left to right. The S1 shifts to the right to S_2 and now intersects D_1 at 30 million pounds per month and 5 dollars per pound.

Table 3.4f Panel C: Changes in Demand and Supply

Points	**Supply Curve (S_1) (Quantity millions of pounds per month, Price per pound)**	**Supply Curve (S_2) (Quantity millions of pounds per month, Price per pound)**	**Demand Curve (D_1) (Quantity millions of pounds per month, Price per pound)**
1	15 million pounds , 4 dollars	20 million pounds , 3 dollars	35 million pounds , 4 dollars
2	20 million pounds , 5 dollars	25 million pounds , 4 dollars	30 million pounds , 5 dollars
3	25 million pounds , 6 dollars	30 million pounds , 5 dollars	25 million pounds, 6 dollars
4	30 million pounds , 7 dollars	35million pounds , 6 dollars	20 million pounds , 7 dollars
5	35 million pounds , 8 dollars	40 million pounds , 7 dollars	15 million pounds , 8 dollars
6	40 million pounds, 9 dollars	45 million pounds , 8 dollars	10 million pounds , 9 dollars

Panel (d) depicts a decrease in supply. The Demand Curve (D_1) is linear sloping downward left to right and intersects with S_1 at 25 million pounds per month and 6 dollars per pound. Supply Curve (S_1) is linear sloping upward from left to right. The S_1 shifts to the left to S_2 and now intersects D_1 at 20 million pounds per month and 7 dollars per pound.

Table 3.4g Changes in Demand and Supply: Panel D

Points	Supply Curve (S_1) (Quantity millions of pounds per month, Price per pound)	Supply Curve (S_2) (Quantity millions of pounds per month, Price per pound)	Demand Curve (D_1) (Quantity millions of pounds per month, Price per pound)
1	15 million pounds , 4 dollars	5 million pounds , 4 dollars	35 million pounds , 4 dollars
2	20 million pounds , 5 dollars	10 million pounds , 5 dollars	30 million pounds , 5 dollars
3	25 million pounds , 6 dollars	15 million pounds , 6 dollars	25 million pounds , 6 dollars
4	30 million pounds , 7 dollars	20 million pounds , 7 dollars	20 million pounds , 7 dollars
5	35 million pounds , 8 dollars	25 million pounds , 8 dollars	15 million pounds , 8 dollars
6	40 million pounds , 9 dollars	30 million pounds , 9 dollars	10 million pounds , 9 dollars

A change in one of the variables (shifters) held constant in any model of demand and supply will create a change in demand or supply. A shift in a demand or supply curve changes the equilibrium price and equilibrium quantity for a good or service. Figure 3.4d "Changes in Demand and Supply" combines the information about changes in the demand and supply of coffee presented in Figure 3.1b "An Increase in Demand" Figure 3.1c "A Reduction in Demand" Figure 3.2b "An Increase in Supply" and Figure 3.2c "A Reduction in Supply" In each case, the original equilibrium price is $6 per pound, and the corresponding equilibrium quantity is 25 million pounds of coffee per month. Figure 3.4d "Changes in Demand and Supply" shows what happens with an increase in demand, a reduction in demand, an increase in supply, and a reduction in supply. We then look at what happens if both curves shift simultaneously. Each of these possibilities is discussed in turn below.

An Increase in Demand

An increase in demand for coffee shifts the demand curve to the right, as shown in Panel (a) of Figure 3.4d "Changes in Demand and Supply". The equilibrium price rises to $7 per pound. As the price rises to the new equilibrium level, the quantity supplied increases to 30 million pounds of coffee per month. Notice that the supply curve does not shift; rather, there is a movement along the supply curve.

Demand shifters that could cause an increase in demand include a shift in preferences that leads to greater coffee consumption; a lower price for a complement to coffee, such as doughnuts; a higher price for a substitute for coffee, such as tea; an increase in income; and an increase in population. A change in buyer expectations, perhaps due to predictions of bad weather lowering expected yields on coffee plants and increasing future coffee prices, could also increase current demand.

A Decrease in Demand

Panel (b) of Figure 3.4d "Changes in Demand and Supply" shows that a decrease in demand shifts the demand curve to the left. The equilibrium price falls to $5 per pound. As the price falls to the new equilibrium level, the quantity supplied decreases to 20 million pounds of coffee per month.

Demand shifters that could reduce the demand for coffee include a shift in preferences that makes people want to consume less coffee; an increase in the price of a complement, such as doughnuts; a reduction in the price of a substitute, such as tea; a reduction in income; a reduction in population; and a change in buyer expectations that leads people to expect lower prices for coffee in the future.

An Increase in Supply

An increase in the supply of coffee shifts the supply curve to the right, as shown in Panel (c) of Figure 3.4d "Changes in Demand and Supply". The equilibrium price falls to $5 per pound. As the price falls to the new equilibrium level, the quantity of coffee demanded increases to 30 million pounds of coffee per month. Notice that the demand curve does not shift; rather, there is movement along the demand curve.

Possible supply shifters that could increase supply include a reduction in the price of an input such as labour, a decline in the returns available from alternative uses of the **inputs** that produce coffee, an improvement in the technology of coffee production, good weather, and an increase in the number of coffee-producing firms.

A Decrease in Supply

Panel (d) of Figure 3.4d "Changes in Demand and Supply" shows that a decrease in supply shifts the supply curve to the left. The equilibrium price rises to $7 per pound. As the price rises to the new equilibrium level, the quantity demanded decreases to 20 million pounds of coffee per month.

Possible supply shifters that could reduce supply include an increase in the prices of inputs used in the production of coffee, an increase in the returns available from alternative uses of these inputs, a decline in production because of problems in technology (perhaps caused by a restriction on pesticides used to protect coffee beans), a reduction in the number of coffee-producing firms, or a natural event, such as excessive rain.

Heads Up!

Figure 3.4e Textual Version

Figure 3.4e contains 3 graphs. All 3 graphs have the same axis: the vertical axis is price per pound (P) and the horizontal axis is quantity (lb of peas per month) (Q).

1. Graph 1 – Set up the graph: depicts a linear supply curve (S_1) that slopes upward left to right and a linear demand curve (D_1) sloping downward left to right. D_1 and S_1 intersect in the middle at point (Q_1, P_1).
2. Graph 2 -Shift the curve: depicts original supply curve (S_1) shifting to the left to supply curve (S_2) intersecting further up D_1 at a new point (Q_2, P_2).
3. Graph 3 -Troubleshoot: depicts S_1 and D_2 intersecting at (Q_1, P_1). The original demand curve (D_1) shifts to the left to D_2, intersecting further down the supply curve (S_1). Overlaying the graph is a circle with an two lines intersecting in an 'x' extending the diameter of the circle.

You are likely to be given problems in which you will have to shift a demand or supply curve.

Suppose you are told that an invasion of pod-crunching insects has gobbled up half the crop of fresh peas, and you are asked to use demand and supply analysis to predict what will happen to the price and quantity of peas demanded and supplied. Here are some suggestions.

Put the quantity of the good you are asked to analyze on the horizontal axis and its price on the vertical axis. Draw a downward-sloping line for demand and an upward-sloping line for supply. The initial equilibrium price is determined by the intersection of the two curves. Label the equilibrium solution. You may find it helpful to use a number for the equilibrium price instead of the letter "P." Pick a price that seems plausible, say, 79¢ per pound. Do not worry about the precise positions of the demand and supply curves; you cannot be expected to know what they are.

Step 2 can be the most difficult step; the problem is to decide which curve to shift. The key is to remember the difference between a change in demand or supply and a change in quantity demanded or supplied. At each price, ask yourself whether the given event would change the quantity demanded. Would the fact that a bug has attacked the pea crop change the quantity demanded at a price of, say, 79¢ per pound? Clearly not; none of the demand shifters have changed. The event would, however, reduce the quantity supplied at this price, and the supply curve would shift to the left. There is a change in supply and a reduction in the quantity demanded. There is no change in demand.

Next check to see whether the result you have obtained makes sense. The graph in Step 2 makes sense; it shows price rising and quantity demanded falling.

It is easy to make a mistake such as the one shown in the third figure of this Heads Up! One might, for example, reason that when fewer peas are available, fewer will be demanded, and therefore the demand curve will shift to the left. This suggests the price of peas will fall—but that does not make sense. If only half as many fresh peas were available, their price would surely rise. The error here lies in confusing a change in quantity demanded with a change in demand. Yes, buyers will end up buying fewer peas. But no, they will not demand fewer peas at each price than before; the demand curve does not shift.

Simultaneous Shifts

As we have seen, when *either* the demand or the supply curve shifts, the results are unambiguous; that is, we know what will happen to both equilibrium price and equilibrium quantity, so long as we know whether demand or supply increased or decreased. However, in practice, several events may occur at around the same time that cause *both* the demand and supply curves to shift. To figure out what happens to equilibrium price and equilibrium quantity, we must know not only in which direction the demand and supply curves have shifted but also the relative amount by which each curve shifts. Of course, the demand and supply curves could shift in the same direction or in opposite directions, depending on the specific events causing them to shift.

For example, all three panels of Figure 3.4f "Simultaneous Decreases in Demand and Supply" show a decrease in demand for coffee (caused perhaps by a decrease in the price of a substitute good, such as tea) and a simultaneous decrease in the supply of coffee (caused perhaps by bad weather). Since reductions in demand and supply, considered separately, each cause the equilibrium quantity to fall, the impact of both curves shifting simultaneously to the left means that the new equilibrium quantity of coffee is less than the old equilibrium quantity. The effect on the equilibrium price, though, is ambiguous. Whether the equilibrium price is higher, lower, or unchanged depends on the extent to which each curve shifts. The vertical axis is price per pound and the horizontal axis is quantity (millions of pounds per month). The Supply Curve is linear sloping upwards from left to right and the Demand Curve is linear sloping downwards from left to right.

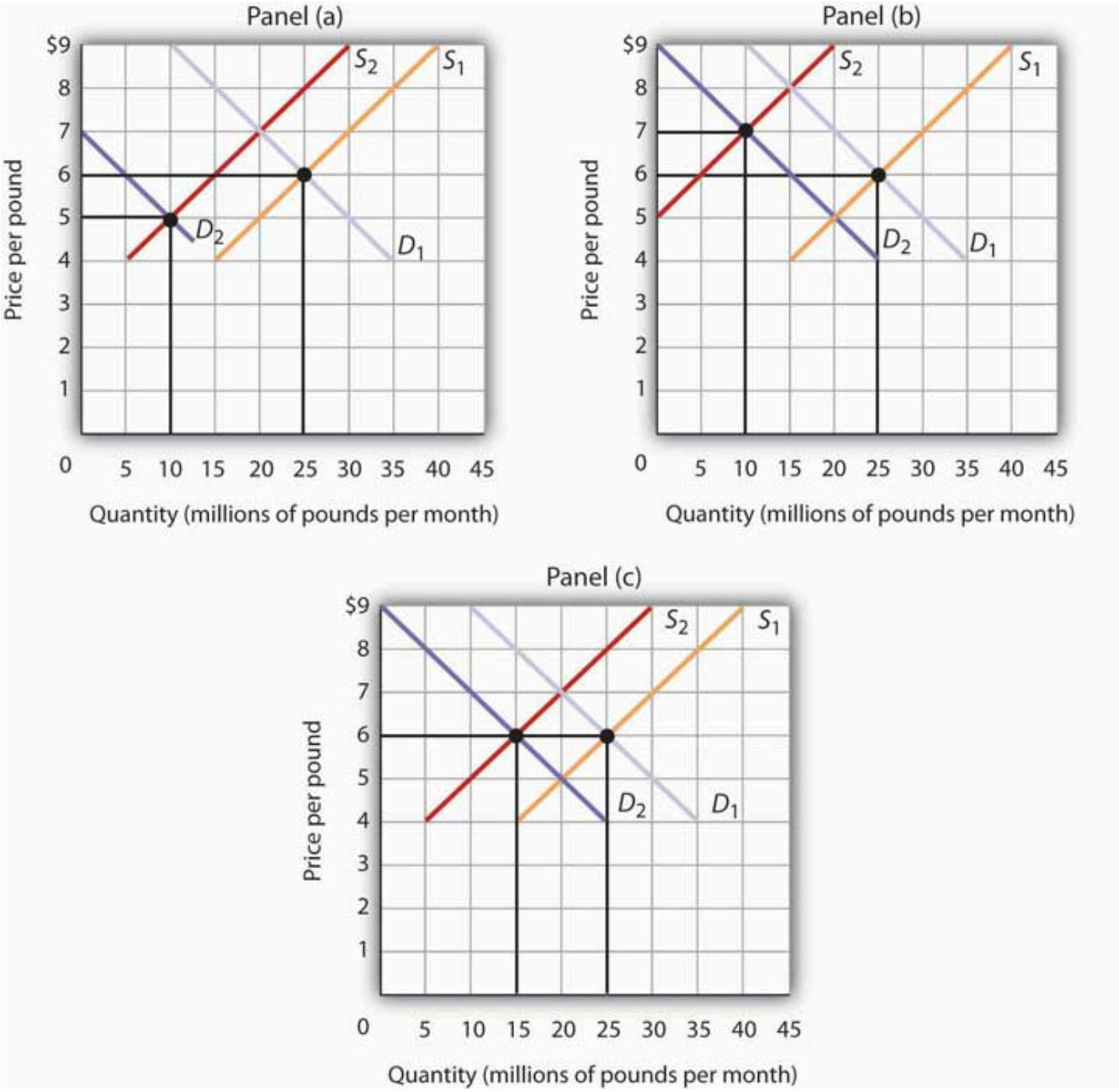

Figure 3.4f Simultaneous Decreases in Demand and Supply. Figure by University of Minnesota, licensed under CC BY-NC-SA 4.0.

Both the demand and the supply of coffee decrease. Since decreases in demand and supply, considered separately, each cause equilibrium quantity to fall, the impact of both decreasing simultaneously means that a new equilibrium quantity of coffee must be less than the old equilibrium quantity. In Panel (a), the demand curve shifts farther to the left than does the supply curve, so equilibrium price falls. In Panel (b), the supply curve shifts farther to the left than does the demand curve, so the equilibrium price rises. In Panel (c), both curves shift to the left by the same amount, so equilibrium price stays the same.

If the demand curve shifts farther to the left than does the supply curve, as shown in Panel (a) of Figure 3.4f "Simultaneous Decreases in Demand and Supply", then the equilibrium price will be lower than it was before the curves shifted. In this case the new equilibrium price falls from $6 per pound to $5 per pound. If the shift to the left of the supply curve is greater than that of the demand curve, the equilibrium price will be higher than it was before, as shown in Panel (b). In this case, the new equilibrium price rises to $7 per pound. In Panel (c), since both curves shift to the left by the same amount, equilibrium price does not change; it remains $6 per pound.

Regardless of the scenario, changes in equilibrium price and equilibrium quantity resulting from two different events need to be considered separately. If both events cause equilibrium price or quantity to move in the same direction, then clearly price or quantity can be expected to move in that direction. If one event causes price or quantity to rise while the other causes it to fall, the extent by which each curve shifts is critical to figuring out what happens. Figure 3.4g "Simultaneous Shifts in Demand and Supply" summarizes what may happen to equilibrium price and quantity when demand and supply both shift.

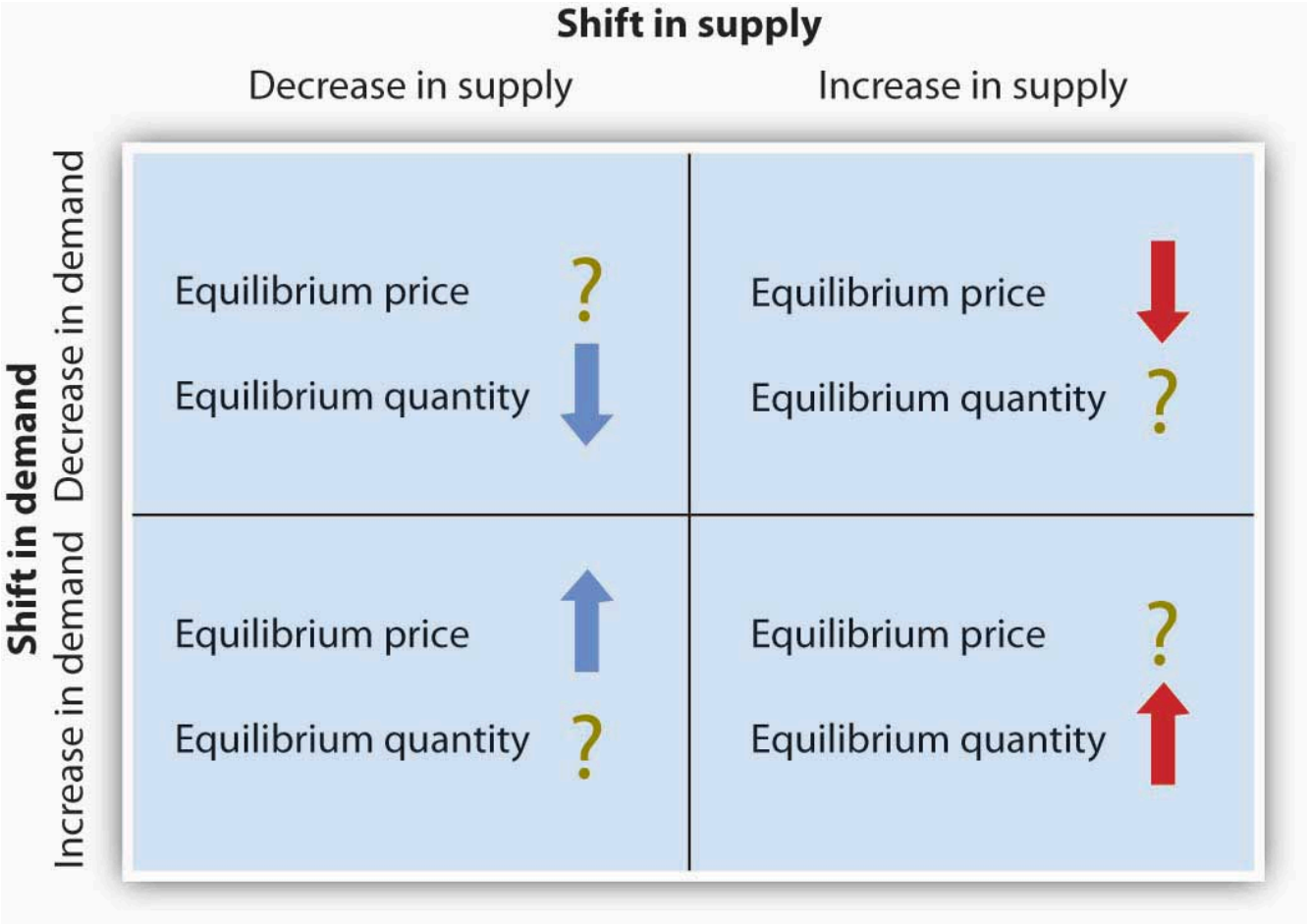

Figure 3.4g Simultaneous Shifts in Demand and Supply. Figure by University of Minnesota, licensed under CC BY-NC-SA 4.0.

If simultaneous shifts in demand and supply cause equilibrium price or quantity to move in the same direction, then equilibrium price or quantity clearly moves in that direction. If the shift in one of the curves causes equilibrium price or quantity to rise while the shift in the other curve causes equilibrium price or quantity to fall, then the relative amount by which each curve shifts is critical to figuring out what happens to that variable.

As demand and supply curves shift, prices adjust to maintain a balance between the quantity of a good demanded and the quantity supplied. If prices did not adjust, this balance could not be maintained.

Notice that the demand and supply curves that we have examined in this chapter have all been drawn as linear. This simplification of the real world makes the graphs a bit easier to read without sacrificing the essential point: whether the curves are linear or nonlinear, demand curves are downward sloping and supply curves are generally upward sloping. As circumstances that shift the demand curve or the supply curve change, we can analyze what will happen to price and what will happen to quantity.

An Overview of Demand and Supply: The Circular Flow Model

Implicit in the concepts of demand and supply is a constant interaction and adjustment that economists illustrate with the circular flow model. The circular flow model provides a look at how markets work and how they are related to each other. It shows flows of spending and income through the economy.

A great deal of economic activity can be thought of as a process of exchange between households and firms. Firms supply goods and services to households. Households buy these goods and services from firms. Households supply factors of production—labour, capital, and natural resources—that firms require. The payments firms make in exchange for these factors represent the incomes households earn.

The flow of goods and services, factors of production, and the payments they generate is illustrated in Figure 3.4h "The Circular Flow of Economic Activity". This circular flow model of the economy shows the interaction of households and firms as they exchange goods and services and factors of production. For simplicity, the model here shows only the private domestic economy; it omits the government and foreign sectors.

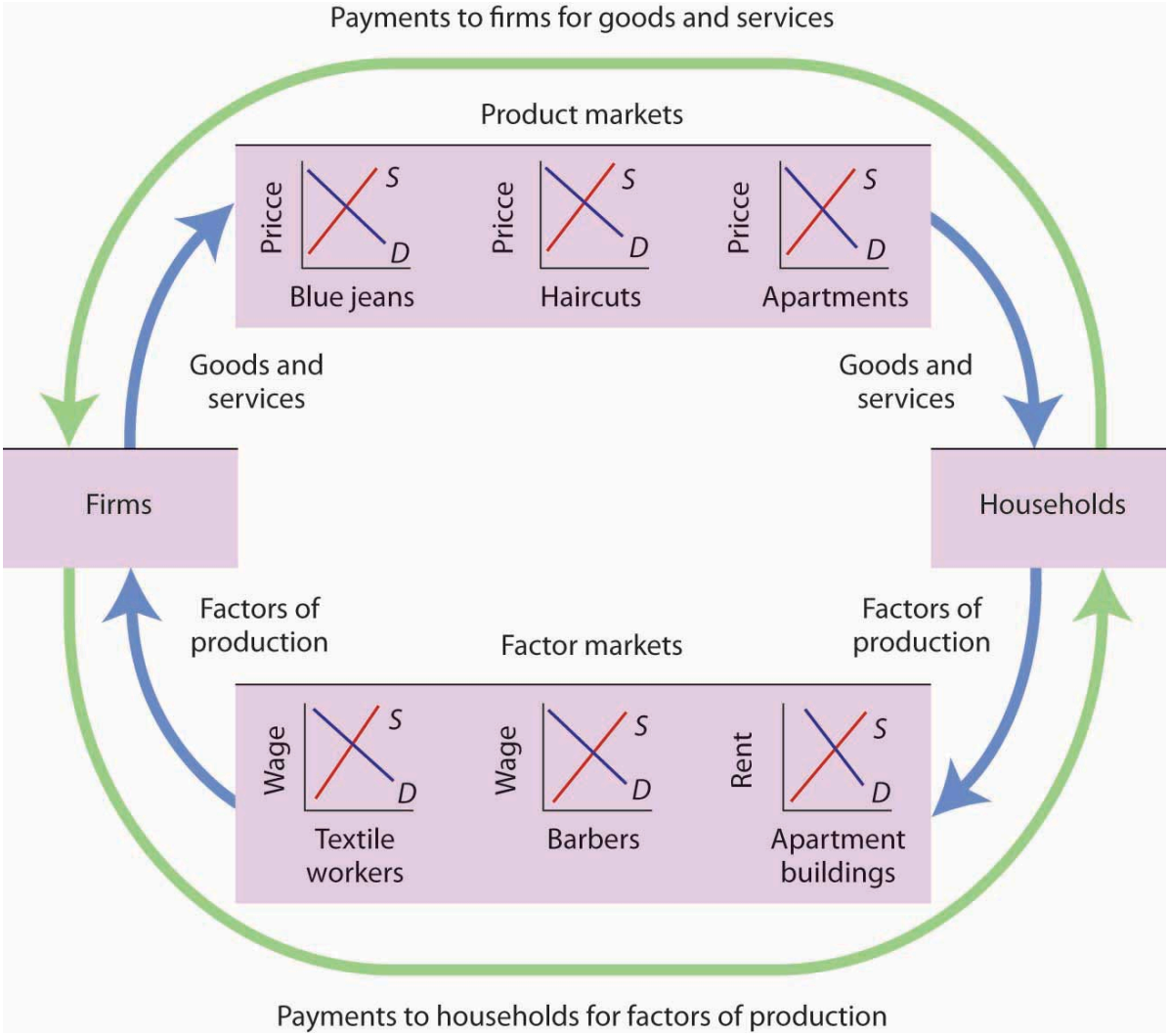

Figure 3.4h The Circular Flow of Economic Activity. Figure by University of Minnesota, licensed under CC BY-NC-SA 4.0.

This simplified circular flow model shows flows of spending between households and firms through product and factor markets. The inner arrows show goods and services flowing from firms to households and factors of production flowing from households to firms. The outer flows show the payments for goods, services, and factors of production. These flows, in turn, represent millions of individual markets for products and factors of production.

The circular flow model shows that goods and services that households demand are supplied by firms in product markets. The exchange for goods and services is shown in the top half of Figure 3.4h "The Circular Flow of Economic Activity". The bottom half of the exhibit illustrates the exchanges that take place in factor markets. factor markets are markets in which households supply factors of production—labour, capital, and natural resources—demanded by firms.

Our model is called a circular flow model because households use the income they receive from their supply of factors of production to buy goods and services from firms. Firms, in turn, use the payments they receive from households to pay for their factors of production.

The demand and supply model developed in this chapter gives us a basic tool for understanding what is happening in each of these product or factor markets and also allows us to see how these markets are interrelated. In Figure 3.4h "The Circular Flow of Economic Activity", markets for three goods and services that households want—blue jeans, haircuts, and apartments—create demands by firms for textile workers, barbers, and apartment buildings. The equilibrium of supply and demand in each market determines the price and quantity of that item. Moreover, a change in equilibrium in one market will affect equilibrium in related markets. For example, an increase in the demand for haircuts would lead to an increase in demand for barbers. Equilibrium price and quantity could rise in both markets. For some purposes, it will be adequate to simply look at a single market, whereas at other times we will want to look at what happens in related markets as well.

In either case, the model of demand and supply is one of the most widely used tools of economic analysis. That widespread use is no accident. The model yields results that are, in fact, broadly consistent with what we observe in the marketplace. Your mastery of this model will pay big dividends in your study of economics.

Key Takeaways

- The equilibrium price is the price at which the quantity demanded equals the quantity supplied. It is determined by the intersection of the demand and supply curves.
- A surplus exists if the quantity of a good or service supplied exceeds the quantity demanded at the current price; it causes downward pressure on price. A shortage exists if the quantity of a good or service demanded exceeds the quantity supplied at the current price; it causes upward pressure on price.
- An increase in demand, all other things unchanged, will cause the equilibrium price to rise; quantity supplied will increase. A decrease in demand will cause the equilibrium price to fall; quantity supplied will decrease.
- An increase in supply, all other things unchanged, will cause the equilibrium price to fall; quantity demanded will increase. A decrease in supply will cause the equilibrium price to rise; quantity demanded will decrease.

- To determine what happens to equilibrium price and equilibrium quantity when both the supply and demand curves shift, you must know in which direction each of the curves shifts and the extent to which each curve shifts.
- The circular flow model provides an overview of demand and supply in product and factor markets and suggests how these markets are linked to one another.

Try It!

What happens to the equilibrium price and the equilibrium quantity of DVD rentals if the price of movie theater tickets increases and wages paid to DVD rental store clerks increase, all other things unchanged? Be sure to show all possible scenarios, as was done in Figure 3.4f "Simultaneous Decreases in Demand and Supply". Again, you do not need actual numbers to arrive at an answer. Just focus on the general position of the curve(s) before and after events occurred.

Check your Answer

An increase in the price of movie theater tickets (a substitute for DVD rentals) will cause the demand curve for DVD rentals to shift to the right. An increase in the wages paid to DVD rental store clerks (an increase in the cost of a factor of production) shifts the supply curve to the left. Each event taken separately causes equilibrium price to rise. Whether equilibrium quantity will be higher or lower depends on which curve shifted more.

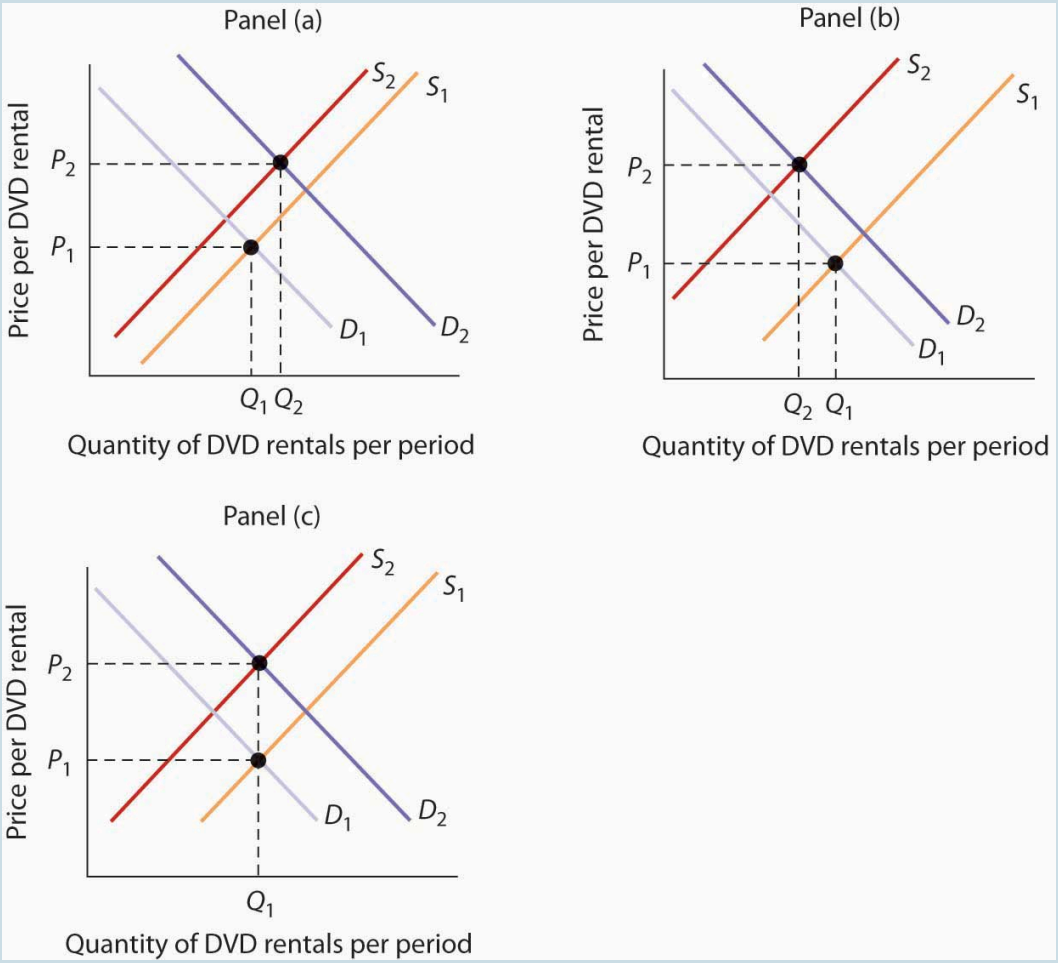

Figure 3.4i. Figure by University of Minnesota, licensed under CC BY-NC-SA 4.0.

Figure 3.4i Textual Version

Figure 3.4i contains 3 graphs: panel (a), panel (b) and panel (c). All graphs have the same vertical and horizontal axes: the vertical axis is price per DVD rental (P) and the horizontal axis is quantity of DVD rentals per period (Q). The original supply curve (S_1) is linear sloping upward from left to right and the original demand curve (D_1) is linear sloping downwards from left to right.

Panel (a) depicts if the demand curve shifted more, then the equilibrium quantity of DVD rentals will rise. The supply curve (S_1) occurs in the central are of the graph and the demand curve (D_1) is further to the left of the graph. S_1 and D_1 intersect at point (Q_1, P_1). S_1 shifts to the left to S_2 and D_1 shifts substantially to the right to D_2. S_2 and D_2 now intersect at (Q_2, P_2), further right along the supply curve in the centre area of the graph.

Panel (b) depicts if the supply curve shifted more, then the equilibrium quantity of DVD rentals will fall. The supply curve (S_1) occurs further to the right on the graph and the demand curve (D_1) is

further to the left. S_1 and D_1 intersect at point (Q_1, P_1). S_1 shifts to substantially to the left to S_2 and D_1 shifts right to D_2. S_2 and D_2 now intersect at (Q_2, P_2), further right along the supply curve towards the left area of the graph.

Panel (c) depicts if the curves shifted by the same amount, then the equilibrium quantity of DVD rentals would not change. The supply curve (S_1) occurs further to the right on the graph and the demand curve (D_1) is further to the left. S_1 and D_1 intersect at point (Q_1, P_1). S_1 shifts to the left to S_2 and D_1 shifts right to D_2. S_2 and D_2 now intersect at (Q_1, P_2), further right along the supply curve in the central area of the graph.

Case in Point: Demand, Supply, and Obesity

Figure 3.4j American fat beauty (https://www.flickr.com/photos/23300509@N03/2229513184) by rattopennugu, licensed under CC BY-NC-ND 2.0.

Why are so many Americans fat? Put so crudely, the question may seem rude, but, indeed, the

number of obese Americans has increased by more than 50% over the last generation, and obesity may now be the nation's number one health problem. According to Sturm Roland in a recent RAND Corporation study, "Obesity appears to have a stronger association with the occurrence of chronic medical conditions, reduced physical health-related quality of life and increased health care and medication expenditures than smoking or problem drinking."

Many explanations of rising obesity suggest higher demand for food. What more apt picture of our sedentary life style is there than spending the afternoon watching a ballgame on TV, while eating chips and salsa, followed by a dinner of a lavishly topped, take-out pizza? Higher income has also undoubtedly contributed to a rightward shift in the demand curve for food. Plus, any additional food intake translates into more weight increase because we spend so few calories preparing it, either directly or in the process of earning the income to buy it. A study by economists Darius Lakdawalla and Tomas Philipson suggests that about 60% of the recent growth in weight may be explained in this way—that is, demand has shifted to the right, leading to an increase in the equilibrium quantity of food consumed and, given our less strenuous life styles, even more weight gain than can be explained simply by the increased amount we are eating.

What accounts for the remaining 40% of the weight gain? Lakdawalla and Philipson further reason that a rightward shift in demand would by itself lead to an increase in the quantity of food as well as an increase in the price of food. The problem they have with this explanation is that over the post-World War II period, the relative price of food has declined by an average of 0.2 percentage points per year. They explain the fall in the price of food by arguing that agricultural innovation has led to a substantial rightward shift in the supply curve of food. As shown in Figure 3.23, lower food prices and a higher equilibrium quantity of food have resulted from simultaneous rightward shifts in demand and supply and that the rightward shift in the supply of food from S_1 to S_2 has been substantially larger than the rightward shift in the demand curve from D_1 to D_2.

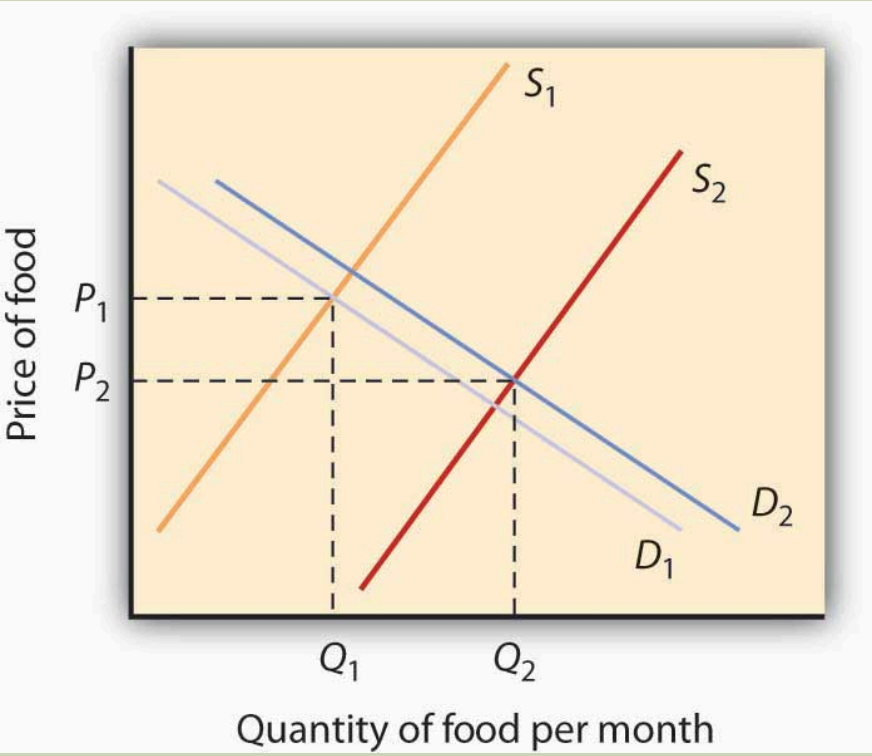

Figure 3.4k. Figure by University of Minnesota, licensed under CC BY-NC-SA 4.0.

Sources:

Sturm, R. (2002). The effects of obesity, smoking, and problem drinking on chronic medical problems and health care costs. *Health Affairs*, *21(2)*, 245–253.

Lakdawalla, D. & Philipson, T. (2002). The growth of obesity and technological change: A theoretical and empirical examination. *NEBR Working Paper Series* [no. 8946]. http://dx.doi.org/10.3386/w8946

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3.5 - DEMAND, SUPPLY, AND EQUILIBRIUM IN MARKETS FOR GOODS AND SERVICES

Learning Objectives

- Explain demand, quantity demanded, and the law of demand
- Identify a demand curve and a supply curve
- Explain supply, quantity supplied, and the law of supply
- Explain equilibrium, equilibrium price, and equilibrium quantity

First let's first focus on what economists mean by demand, what they mean by supply, and then how demand and supply interact in a market.

Demand for Goods and Services

Economists use the term **demand** to refer to the amount of some good or service consumers are willing and able to purchase at each price. Demand is fundamentally based on needs and wants—if you have no need or want for something, you won't buy it. While a consumer may be able to differentiate between a need and a want, from an economist's perspective they are the same thing. Demand is also based on ability to pay. If you cannot pay for it, you have no effective demand. By this definition, a homeless person probably has no effective demand for shelter.

What a buyer pays for a unit of the specific good or service is called price. The total number of units that consumers would purchase at that price is called the quantity demanded. A rise in price of a good or service almost always decreases the quantity demanded of that good or service. Conversely, a fall in price will increase the quantity demanded. When the price of a gallon of gasoline increases, for example, people look for ways to reduce their consumption by combining several errands, commuting by carpool or mass transit, or taking weekend or vacation trips closer to home. Economists call this inverse relationship between price and quantity

demanded the **law of demand**. The law of demand assumes that all other variables that affect demand (which we explain in the next module) are held constant.

We can show an example from the market for gasoline in a table or a graph. Economist call a table that shows the quantity demanded at each price, such as Table 3.5a, a **demand schedule**. In this case we measure price in dollars per gallon of gasoline. We measure the quantity demanded in millions of gallons over some time period (for example, per day or per year) and over some geographic area (like a state or a country). A **demand curve** shows the relationship between price and quantity demanded on a graph like Figure 3.5a, with quantity on the horizontal axis and the price per gallon on the vertical axis. (Note that this is an exception to the normal rule in mathematics that the independent variable (x) goes on the horizontal axis and the dependent variable (y) goes on the vertical. Economics is not math.)

Table 3.5a shows the demand schedule and the graph in Figure 3.5a shows the demand curve. These are two ways to describe the same relationship between price and quantity demanded.

Table 3.5a Price and Quantity Demanded of Gasoline

Price (per gallon) ($)	Quantity Demanded (millions of gallons)
1.00	800
1.20	700
1.40	600
1.60	550
1.80	500
2.00	460
2.20	420

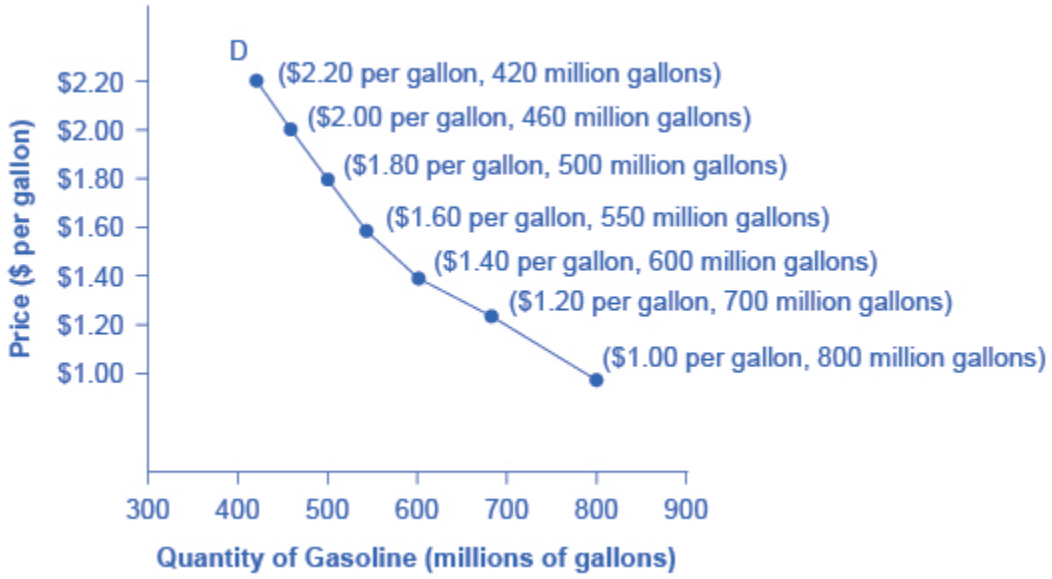

Figure 3.5a A Demand Curve for Gasoline. The demand schedule shows that as price rises, quantity demanded decreases, and vice versa. We graph these points, and the line connecting them is the demand curve (D). The downward slope of the demand curve again illustrates the law of demand—the inverse relationship between prices and quantity demanded. A Demand Curve for Gasoline by Steven A. Greenlaw & David Shapiro (OpenStax), licensed under CC BY 4.0.

Demand curves will appear somewhat different for each product. They may appear relatively steep or flat, or they may be straight or curved. Nearly all demand curves share the fundamental similarity that they slope down from left to right. Demand curves embody the law of demand: As the price increases, the quantity demanded decreases, and conversely, as the price decreases, the quantity demanded increases.

Confused about these different types of demand? Read the next Clear It Up feature.

Clear it Up: Is demand the same as quantity demanded?

In economic terminology, demand is not the same as quantity demanded. When economists talk about demand, they mean the relationship between a range of prices and the quantities demanded at those prices, as illustrated by a demand curve or a demand schedule. When economists talk about quantity demanded, they mean only a certain point on the demand curve, or one quantity on the demand schedule. In short, demand refers to the curve and quantity demanded refers to the (specific) point on the curve.

Supply of Goods and Services

When economists talk about **supply**, they mean the amount of some good or service a producer is willing to supply at each price. Price is what the producer receives for selling one unit of a good or service. A rise in price almost always leads to an increase in the quantity supplied of that good or service, while a fall in price will decrease the quantity supplied. When the price of gasoline rises, for example, it encourages profit-seeking firms to take several actions: expand exploration for oil reserves; drill for more oil; invest in more pipelines and oil tankers to bring the oil to plants for refining into gasoline; build new oil refineries; purchase additional pipelines and trucks to ship the gasoline to gas stations; and open more gas stations or keep existing gas stations open longer hours. Economists call this positive relationship between price and quantity supplied—that a higher price leads to a higher quantity supplied and a lower price leads to a lower quantity supplied—the **law of supply**. The law of supply assumes that all other variables that affect supply (to be explained in the next module) are held constant.

Still unsure about the different types of supply? See the following Clear It Up feature.

Clear it Up: Is supply the same as quantity supplied?

In economic terminology, supply is not the same as quantity supplied. When economists refer to supply, they mean the relationship between a range of prices and the quantities supplied at those prices, a relationship that we can illustrate with a supply curve or a supply schedule. When economists refer to quantity supplied, they mean only a certain point on the supply curve, or one quantity on the supply schedule. In short, supply refers to the curve and quantity supplied refers to the (specific) point on the curve.

Figure 3.5b illustrates the law of supply, again using the market for gasoline as an example. Like demand, we can illustrate supply using a table or a graph. A **supply schedule** is a table, like Table 3.5b, that shows the quantity supplied at a range of different prices. Again, we measure price in dollars per gallon of gasoline and we measure quantity supplied in millions of gallons. A **supply curve** is a graphic illustration of the relationship between price, shown on the vertical axis, and quantity, shown on the horizontal axis. The supply schedule and the supply curve are just two different ways of showing the same information. Notice that the horizontal and vertical axes on the graph for the supply curve are the same as for the demand curve.

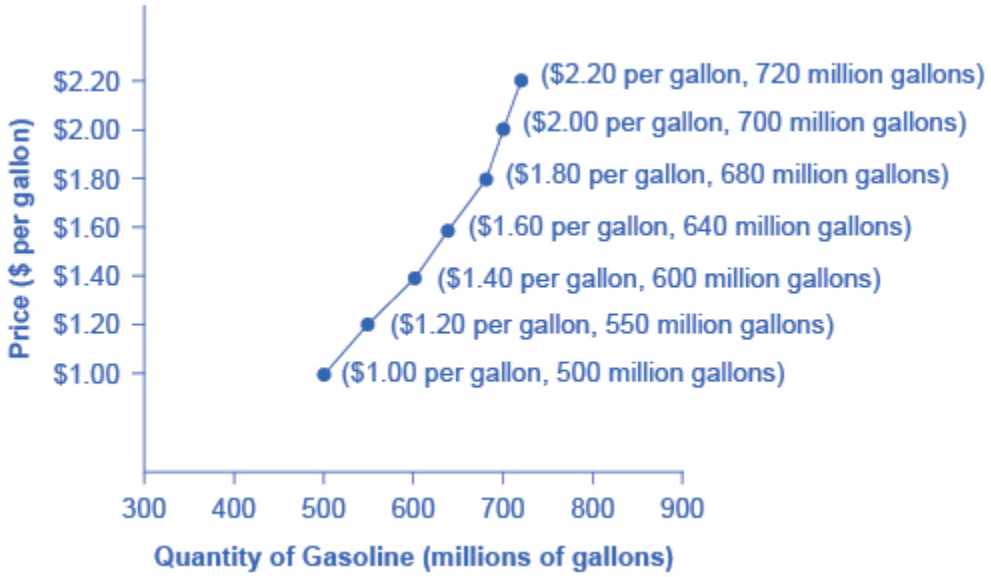

Figure 3.5b. A Supply Curve for Gasoline. The supply schedule is the table that shows quantity supplied of gasoline at each price. As price rises, quantity supplied also increases, and vice versa. The supply curve (S) is created by graphing the points from the supply schedule and then connecting them. The upward slope of the supply curve illustrates the law of supply—that a higher price leads to a higher quantity supplied, and vice versa. A Supply Curve for Gasoline by Steven A. Greenlaw & David Shapiro (OpenStax), licensed under CC BY 4.0.

Table 3.5b. Price and Supply of Gasoline

Price (per gallon) ($)	Quantity Supplied (millions of gallons)
1.00	500
1.20	550
1.40	600
1.60	640
1.80	680
2.00	700
2.20	720

The shape of supply curves will vary somewhat according to the product: steeper, flatter, straighter, or curved. Nearly all supply curves, however, share a basic similarity: they slope up from left to right and illustrate the law of supply: as the price rises, say, from $1.00 per gallon to $2.20 per gallon, the quantity supplied increases from 500 gallons to 720 gallons. Conversely, as the price falls, the quantity supplied decreases.

Equilibrium—Where Demand and Supply Intersect

Because the graphs for demand and supply curves both have price on the vertical axis and quantity on the horizontal axis, the demand curve and supply curve for a particular good or service can appear on the same graph. Together, demand and supply determine the price and the quantity that will be bought and sold in a market.

Figure 3.5c illustrates the interaction of demand and supply in the market for gasoline. The demand curve (D) is identical to Figure 3.5a. The supply curve (S) is identical to Figure 3.5b. Table 3.5b contains the same information in tabular form.

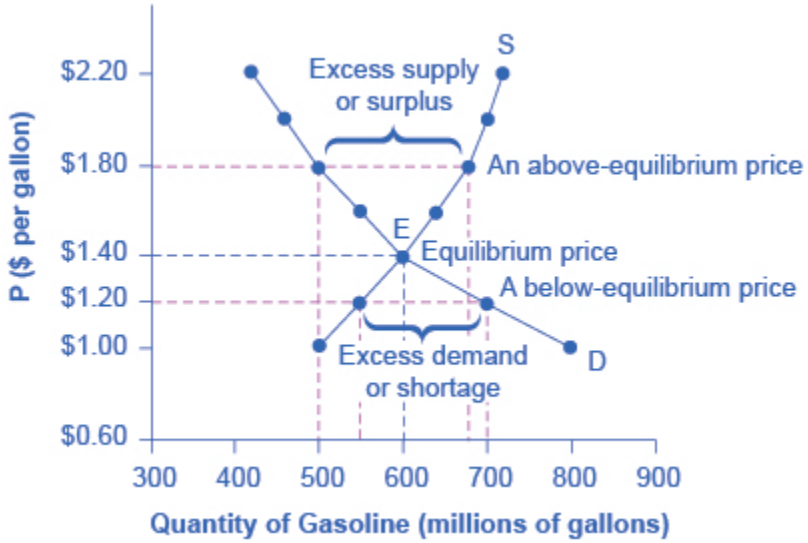

Figure 3.5c Demand and Supply for Gasoline. The demand curve (D) and the supply curve (S) intersect at the equilibrium point E, with a price of $1.40 and a quantity of 600. The equilibrium is the only price where quantity demanded is equal to quantity supplied. At a price above equilibrium like $1.80, quantity supplied exceeds the quantity demanded, so there is excess supply. At a price below equilibrium such as $1.20, quantity demanded exceeds quantity supplied, so there is excess demand.Demand and Supply for Gasoline by Steven A. Greenlaw & David Shapiro (OpenStax), licensed under CC BY 4.0.

Table 3.5c Price, Quantity Demanded, and Quantity Supplied

Price ($ per gallon)	Demand Curve (D): Quantity demanded (millions of gallons)	Supply Curve (S) : Quantity supplied (millions of gallons)
1.00	800	500
1.20	700	550
1.40	**600**	**600**
1.60	550	640
1.80	500	680
2.00	460	700
2.20	420	720

Remember this: When two lines on a diagram cross, this intersection usually means something. Supply curve (S) slopes concave upwards from left to right. Demand curve (D) slopes downward concave from left to right. The point where the supply curve (S) and the demand curve (D) cross, designated by point E (price of $1.40 and a quantity of 600) in Figure 3.5c, is called the equilibrium. The **equilibrium price** is the only price where the plans of consumers and the plans of producers agree—that is, where the amount of the product consumers want to buy (quantity demanded) is equal to the amount producers want to sell (quantity supplied). Economists call this common quantity the **equilibrium quantity**. At any other price, the quantity demanded does not equal the quantity supplied, so the market is not in equilibrium at that price.

In Figure 3.5c, the equilibrium price is $1.40 per gallon of gasoline and the equilibrium quantity is 600 million gallons. If you had only the demand and supply schedules, and not the graph, you could find the equilibrium by looking for the price level on the tables where the quantity demanded and the quantity supplied are equal.

The word "equilibrium" means "balance." If a market is at its equilibrium price and quantity, then it has no reason to move away from that point. However, if a market is not at equilibrium, then economic pressures arise to move the market toward the equilibrium price and the equilibrium quantity.

Imagine, for example, that the price of a gallon of gasoline was above the equilibrium price—that is, instead of $1.40 per gallon, the price is $1.80 per gallon. The dashed horizontal line at the price of $1.80 in Figure 3.5c illustrates this above equilibrium price. At this higher price, the quantity demanded drops from 600 to 500. This decline in quantity reflects how consumers react to the higher price by finding ways to use less gasoline.

Moreover, at this higher price of $1.80, the quantity of gasoline supplied rises from the 600 to 680, as the higher price makes it more profitable for gasoline producers to expand their output. Now, consider how quantity demanded and quantity supplied are related at this above-equilibrium price. Quantity demanded has

fallen to 500 gallons, while quantity supplied has risen to 680 gallons. In fact, at any above-equilibrium price, the quantity supplied exceeds the quantity demanded. We call this an excess supply or a **surplus**.

With a surplus, gasoline accumulates at gas stations, in tanker trucks, in pipelines, and at oil refineries. This accumulation puts pressure on gasoline sellers. If a surplus remains unsold, those firms involved in making and selling gasoline are not receiving enough cash to pay their workers and to cover their expenses. In this situation, some producers and sellers will want to cut prices, because it is better to sell at a lower price than not to sell at all. Once some sellers start cutting prices, others will follow to avoid losing sales. These price reductions in turn will stimulate a higher quantity demanded. Therefore, if the price is above the equilibrium level, incentives built into the structure of demand and supply will create pressures for the price to fall toward the equilibrium.

Now suppose that the price is below its equilibrium level at $1.20 per gallon, as the dashed horizontal line at this price in Figure 3.5c shows. At this lower price, the quantity demanded increases from 600 to 700 as drivers take longer trips, spend more minutes warming up the car in the driveway in wintertime, stop sharing rides to work, and buy larger cars that get fewer miles to the gallon. However, the below-equilibrium price reduces gasoline producers' incentives to produce and sell gasoline, and the quantity supplied falls from 600 to 550.

When the price is below equilibrium, there is **excess demand**, or a **shortage**—that is, at the given price the quantity demanded, which has been stimulated by the lower price, now exceeds the quantity supplied, which had been depressed by the lower price. In this situation, eager gasoline buyers mob the gas stations, only to find many stations running short of fuel. Oil companies and gas stations recognize that they have an opportunity to make higher profits by selling what gasoline they have at a higher price. As a result, the price rises toward the equilibrium level.

Key Concepts and Summary

A demand schedule is a table that shows the quantity demanded at different prices in the market. A demand curve shows the relationship between quantity demanded and price in a given market on a graph. The law of demand states that a higher price typically leads to a lower quantity demanded.

A supply schedule is a table that shows the quantity supplied at different prices in the market. A supply curve shows the relationship between quantity supplied and price on a graph. The law of supply says that a higher price typically leads to a higher quantity supplied.

The equilibrium price and equilibrium quantity occur where the supply and demand curves cross. The equilibrium occurs where the quantity demanded is equal to the quantity supplied. If the price is below the equilibrium level, then the quantity demanded will exceed the quantity supplied. Excess demand or a shortage will exist. If the price is above the equilibrium level, then the quantity supplied will exceed the quantity demanded. Excess supply or a surplus will exist. In either case, economic pressures will push the price toward the equilibrium level.

Attribution

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3.6 - SHIFTS IN DEMAND AND SUPPLY FOR GOODS AND SERVICES

Learning Objectives

- Identify factors that affect demand
- Graph demand curves and demand shifts
- Identify factors that affect supply
- Graph supply curves and supply shifts

The previous module explored how price affects the quantity demanded and the quantity supplied. The result was the demand curve and the supply curve. Price, however, is not the only factor that influences buyers' and sellers' decisions. For example, how is demand for vegetarian food affected if, say, health concerns cause more consumers to avoid eating meat? How is the supply of diamonds affected if diamond producers discover several new diamond mines? What are the major factors, in addition to the price, that influence demand or supply?

Link It Up

Visit this The Delicious Truth: Chilean Sea Bass = Patagonian Toothfish [New Tab] (http://thedelicioustruth.blogspot.com/2009/08/chilean-sea-bass-patagonian-toothfish.html)to read a brief note on how marketing strategies can influence supply and demand of products.

What Factors Affect Demand?

We defined demand as the amount of some product a consumer is willing and able to purchase at each price. That suggests at least two factors that affect demand. Willingness to purchase suggests a desire, based on what economists call tastes and preferences. If you neither need nor want something, you will not buy it. Ability to purchase suggests that income is important. Professors are usually able to afford better housing and transportation than students, because they have more income. Prices of related goods can affect demand also. If you need a new car, the price of a Honda may affect your demand for a Ford. Finally, the size or composition of the population can affect demand. The more children a family has, the greater their demand for clothing. The more driving-age children a family has, the greater their demand for car insurance, and the less for diapers and baby formula.

These factors matter for both individual and market demand as a whole. Exactly how do these various factors affect demand, and how do we show the effects graphically? To answer those questions, we need the ***ceteris paribus*** assumption.

The *Ceteris Paribus* Assumption

A demand curve or a supply curve is a relationship between two, and only two, variables: quantity on the horizontal axis and price on the vertical axis. The assumption behind a demand curve or a supply curve is that no relevant economic factors, other than the product's price, are changing. Economists call this assumption ceteris paribus, a Latin phrase meaning "other things being equal." Any given demand or supply curve is based on the *ceteris paribus* assumption that all else is held equal. A demand curve or a supply curve is a relationship between two, and only two, variables when all other variables are kept constant. If all else is not held equal, then the laws of supply and demand will not necessarily hold, as the following Clear It Up feature shows.

Clear It Up

When does *ceteris paribus* apply?

We typically apply *ceteris paribus* when we observe how changes in price affect demand or supply, but we can apply *ceteris paribus* more generally. In the real world, demand and supply depend on more factors than just price. For example, a consumer's demand depends on income and a producer's supply depends on the cost of producing the product. How can we analyze the effect on demand or supply if multiple factors are changing at the same time—say price rises and income falls? The answer is that we examine the changes one at a time, assuming the other factors are held constant.

For example, we can say that an increase in the price reduces the amount consumers will buy (assuming income, and anything else that affects demand, is unchanged). Additionally, a decrease in income reduces the amount consumers can afford to buy (assuming price, and anything else that affects demand, is unchanged). This is what the *ceteris paribus* assumption really means. In this particular case, after we analyze each factor separately, we can combine the results. The amount consumers buy falls for two reasons: first because of the higher price and second because of the lower income.

How Does Income Affect Demand?

Let's use income as an example of how factors other than price affect demand. Figure 3.6a shows the initial demand for automobiles as D_0. At point Q, for example, if the price is $20,000 per car, the quantity of cars demanded is 18 million. D_0 also shows how the quantity of cars demanded would change as a result of a higher or lower price. For example, if the price of a car rose to $22,000, the quantity demanded would decrease to 17 million, at point R.

The original demand curve D_0, like every demand curve, is based on the *ceteris paribus* assumption that no other economically relevant factors change. Now imagine that the economy expands in a way that raises the incomes of many people, making cars more affordable. How will this affect demand? How can we show this graphically?

Return to Figure 3.6a. The price of cars is still $20,000, but with higher incomes, the quantity demanded has now increased to 20 million cars, shown at point S. As a result of the higher income levels, the demand curve shifts to the right to the new demand curve D_1, indicating an increase in demand. Table 3.6a shows clearly that this increased demand would occur at every price, not just the original one.

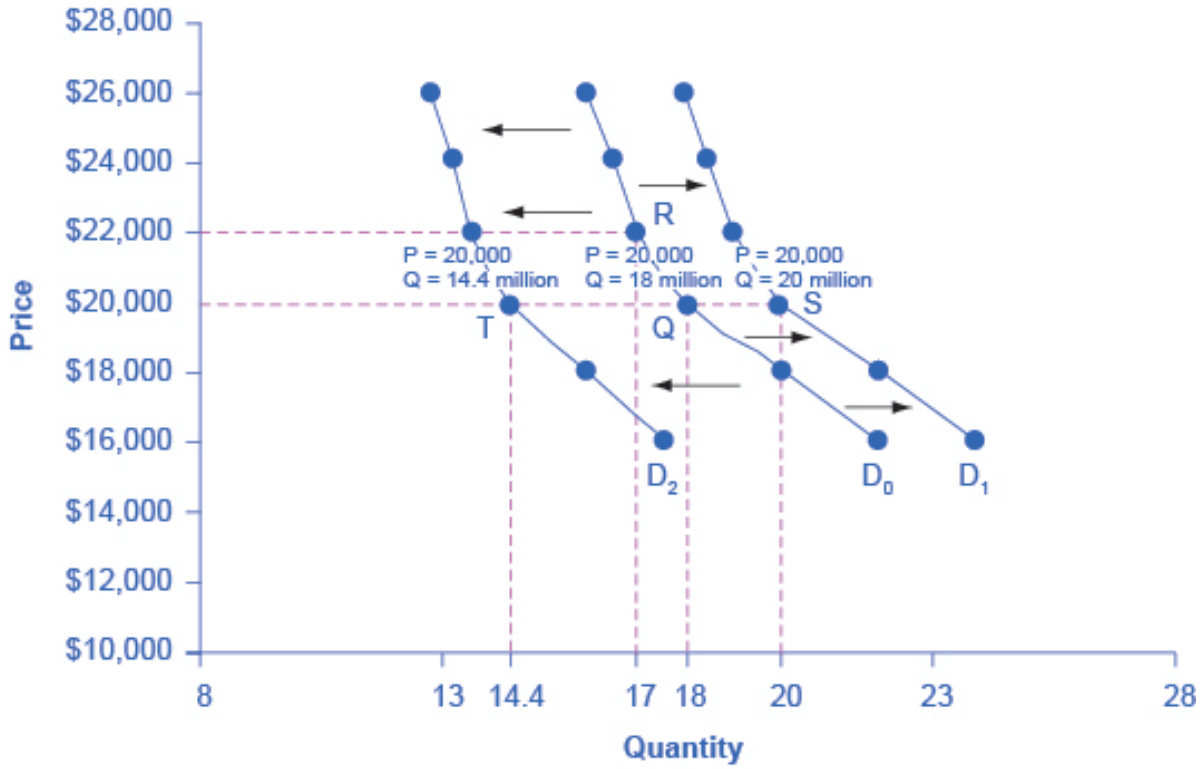

Figure 3.6a Shifts in Demand: A Car Example. Increased demand means that at every given price, the quantity demanded is higher, so that the demand curve shifts to the right from D_0 to D_1. Decreased demand means that at every given price, the quantity demanded is lower, so that the demand curve shifts to the left from D_0 to D_2. Graph by Steven A. Greenlaw & David Shapiro (OpenStax), licensed under CC BY 4.0.

Table 3.6a Price and Demand Shifts: A Car Example

Price ($)	Decrease to D_2	Original Quantity Demanded D_0	Increase to D_1
16,000	17.6 million	22.0 million	24.0 million
18,000	16.0 million	20.0 million	22.0 million
20,000	14.4 million	18.0 million	20.0 million
22,000	13.6 million	17.0 million	19.0 million
24,000	13.2 million	16.5 million	18.5 million
26,000	12.8 million	16.0 million	18.0 million

Now, imagine that the economy slows down so that many people lose their jobs or work fewer hours, reducing their incomes. In this case, the decrease in income would lead to a lower quantity of cars demanded at every given price, and the original demand curve D_0 would shift left to D_2. The shift from D_0 to D_2 represents such a decrease in demand: At any given price level, the quantity demanded is now lower. In this example, a price of $20,000 means 18 million cars sold along the original demand curve, but only 14.4 million

sold after demand fell.

When a demand curve shifts, it does not mean that the quantity demanded by every individual buyer changes by the same amount. In this example, not everyone would have higher or lower income and not everyone would buy or not buy an additional car. Instead, a shift in a demand curve captures a pattern for the market as a whole.

In the previous section, we argued that higher income causes greater demand at every price. This is true for most goods and services. For some—luxury cars, vacations in Europe, and fine jewellery—the effect of a rise in income can be especially pronounced. A product whose demand rises when income rises, and vice versa, is called a **normal good**. A few exceptions to this pattern do exist. As incomes rise, many people will buy fewer generic brand groceries and more name brand groceries. They are less likely to buy used cars and more likely to buy new cars. They will be less likely to rent an apartment and more likely to own a home. A product whose demand falls when income rises, and vice versa, is called an **inferior good**. In other words, when income increases, the demand curve shifts to the left.

Other Factors That Shift Demand Curves

Income is not the only factor that causes a **shift in demand**. Other factors that change demand include tastes and preferences, the composition or size of the population, the prices of related goods, and even expectations. A change in any one of the underlying factors that determine what quantity people are willing to buy at a given price will cause a shift in demand. Graphically, the new demand curve lies either to the right (an increase) or to the left (a decrease) of the original demand curve. Let's look at these factors.

Changing Tastes or Preferences

From 1980 to 2014, the per-person consumption of chicken by Americans rose from 48 pounds per year to 85 pounds per year, and consumption of beef fell from 77 pounds per year to 54 pounds per year, according to the U.S. Department of Agriculture (USDA). Changes like these are largely due to movements in taste, which change the quantity of a good demanded at every price: that is, they shift the demand curve for that good, rightward for chicken and leftward for beef.

Changes in the Composition of the Population

The proportion of elderly citizens in the United States population is rising. It rose from 9.8% in 1970 to 12.6% in 2000, and will be a projected (by the U.S. Census Bureau) 20% of the population by 2030. A society with relatively more children, like the United States in the 1960s, will have greater demand for goods and services like tricycles and day care facilities. A society with relatively more elderly persons, as the United States is projected to have by 2030, has a higher demand for nursing homes and hearing aids. Similarly, changes in

the size of the population can affect the demand for housing and many other goods. Each of these changes in demand will be shown as a shift in the demand curve.

Changes in the Prices of Related Goods

Changes in the prices of related goods such as **substitutes** or **complements** also can affect the demand for a product. A substitute is a good or service that we can use in place of another good or service. As electronic books, like this one, become more available, you would expect to see a decrease in demand for traditional printed books. A lower price for a substitute decreases demand for the other product. For example, in recent years as the price of tablet computers has fallen, the quantity demanded has increased (because of the law of demand). Since people are purchasing tablets, there has been a decrease in demand for laptops, which we can show graphically as a leftward shift in the demand curve for laptops. A higher price for a substitute good has the reverse effect.

Other goods are complements for each other, meaning we often use the goods together, because consumption of one good tends to enhance consumption of the other. Examples include breakfast cereal and milk; notebooks and pens or pencils, golf balls and golf clubs; gasoline and sport utility vehicles; and the five-way combination of bacon, lettuce, tomato, mayonnaise, and bread. If the price of golf clubs rises, since the quantity demanded of golf clubs falls (because of the law of demand), demand for a complement good like golf balls decreases, too. Similarly, a higher price for skis would shift the demand curve for a complement good like ski resort trips to the left, while a lower price for a complement has the reverse effect.

Changes in Expectations about Future Prices or Other Factors that Affect Demand

While it is clear that the price of a good affects the quantity demanded, it is also true that expectations about the future price (or expectations about tastes and preferences, income, and so on) can affect demand. For example, if people hear that a hurricane is coming, they may rush to the store to buy flashlight batteries and bottled water. If people learn that the price of a good like coffee is likely to rise in the future, they may head for the store to stock up on coffee now. We show these changes in demand as shifts in the curve. Therefore, a shift in demand happens when a change in some economic factor (other than price) causes a different quantity to be demanded at every price. The following Work It Out feature shows how this happens.

Work It Out: Shift in Demand

A shift in demand means that at any price (and at every price), the quantity demanded will be different than it was before. Following is an example of a shift in demand due to an income increase.

Step 1. Draw the graph of a demand curve for a normal good like pizza. Pick a price (like P_0). Identify the corresponding Q_0. See an example in Figure 3.6b.

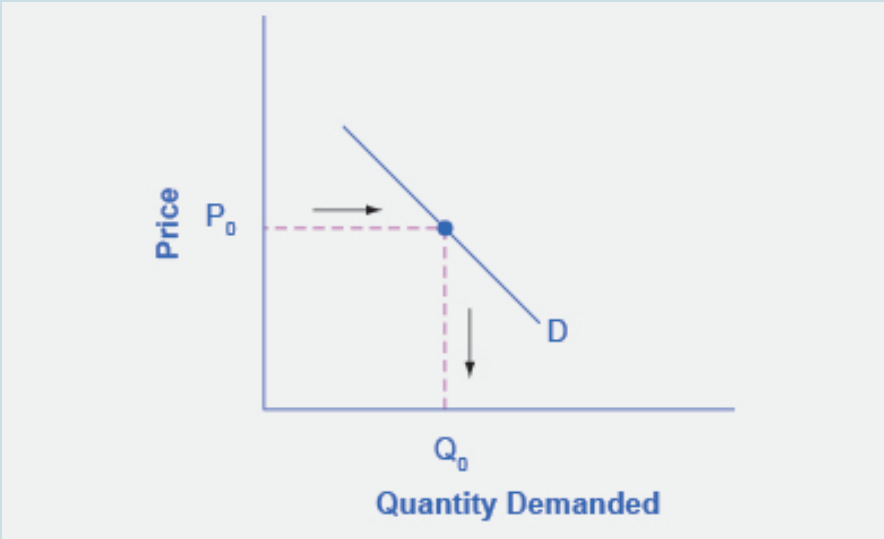

Figure 3.6b Demand Curve. We can use the demand curve to identify how much consumers would buy at any given price. Graph by Steven A. Greenlaw & David Shapiro (OpenStax), licensed under CC BY 4.0.

Figure 3.6b Demand Curve (Text version)

Figure 3.6b Demand Curve represents the directions for step 1. The vertical axis represents Price and the horizontal axis represents Quantity Demand. The point is at (P_0, Q_0) is plotted on the graph an arrow and dotted line denotes Price moving left from the vertical axis to right towards the point (P_0, Q_0) and from that point Quality Demanded is denoted by an arrow and dotted line moving downward towards the horizontal axis forming a square shape. here is a linear demand curve labelled D remains unchanged demand curve slanting downward from left to right through point (P_0, Q_0). Relationship between price and quantity, when price goes down output increases.

Step 2. Suppose income increases. As a result of the change, are consumers going to buy more or less pizza? The answer is more. Draw a dotted horizontal line from the chosen price, through the original quantity demanded, to the new point with the new Q_1. Draw a dotted vertical line down to the horizontal axis and label the new Q_1. Figure 3.6c provides an example.

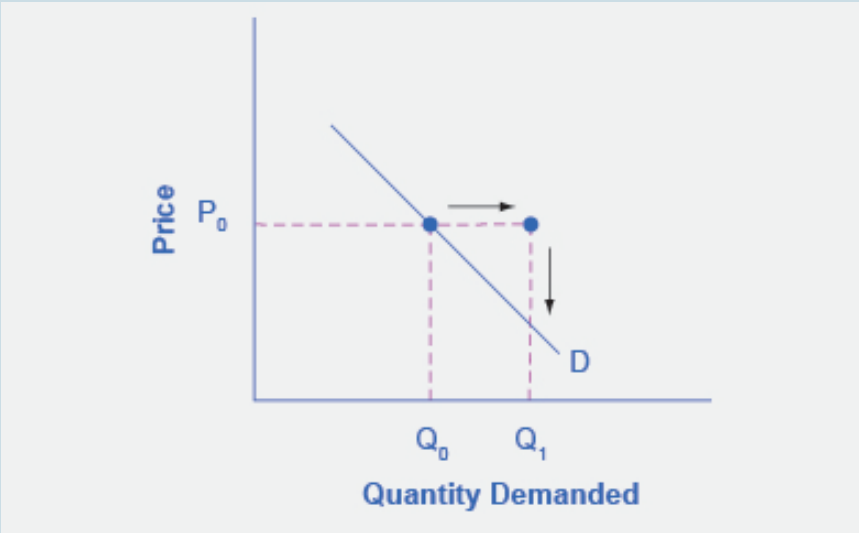

Figure 3.6c Demand Curve with Income Increase. With an increase in income, consumers will purchase larger quantities, pushing demand to the right. Graph by Steven A. Greenlaw & David Shapiro (OpenStax), licensed under CC BY 4.0.

Figure 3.6c Demand Curve with Income Increase (Text version)

Figure 3.6c Demand Curve with Income Increase shows steps 2, based off the original Figure 3.6 Demand Curve. Price increases moving point P_0 to the right and this is denoted by a continuation of the dotted line and an arrow moving left to right. This price increase also shifts Quantity Demanded to the right from Q_0 to Q_1 and is depicted by an arrow pointing from the new point (P_0, Q_1) to the horizontal axis. There is a linear demand curve labelled D remains unchanged – slanting downward from left to right through point (P_0, Q_0), – this will be changed in the following graph**.**

Step 3. Now, shift the curve through the new point. You will see that an increase in income causes an upward (or rightward) shift in the demand curve, so that at any price the quantities demanded will be higher, as Figure 3.6d illustrates.

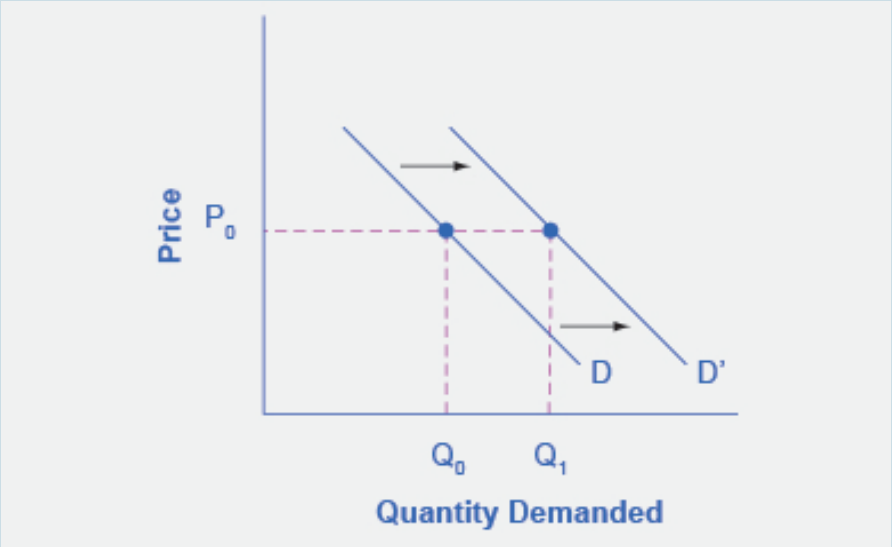

Figure 3.6d Demand Curve Shifted Right. With an increase in income, consumers will purchase larger quantities, pushing demand to the right, and causing the demand curve to shift right. Graph by Steven A. Greenlaw & David Shapiro (OpenStax), licensed under CC BY 4.0.

Figure 3.6d Demand Curve Shifted Right (Text version)

Figure 3.6d Demand Curve Shifted Right represents the directions for step 3. The graph is based off Figure 3.6c Demand Curve with Income Increase but reflects the the rightward shift of the demand curve. The demand curve retains it's linear downward slope from left to right, but shifts from D_0 to D_1 to intersect the new point (P_1, Q_1).

Summing Up Factors That Change Demand

Figure 3.6e summarizes six factors that can shift demand curves. The direction of the arrows indicates whether the demand curve shifts represent an increase in demand or a decrease in demand. Notice that a change in the price of the good or service itself is not listed among the factors that can shift a demand curve. A change in the price of a good or service causes a movement along a specific demand curve, and it typically leads to some change in the quantity demanded, but it does not shift the demand curve.

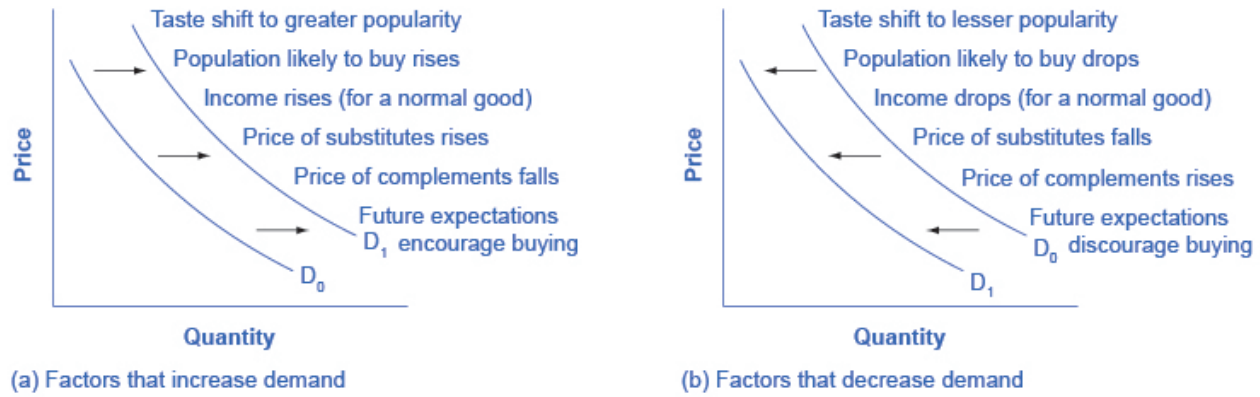

Figure 3.6e Factors That Shift Demand Curves. Graph A: list of factors that can cause an increase in demand from D0 to D1. Graph B: Lists the same factors, if their direction is reversed, can cause a decrease in demand from D0 to D1. Graph by Steven A. Greenlaw & David Shapiro (OpenStax), licensed under CC BY 4.0.

Figure 3.6e Factors That Shift Demand Curves (Text version)

Figure 3.6e Factors That Shift Demand Curves depicts two graphs, Graph A and B. Both graphs have the same vertical and horizontal axes: Price is the vertical axis and Quantity is the horizontal axis. There are two demand curves denoted by D_0 to D_1 and they both run parallel to each other in concave lines that curves downward from left to right. Graph A on the left lists events that could lead to increased demand. Graph B on the right lists events that could lead to decreased demand.

In Graph A: Factors that increase demand shift the demand curve from D_0 to D_1 up and to the right. The factors are: tastes shift to greater popularity, population likely to buy rises, income rises (from a normal good), price of substitutes rises, price of complements falls, future expectations encourage buying.

In Graph B: Factors that decrease demand shifts the demand curve from D_0 to D_1 down and to the left. The factors are: tastes shift to lesser popularity, population likley to buy drops, income drops (from a normal good), price of substitues falls, price of complements rises, future expectations discourage buying.

When a demand curve shifts, it will then intersect with a given supply curve at a different equilibrium price and quantity. We are, however, getting ahead of our story. Before discussing how changes in demand can affect equilibrium price and quantity, we first need to discuss shifts in supply curves.

How Production Costs Affect Supply

A supply curve shows how quantity supplied will change as the price rises and falls, assuming *ceteris paribus* so that no other economically relevant factors are changing. If other factors relevant to supply do change, then

the entire supply curve will shift. Just as we described a shift in demand as a change in the quantity demanded at every price, a **shift in supply** means a change in the quantity supplied at every price.

In thinking about the factors that affect supply, remember what motivates firms: profits, which are the difference between revenues and costs. A firm produces goods and services using combinations of labour, materials, and machinery, or what we call inputs or **factors of production**. If a firm faces lower costs of production, while the prices for the good or service the firm produces remain unchanged, a firm's profits go up. When a firm's profits increase, it is more motivated to produce output, since the more it produces the more profit it will earn. When costs of production fall, a firm will tend to supply a larger quantity at any given price for its output. We can show this by the supply curve shifting to the right.

Take, for example, a messenger company that delivers packages around a city. The company may find that buying gasoline is one of its main costs. If the price of gasoline falls, then the company will find it can deliver messages more cheaply than before. Since lower costs correspond to higher profits, the messenger company may now supply more of its services at any given price. For example, given the lower gasoline prices, the company can now serve a greater area, and increase its supply.

Conversely, if a firm faces higher costs of production, then it will earn lower profits at any given selling price for its products. As a result, a higher cost of production typically causes a firm to supply a smaller quantity at any given price. In this case, the supply curve shifts to the left.

Consider the supply for cars, shown by curve S_0 in Figure 3.6f. Point J indicates that if the price is $20,000, the quantity supplied will be 18 million cars. If the price rises to $22,000 per car, *ceteris paribus,* the quantity supplied will rise to 20 million cars, as point K on the S_0 curve shows. We can show the same information in table form, as in Table 3.6b.

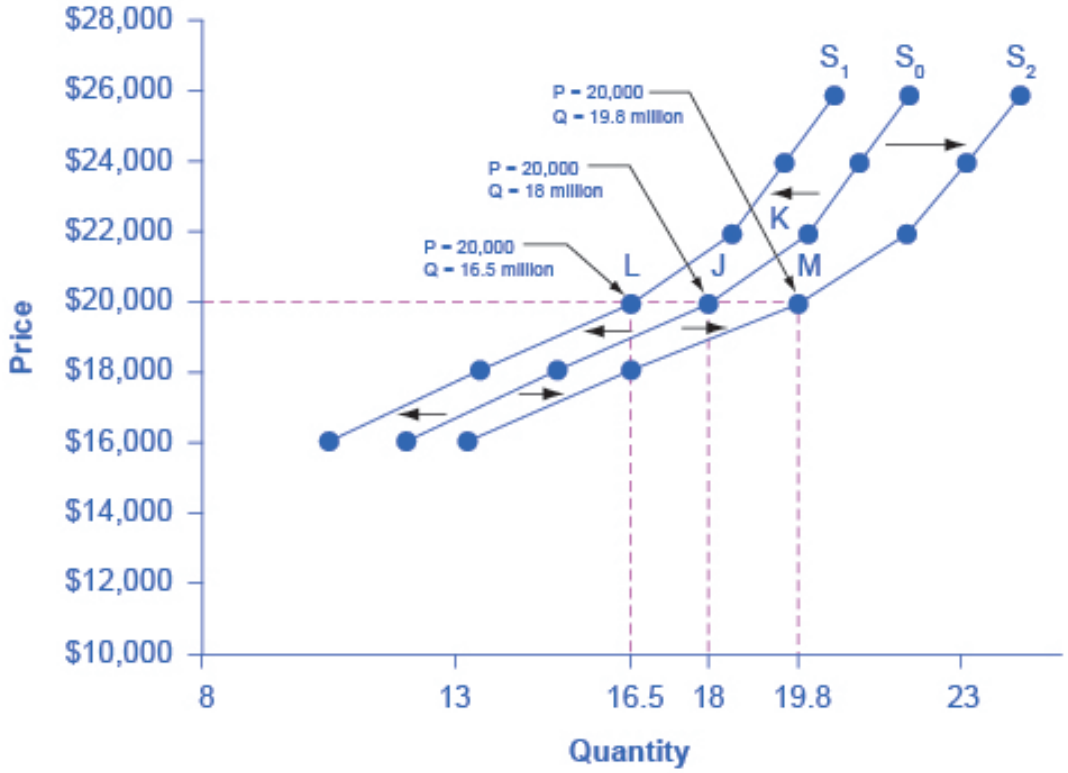

Figure 3.6f Shifts in Supply: A Car Example. Decreased supply means that at every given price, the quantity supplied is lower, so that the supply curve shifts to the left, from S_0 to S_1. Increased supply means that at every given price, the quantity supplied is higher, so that the supply curve shifts to the right, from S_0 to S_1. Graph by Steven A. Greenlaw & David Shapiro (OpenStax), licensed under CC BY 4.0.

Figure 3.6f Shifts in Supply: A Car Example (Text version)

The graphs vertical axis is Price ($) in thousands and the horizontal axis is Quantity in millions. All 3 supply curves slope gradually upwards from left to right. Uses the base price 20,000 to plot points L, J, and M.

The original supply curve supply curve (S_0) is the intersects point J, with a price of $ 20,000, and quantity 18 million.Supply curve S_1 represents a shift based on decreased supply, shifting from S_0 to the left and intersects point L, $ 20,000, and quantity 16.5 million. Supply curve S_2 represents a shift based on increased supply and moves from S_0 to the right to S_2 and intersects point M, $ 20,000, and quantity 19.8 million. (20,000, 19.8). See the table below for data reflected in the graph.

Table 3.6b Price and Shifts in Supply: A Car Example

Price	Decrease to S_1	Original Quantity Supplied S_0	Increase to S_2
$16,000	10.5 million	12.0 million	13.2 million
$18,000	13.5 million	15.0 million	16.5 million
$20,000	16.5 million	18.0 million	19.8 million
$22,000	18.5 million	20.0 million	22.0 million
$24,000	19.5 million	21.0 million	23.1 million
$26,000	20.5 million	22.0 million	24.2 million

Now, imagine that the price of steel, an important ingredient in manufacturing cars, rises, so that producing a car has become more expensive. At any given price for selling cars, car manufacturers will react by supplying a lower quantity. We can show this graphically as a leftward shift of supply, from S_0 to S_1, which indicates that at any given price, the quantity supplied decreases. In this example, at a price of $20,000, the quantity supplied decreases from 18 million on the original supply curve (S_0) to 16.5 million on the supply curve S_1, which is labeled as point L.

Conversely, if the price of steel decreases, producing a car becomes less expensive. At any given price for selling cars, car manufacturers can now expect to earn higher profits, so they will supply a higher quantity. The shift of supply to the right, from S_0 to S_2, means that at all prices, the quantity supplied has increased. In this example, at a price of $20,000, the quantity supplied increases from 18 million on the original supply curve (S_0) to 19.8 million on the supply curve S_2, which is labeled M.

Other Factors That Affect Supply

In the example above, we saw that changes in the prices of inputs in the production process will affect the cost of production and thus the supply. Several other things affect the cost of production, too, such as changes in weather or other natural conditions, new technologies for production, and some government policies.

Changes in weather and climate will affect the cost of production for many agricultural products. For example, in 2014 the Manchurian Plain in Northeastern China, which produces most of the country's wheat, corn, and soybeans, experienced its most severe drought in 50 years. A drought decreases the supply of agricultural products, which means that at any given price, a lower quantity will be supplied. Conversely, especially good weather would shift the supply curve to the right.

When a firm discovers a new technology that allows the firm to produce at a lower cost, the supply curve will shift to the right, as well. For instance, in the 1960s a major scientific effort nicknamed the Green Revolution

focused on breeding improved seeds for basic crops like wheat and rice. By the early 1990s, more than two-thirds of the wheat and rice in low-income countries around the world used these Green Revolution seeds—and the harvest was twice as high per acre. A technological improvement that reduces costs of production will shift supply to the right, so that a greater quantity will be produced at any given price.

Government policies can affect the cost of production and the supply curve through taxes, regulations, and subsidies. For example, the U.S. government imposes a tax on alcoholic beverages that collects about $8 billion per year from producers. Businesses treat taxes as costs. Higher costs decrease supply for the reasons we discussed above. Other examples of policy that can affect cost are the wide array of government regulations that require firms to spend money to provide a cleaner environment or a safer workplace. Complying with regulations increases costs.

A government subsidy, on the other hand, is the opposite of a tax. A subsidy occurs when the government pays a firm directly or reduces the firm's taxes if the firm carries out certain actions. From the firm's perspective, taxes or regulations are an additional cost of production that shifts supply to the left, leading the firm to produce a lower quantity at every given price. Government subsidies reduce the cost of production and increase supply at every given price, shifting supply to the right. The following Work It Out feature shows how this shift happens.

Work It Out: Shift in Supply

We know that a supply curve shows the minimum price a firm will accept to produce a given quantity of output. What happens to the supply curve when the cost of production goes up? Following is an example of a shift in supply due to a production cost increase. The vertical axis is Price and the horizontal axis is Quantity Supplied. The supply curve (S) is linear sloping upwards from left to right.

Step 1. Draw a graph of a supply curve for pizza. Pick a quantity (like Q_0). If you draw a vertical line up from Q_0 to the supply curve, you will see the price the firm chooses (P_0) . Figure 3.6g provides an example.

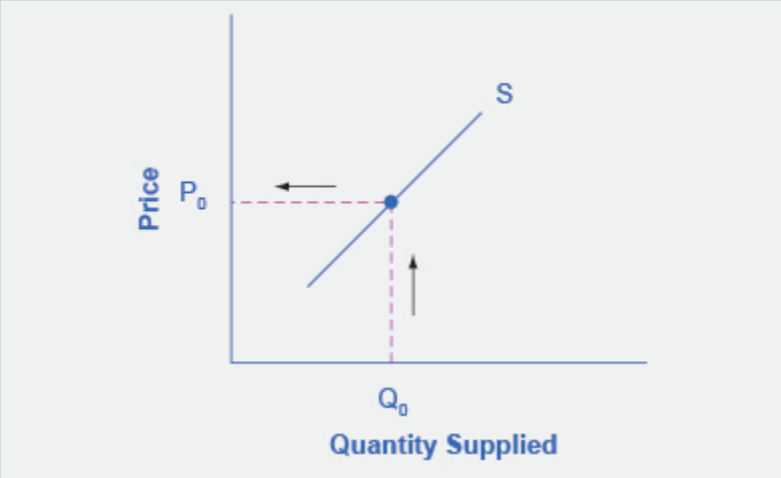

Figure 3.6g Supply Curve. You can use a supply curve to show the minimum price a firm will accept to produce a given quantity of output. Graph by Steven A. Greenlaw & David Shapiro (OpenStax), licensed under CC BY 4.0.

Step 2. Why did the firm choose that price and not some other? One way to think about this is that the price is composed of two parts. The first part is the cost of producing pizzas at the margin; in this case, the cost of producing the pizza, including cost of ingredients (e.g., dough, sauce, cheese, and pepperoni), the cost of the pizza oven, the shop rent, and the workers' wages. The second part is the firm's desired profit, which is determined, among other factors, by the profit margins in that particular business. (Desired profit is not necessarily the same as economic profit.) If you add these two parts together, you get the price the firm wishes to charge. The quantity Q_0 and associated price P_0 give you one point on the firm's supply curve, as Figure 3.6h illustrates.

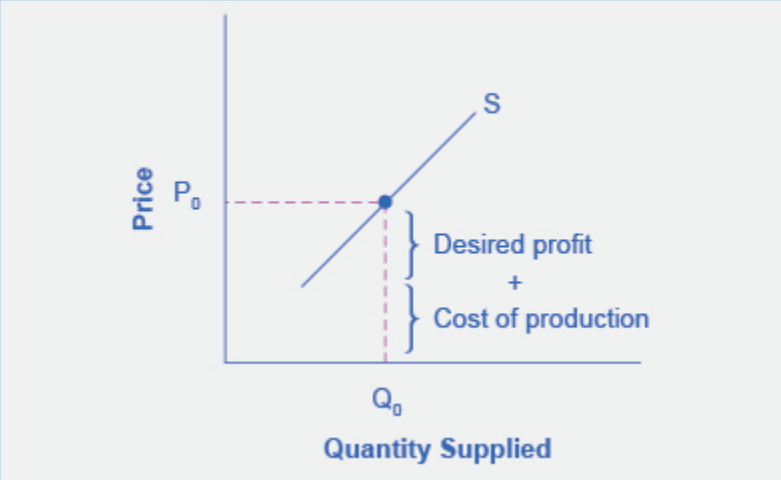

Figure 3.6h Setting Prices. Graph represents the directions for step 2. For a given quantity of output (Q_0), the firm wishes to charge a price (P_0) equal to the cost of production plus the desired profit margin. Setting Prices The cost of production and the desired profit equal the price a firm will set for a product. The supply curve intersects the point (Q_0, P_0). Graph by Steven A. Greenlaw & David Shapiro (OpenStax), licensed under CC BY 4.0.

Step 3. Now, suppose that the cost of production increases. Perhaps cheese has become more expensive by $0.75 per pizza. If that is true, the firm will want to raise its price by the amount of the increase in cost ($0.75). Draw this point on the supply curve directly above the initial point on the curve, but $0.75 higher, as Figure 3.6i shows.

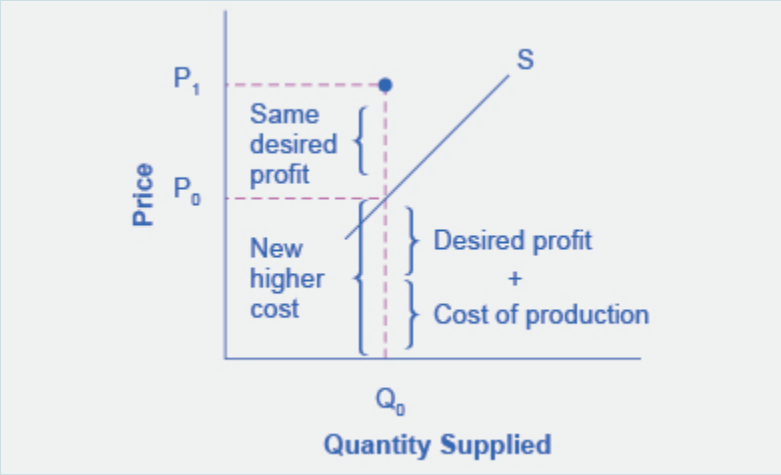

Figure 3.6i Increasing Costs Leads to Increasing Price. Graph by Steven A. Greenlaw & David Shapiro (OpenStax), licensed under CC BY 4.0.

The graph depicts the quantity supplied (Q_0) remaining the same. The original price at P_0 is the new higher cost is equal to the desired profit plus the cost of production. An increasing costs leads to increasing price because the cost of production and the desired profit equal the price a firm will set for a product, if the cost of production increases, the price for the product will also need to increase. Because the cost of production and the desired profit equal the price a firm will set for a product, if the cost of production increases, the price for the product will also need to increase. If the firm would like the same desired profit the price will increase straight upward to P_1.

Step 4. Shift the supply curve through this point. You will see that an increase in cost causes an upward (or a leftward) shift of the supply curve so that at any price, the quantities supplied will be smaller, as Figure 3.6j illustrates.

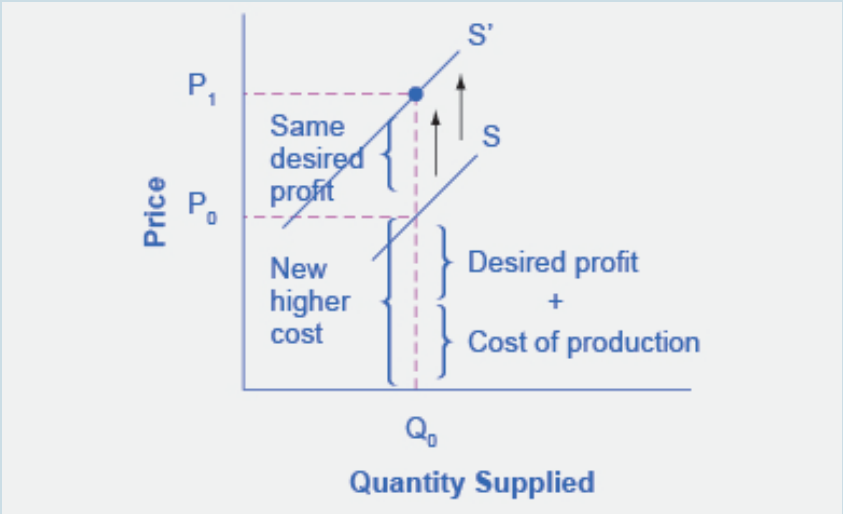

Figure 3.6j Supply Curve Shifts. Supply curve shifts when the cost of production increases, the supply curve shifts upwardly to a new price level. The supply curve has shifted upward from S to S_1 reflecting the change in price from P_0 to P_1. S_1 now intersects the point (Q_0, P_1). Graph by Steven A. Greenlaw & David Shapiro (OpenStax), licensed under CC BY 4.0.

Figure 3.6j supply curve shifts when the cost of production increases, the supply curve shifts upwardly to a new price level. The supply curve has shifted upward from S to S_1 reflecting the change in price from P_0 to P_1. S_1 now intersects the point (Q_0, P_1).

Summing Up Factors That Change Supply

Changes in the cost of inputs, natural disasters, new technologies, and the impact of government decisions all

affect the cost of production. In turn, these factors affect how much firms are willing to supply at any given price.

Figure 3.6k summarizes factors that change the supply of goods and services. Notice that a change in the price of the product itself is not among the factors that shift the supply curve. Although a change in price of a good or service typically causes a change in quantity supplied or a movement along the supply curve for that specific good or service, it does not cause the supply curve itself to shift.

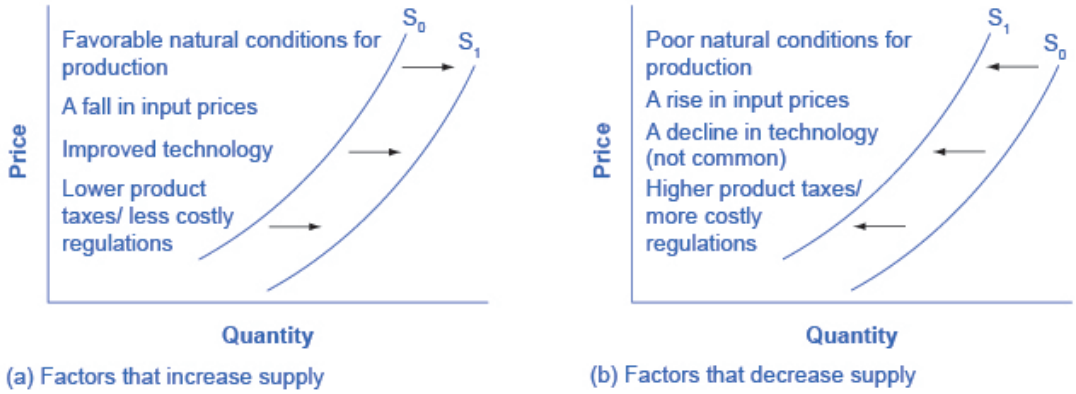

Figure 3.6kFactors That Shift Supply Curves. Graph A lists factors that can cause an increase in supply from S0 to S1. Graph B lists the same factors, and if their direction is reversed, can cause a decrease in supply from S0 to S1. Graph by Steven A. Greenlaw & David Shapiro (OpenStax), licensed under CC BY 4.0.

Figure 3.6k Factors That Shift Supply Curves (Text Version)

Figure 3.6k contains two graphs and both have the same axes: The vertical axis is Price and the horizontal axis is Quantity for both graphs and S_0 is the original supply curve and is the S_1 .Graph A on the left list of factors that can cause an increase in supply shifting S_0 to the right to S_1. The factors that increase supply are:

- Favourable natural conditions for production
- A fall in input prices
- Improved technology
- Lower product taxes/less costly regulations.

Graph B on the right lists the same factors, if their direction is reversed, can cause a decrease in supply shifting S_0 to the left to S_1. The factors that decrease supply are:

- Poor natural conditions for production
- A rise in input prices
- A decline in technology (not common)
- Higher product taxes/more costly regulations.

Because demand and supply curves appear on a two-dimensional diagram with only price and quantity on the axes, an unwary visitor to the land of economics might be fooled into believing that economics is about only four topics: demand, supply, price, and quantity. However, demand and supply are really "umbrella" concepts: demand covers all the factors that affect demand, and supply covers all the factors that affect supply. We include factors other than price that affect demand and supply are included by using shifts in the demand or the supply curve. In this way, the two-dimensional demand and supply model becomes a powerful tool for analyzing a wide range of economic circumstances.

Key Concepts and Summary

Economists often use the *ceteris paribus* or "other things being equal" assumption: while examining the economic impact of one event, all other factors remain unchanged for analysis purposes. Factors that can shift the demand curve for goods and services, causing a different quantity to be demanded at any given price, include changes in tastes, population, income, prices of substitute or complement goods, and expectations about future conditions and prices. Factors that can shift the supply curve for goods and services, causing a different quantity to be supplied at any given price, include input prices, natural conditions, changes in technology, and government taxes, regulations, or subsidies.

Attribution

Except where otherwise noted, this chapter is adapted from "Shifts in Demand and Supply for Goods and Services (https://openstax.org/books/principles-microeconomics-2e/pages/3-2-shifts-in-demand-and-supply-for-goods-and-services)" and "Key Concepts and Summary" In *Principles of Economics 2e (https://openstax.org/details/books/principles-economics-2e)* (OpenStax) by Steven A. Greenlaw & David Shapiro, licensed under CC BY 4.0./ Addition of key concepts and summary.

Access for free at https://openstax.org/books/principles-microeconomics-2e/pages/1-introduction

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3.7 - CHANGES IN EQUILIBRIUM PRICE AND QUANTITY: THE FOUR-STEP PROCESS

Learning Objectives

- Identify equilibrium price and quantity through the four-step process
- Graph equilibrium price and quantity
- Contrast shifts of demand or supply and movements along a demand or supply curve
- Graph demand and supply curves, including equilibrium price and quantity, based on real-world examples

Let's begin this discussion with a single economic event. It might be an event that affects demand, like a change in income, population, tastes, prices of substitutes or complements, or expectations about future prices. It might be an event that affects supply, like a change in natural conditions, input prices, or technology, or government policies that affect production. How does this economic event affect equilibrium price and quantity? We will analyze this question using a four-step process.

Step 1. Draw a demand and supply model before the economic change took place. To establish the model requires four standard pieces of information: The law of demand, which tells us the slope of the demand curve; the law of supply, which gives us the slope of the supply curve; the shift variables for demand; and the shift variables for supply. From this model, find the initial equilibrium values for price and quantity.

Step 2. Decide whether the economic change you are analyzing affects demand or supply. In other words, does the event refer to something in the list of demand factors or supply factors?

Step 3. Decide whether the effect on demand or supply causes the curve to shift to the right or to the left, and sketch the new demand or supply curve on the diagram. In other words, does the event increase or decrease the amount consumers want to buy or producers want to sell?

Step 4. Identify the new equilibrium and then compare the original equilibrium price and quantity to the new equilibrium price and quantity.

Let's consider one example that involves a shift in supply and one that involves a shift in demand. Then we will consider an example where both supply and demand shift.

Good Weather for Salmon Fishing

Supposed that during the summer of 2015, weather conditions were excellent for commercial salmon fishing off the California coast. Heavy rains meant higher than normal levels of water in the rivers, which helps the salmon to breed. Slightly cooler ocean temperatures stimulated the growth of plankton, the microscopic organisms at the bottom of the ocean food chain, providing everything in the ocean with a hearty food supply. The ocean stayed calm during fishing season, so commercial fishing operations did not lose many days to bad weather. How did these climate conditions affect the quantity and price of salmon? Figure 3.7a illustrates the four-step approach, which we explain below, to work through this problem. Table 3.7a also provides the information to work the problem.

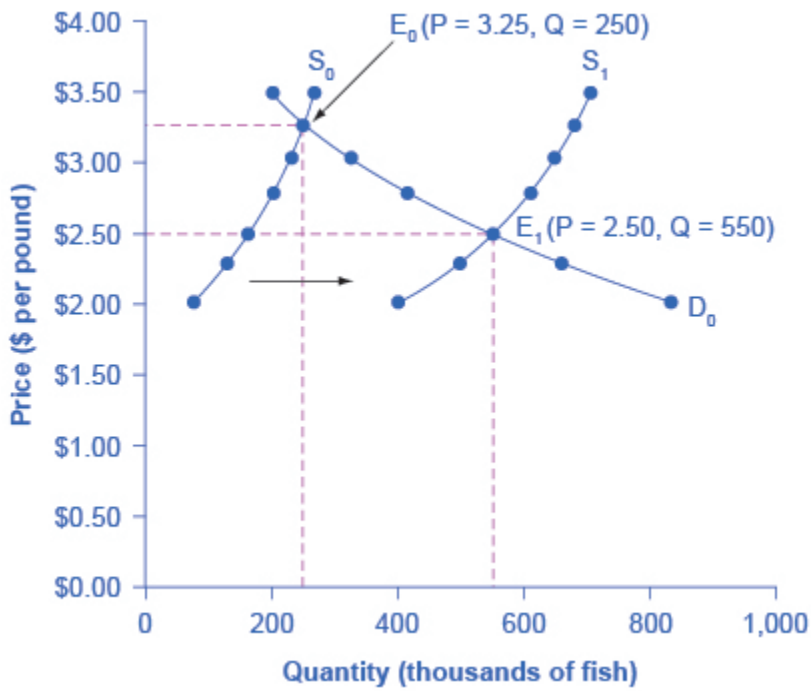

Figure 3.7a Good Weather for Salmon Fishing: The Four-Step Process. The graph represents the four-step approach to determining shifts in the new equilibrium price and quantity in response to good weather for salmon fishing. Figure by Steven A. Greenlaw & David Shapiro (OpenStax), licensed under CC BY 4.0.

Figure 3.7a Good Weather for Salmon Fishing: The Four-Step Process (Text Version)

The graph represents the four-step approach to determining shifts in the new equilibrium price and quantity in response to good weather for salmon fishing.
The vertical axis is Price ($ Per Pound) ranging from $0 to $4 increasing by $0.50 increments and the horizontal axis is Quantity (thousands of fish) increasing by increments of 200.
The original supply curve (S_0) is slightly bowed curve sloping upwards from left to right. The new supply curve (S_1) shifts to the right and is a convex curve sloping upwards from left to right.
Point E_0 occurs along S_0 at ($3.25 per pound, 250 thousand fish) and E1 occurs along the S_1 at ($2.50 per pound, 550 thousand fish). The demand curve (D_0) slopes downward left to right intersecting both E_0 and E_1.
The original supply curve uses data points from Quantity Supplied in 2014, the new supply curve uses data points from Quantity Supplied in 2015, and the demand curve (D_0) uses data points from Quantity demand.

Table 3.7a Salmon Fishing

Price per Pound ($)	Quantity Supplied in 2014	Quantity Supplied in 2015	Quantity Demanded
2.00	80	400	840
2.25	120	480	680
2.50	160	550	550
2.75	200	600	450
3.00	230	640	350
3.25	250	670	250
3.50	270	700	200

Step 1. Draw a demand and supply model to illustrate the market for salmon in the year before the good weather conditions began. The demand curve D_0 and the supply curve S_0 show that the original equilibrium price is $3.25 per pound and the original equilibrium quantity is 250,000 fish. (This price per pound is what commercial buyers pay at the fishing docks. What consumers pay at the grocery is higher.)

Step 2. Did the economic event affect supply or demand? Good weather is an example of a natural condition that affects supply.

Step 3. Was the effect on supply an increase or a decrease? Good weather is a change in natural conditions that increases the quantity supplied at any given price. The supply curve shifts to the right, moving from the original supply curve S_0 to the new supply curve S_1, which Figure 3.7a and Table 3.7a show.

Step 4. Compare the new equilibrium price and quantity to the original equilibrium. At the new equilibrium E_1, the equilibrium price falls from $3.25 to $2.50, but the equilibrium quantity increases from 250,000 to 550,000 salmon. Notice that the equilibrium quantity demanded increased, even though the demand curve did not move.

In short, good weather conditions increased supply of the California commercial salmon. The result was a higher equilibrium quantity of salmon bought and sold in the market at a lower price.

Newspapers and the Internet

According to the Pew Research Center for People and the Press, increasingly more people, especially younger people, are obtaining their news from online and digital sources. The majority of U.S. adults now own smartphones or tablets, and most of those Americans say they use them in part to access the news. From 2004 to 2012, the share of Americans who reported obtaining their news from digital sources increased from 24% to 39%. How has this affected consumption of print news media, and radio and television news? Figure 3.7b and the text below illustrates using the four-step analysis to answer this question.

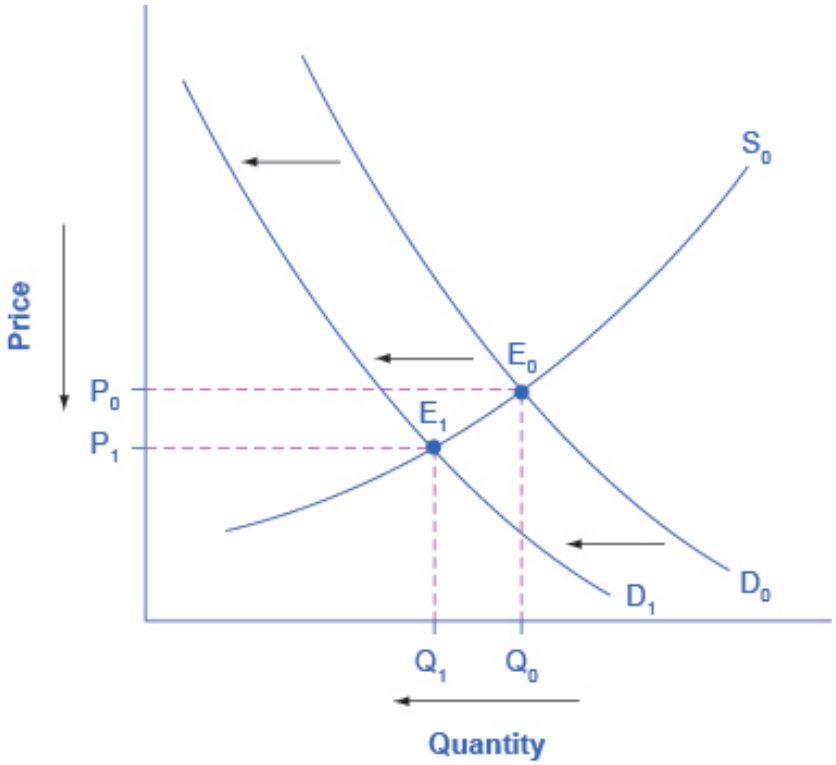

Figure 3.7b The Print News Market: A Four-Step Analysis.
Figure by Steven A. Greenlaw & David Shapiro (OpenStax), licensed under CC BY 4.0.

Figure 3.7b The Print News Market: A Four-Step Analysis (Text Version)

The vertical axis is Price and has a downward facing arrow next to it showing an increase in price. The horizontal axis is Quantity and it has an arrow facing left to show a decrease in quantity. The supply curve (S_0) is concave and slopes upward left to right. The original demand curve (D_0) is concave and slopes upward from right to left and intersects the centre of S_0 at Point E_0 (Q_0, P_0). Arrows pointing from right to left between D_0 and D_2 show the shift in demand curve. The original demand curve (D_0) shifts to the left to the new demand curve (D_1). D_1 now intersects with S_0 at E_2 at point (Q_2, P_2) with P0 shifting downward to P_2 and Q_0 shifting to the left from Q_0 to Q_2.
Figure 3.17 depicts the approach to determining changes in equilibrium price and quantity of print news. The graph shows a change in tastes from print news sources to digital sources results in a leftward shift in demand for the former. The result is a decrease in both equilibrium price and quantity.

Step 1. Develop a demand and supply model to think about what the market looked like before the event. Price is on the vertical axis and quantity is on the horizontal axis. The original quanity is Q_0 and the original price is P_0. The demand curve D_0 and the supply curve S_0 shows the original relationships. In this case, we perform the analysis without specific numbers on the price and quantity axis. The supply curve S_0 is concave trending upward from left to right. The demand curve D_0 is concave trending downward from left to right and intersects with the supply curve at E_0 equilibrium price occuring at (Q_0, P_0).

Step 2. Did the described change affect supply or demand? A change in tastes, from traditional news sources (print, radio, and television) to digital sources, caused a change in demand for the former.

Step 3. Was the effect on demand positive or negative? A shift to digital news sources will tend to mean a lower quantity demanded of traditional news sources at every given price, causing the demand curve for print and other traditional news sources to shift to the left, from D_0 to D_1. The supply curve S_0 remains the same. Quanity is lower, shifting left to Q_1, and price is also lower shifting downward to P_1 and is at the point where the new demand curve D_1 instersects with supply curve S_0 equilibrium price is now E_1.

Step 4. Compare the new equilibrium price and quantity (E_1) to the original equilibrium price (E_0). The new equilibrium (E_1) occurs at a lower quantity and a lower price than the original equilibrium (E_0).

The decline in print news reading predates 2004. Print newspaper circulation peaked in 1973 and has declined since then due to competition from television and radio news. In 1991, 55% of Americans indicated they received their news from print sources, while only 29% did so in 2012. Radio news has followed a similar path in recent decades, with the share of Americans obtaining their news from radio declining from 54% in 1991 to 33% in 2012. Television news has held its own over the last 15 years, with a market share staying in the mid to upper fifties. What does this suggest for the future, given that two-thirds of Americans under 30 years old say they do not obtain their news from television at all?

The Interconnections and Speed of Adjustment in Real Markets

In the real world, many factors that affect demand and supply can change all at once. For example, the demand for cars might increase because of rising incomes and population, and it might decrease because of rising gasoline prices (a complementary good). Likewise, the supply of cars might increase because of innovative new technologies that reduce the cost of car production, and it might decrease as a result of new government regulations requiring the installation of costly pollution-control technology.

Moreover, rising incomes and population or changes in gasoline prices will affect many markets, not just cars. How can an economist sort out all these interconnected events? The answer lies in the *ceteris paribus* assumption. Look at how each economic event affects each market, one event at a time, holding all else constant. Then combine the analyses to see the net effect.

A Combined Example

The U.S. Postal Service is facing difficult challenges. Compensation for postal workers tends to increase most years due to cost-of-living increases. At the same time, increasingly more people are using email, text, and other digital message forms such as Facebook and Twitter to communicate with friends and others. What does this suggest about the continued viability of the Postal Service? Figure 3.7c and the text below illustrate this using the four-step analysis to answer this question.

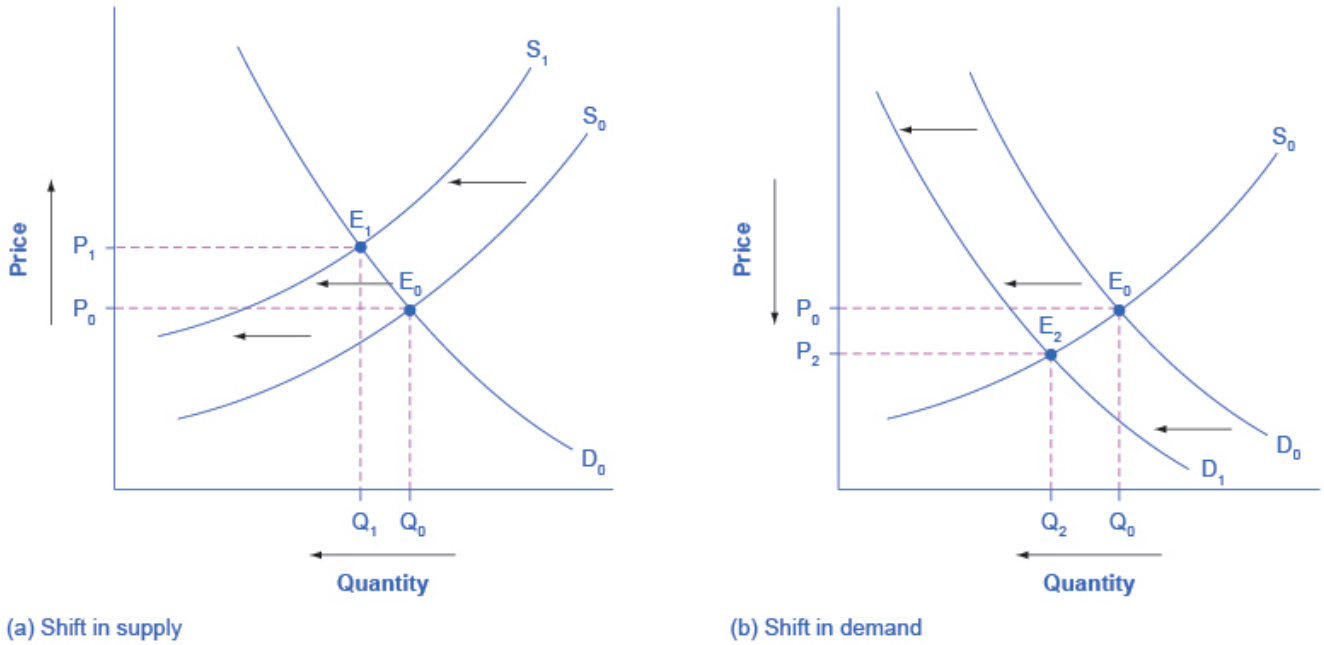

Figure 3.7c Higher Compensation for Postal Workers: A Four-Step Analysis. Figure by Steven A. Greenlaw & David Shapiro (OpenStax), licensed under CC BY 4.0.

Figure 3.7c Higher Compensation for Postal Workers: A Four-Step Analysis (Text Version)

There are two graphs: Graph A depicts the shift in supply and Graph B depicts the shift in demand.
Graph A: The vertical axis is Price and has an upward facing arrow next to it showing an increase in price. The horizontal axis is Quantity and it has an arrow facing left to show a decrease in quantity. The original supply curve (S_0) is concave and slopes upward left to right. Point E_0 (Q_0, P_0) occurs along S_0. The new supply curve (S_1) shifts to the left running parallel toS_0. Occurring along S_1, Point E_1 occurs at (Q_1, P_1) quantity has shifted left from Q_0 to Q_1 and P_0. Arrows pointing from right to left between S_0 and S_1 show the shift in supply curve. The demand curve (D_0) is concave and slopes upward from right to left and intersects the centre of both supply curves S_0 and S_1.
Graph B: The vertical axis is Price and has a downward facing arrow next to it showing an decrease in price. The horizontal axis is Quantity and it has an arrow facing left to show a decrease in quantity. The supply curve (S_0) is concave and slopes upward left to right. The original demand curve (D_0) is concave and slopes upward from right to left and intersects the centre of S_0 at Point E_0 (Q_0, P_0). Arrows pointing from right to left between D_0 and D2 show the shift in demand curve. The original demand curve (D_0) shifts to the left to the new demand curve (D_1). D_1 now intersects with S_0 at E_2 at point (Q2, P2) with P_0 shifting downward to P_2 and Q_0 shifting to the left from Q_0 to Q_2.

Figure 3.7c Higher Compensation for Postal Workers: A Four-Step Analysis (a) Higher labour compensation causes a leftward shift in the supply curve, a decrease in the equilibrium quantity, and an increase in the

equilibrium price. (b) A change in tastes away from Postal Services causes a leftward shift in the demand curve, a decrease in the equilibrium quantity, and a decrease in the equilibrium price.

Since this problem involves two disturbances, we need two four-step analyses, the first to analyze the effects of higher compensation for postal workers, the second to analyze the effects of many people switching from "snail mail" to email and other digital messages.

Figure 3.7c (a) shows the shift in supply discussed in the following steps.

Step 1. Draw a demand and supply model to illustrate what the market for the U.S. Postal Service looked like before this scenario starts. The demand curve D_0 and the supply curve S_0 show the original relationships.

Step 2. Did the described change affect supply or demand? Labour compensation is a cost of production. A change in production costs caused a change in supply for the Postal Service.

Step 3. Was the effect on supply positive or negative? Higher labour compensation leads to a lower quantity supplied of postal services at every given price, causing the supply curve for postal services to shift to the left, from S_0 to S_1.

Step 4. Compare the new equilibrium price and quantity to the original equilibrium price. The new equilibrium (E_1) occurs at a lower quantity and a higher price than the original equilibrium (E_0).

Figure 3.7c (b) shows the shift in demand in the following steps.

Step 1. Draw a demand and supply model to illustrate what the market for U.S. Postal Services looked like before this scenario starts. The demand curve D_0 and the supply curve S_0 show the original relationships. Note that this diagram is independent from the diagram in panel (a).

Step 2. Did the change described affect supply or demand? A change in tastes away from snail mail toward digital messages will cause a change in demand for the Postal Service.

Step 3. Was the effect on demand positive or negative? A change in tastes away from snailmail toward digital messages causes lower quantity demanded of postal services at every given price, causing the demand curve for postal services to shift to the left, from D_0 to D_1.

Step 4. Compare the new equilibrium price and quantity to the original equilibrium price. The new equilibrium (E_2) occurs at a lower quantity and a lower price than the original equilibrium (E_0).

The final step in a scenario where both supply and demand shift is to combine the two individual analyses to determine what happens to the equilibrium quantity and price. Graphically, we superimpose the previous two diagrams one on top of the other, as in Figure 3.7d.

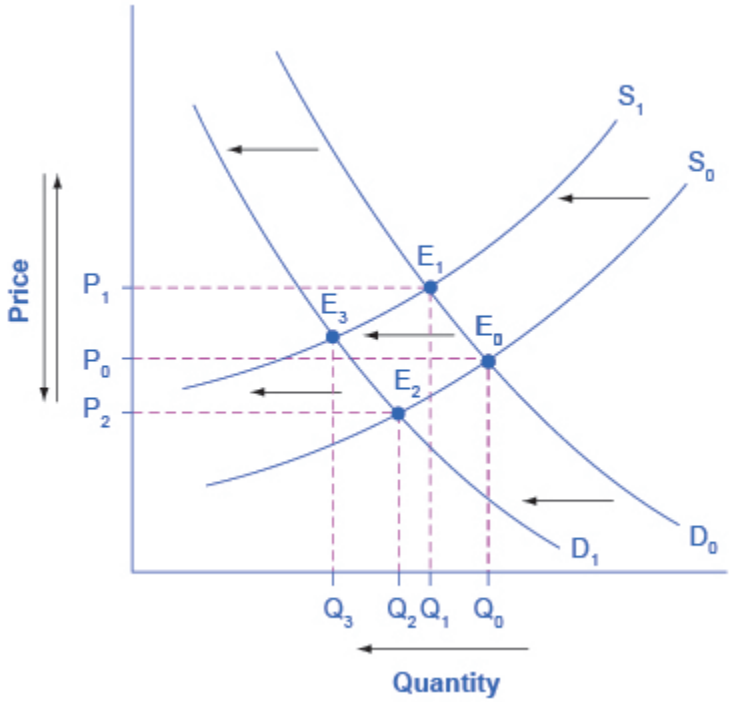

Figure 3.7d Combined Effect of Decreased Demand and Decreased Supply. Figure by Steven A. Greenlaw & David Shapiro (OpenStax), licensed under CC BY 4.0.

Figure 3.7d Combined Effect of Decreased Demand and Decreased Supply (Text Version)

The vertical axis is Price and the horizontal axis is Quantity. The original supply curve (S0) slopes upward from left to right. The original demand curve (D0) slopes downward from left to right.

Where the original supply curve (S0) and original demand curve (D0) intersects is the original equilibrium at point P0 Q0.

Effect on Quantity: The effect of higher labour compensation on Postal Services because it raises the cost of production is to decrease the equilibrium quantity. Both the demand and supply curve shift: D0 shifts to the left to D1 and S0 shifts to the left to S1. The decrease in the equilibrium quantity of Postal Services (Q3) results in a new equilibrium (E3), which occurs where S1 and D1 intersect.

Effect on Price: There are different factors that can affect the price equilibrium:

The effect of higher labour compensation on Postal Services, because it raises the cost of production, is to increase the equilibrium price. Quantity decreases and S0 shifts to the left to Q1; however, D0 remains the same. S1 and D0 intersect at the new equilibrium E1 at P1, Q1.

The effect of a change in tastes away from snail mail is to decrease the equilibrium price. Quantity decreases and D0 shifts to the left to Q2; however, S0 remains the same. D1 and S0 intersect at the new equilibrium E2 at P2, Q2.

Following are the results:

Effect on Quantity: The effect of higher labour compensation on Postal Services because it raises the cost of production is to decrease the equilibrium quantity. The effect of a change in tastes away from snail mail is to decrease the equilibrium quantity. Since both shifts are to the left, the overall impact is a decrease in the equilibrium quantity of Postal Services (Q_3). This is easy to see graphically, since Q_3 is to the left of Q_0.

Effect on Price: The overall effect on price is more complicated. The effect of higher labour compensation on Postal Services, because it raises the cost of production, is to increase the equilibrium price. The effect of a change in tastes away from snail mail is to decrease the equilibrium price. Since the two effects are in opposite directions, unless we know the magnitudes of the two effects, the overall effect is unclear. This is not unusual. When both curves shift, typically we can determine the overall effect on price or on quantity, but not on both. In this case, we determined the overall effect on the equilibrium quantity, but not on the equilibrium price. In other cases, it might be the opposite.

The next Clear It Up feature focuses on the difference between shifts of supply or demand and movements along a curve.

Clear It Up

What is the difference between shifts of demand or supply versus movements along a demand or supply curve?

One common mistake in applying the demand and supply framework is to confuse the shift of a demand or a supply curve with movement along a demand or supply curve. As an example, consider a problem that asks whether a drought will increase or decrease the equilibrium quantity and equilibrium price of wheat. Lee, a student in an introductory economics class, might reason:

"Well, it is clear that a drought reduces supply, so I will shift back the supply curve, as in the shift from the original supply curve S_0 to S_1 on the diagram (Shift 1). The equilibrium moves from E_0 to E_1, the equilibrium quantity is lower and the equilibrium price is higher. Then, a higher price makes farmers more likely to supply the good, so the supply curve shifts right, as shows the shift from S_1 to S_2, shows on the diagram (Shift 2), so that the equilibrium now moves from E_1 to E_2. The higher price, however,

also reduces demand and so causes demand to shift back, like the shift from the original demand curve, D_0 to D_1 on the diagram (labeled Shift 3), and the equilibrium moves from E_2 to E_3."

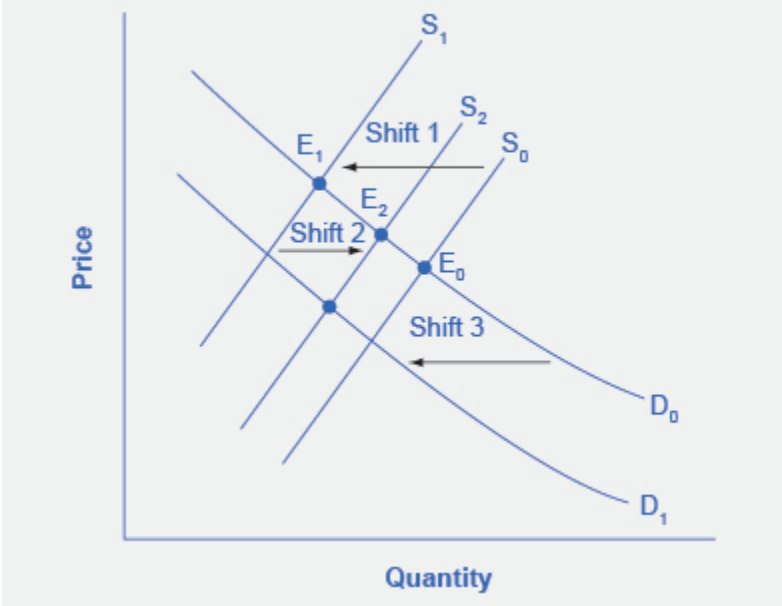

Figure 3.7e Shifts of Demand or Supply versus Movements along a Demand or Supply Curve. A shift in one curve never causes a shift in the other curve. Rather, a shift in one curve causes a movement along the second curve. Figure by Steven A. Greenlaw & David Shapiro (OpenStax), licensed under CC BY 4.0.

Figure 3.7e Shifts of Demand or Supply versus Movements along a Demand or Supply Curve (Text Version)

The vertical axis is Price and the horizontal axis is Quantity. The original supply curve (S_0) is linear sloping upwards from left to right in the middle of the graph. The original demand curve (D_0) is slightly curved sloping downward from left to right and intersects with S_0 at Point E_0, the original equilibrium.

Shift 1: S_0 shifts furthest to the left to S_1; E0 also shifts to the left where S_1 and D_0 intersect, denoted by Point E_1.

Shift 2: S_1 then shifts slightly back to the right becoming S_2; E_1 also shifts to the right to where S_2 and D_0 intersect, denoted by Point E_2.

Shift 3: D_0 shifts to D_1 shifts to the left; E_2 shifts downward to a new point of equilibrium at S_2 and D_1.

At about this point, Lee suspects that this answer is headed down the wrong path. Think about what might be wrong with Lee's logic, and then read the answer that follows.

Answer: Lee's first step is correct: that is, a drought shifts back the supply curve of wheat and leads to

a prediction of a lower equilibrium quantity and a higher equilibrium price. This corresponds to a movement along the original demand curve (D_0), from E_0 to E_1. The rest of Lee's argument is wrong, because it mixes up shifts in supply with quantity supplied, and shifts in demand with quantity demanded. A higher or lower price never shifts the supply curve, as suggested by the shift in supply from S_1 to S_2. Instead, a price change leads to a movement along a given supply curve. Similarly, a higher or lower price never shifts a demand curve, as suggested in the shift from D_0 to D_1. Instead, a price change leads to a movement along a given demand curve. Remember, a change in the price of a good never causes the demand or supply curve for that good to shift.

Think carefully about the timeline of events: What happens first, what happens next? What is cause, what is effect? If you keep the order right, you are more likely to get the analysis correct.

In the four-step analysis of how economic events affect equilibrium price and quantity, the movement from the old to the new equilibrium seems immediate. As a practical matter, however, prices and quantities often do not zoom straight to equilibrium. More realistically, when an economic event causes demand or supply to shift, prices and quantities set off in the general direction of equilibrium. Even as they are moving toward one new equilibrium, a subsequent change in demand or supply often pushes prices toward another equilibrium.

Key Concepts and Summary

When using the supply and demand framework to think about how an event will affect the equilibrium price and quantity, proceed through four steps:

1. sketch a supply and demand diagram to think about what the market looked like before the event
2. decide whether the event will affect supply or demand
3. decide whether the effect on supply or demand is negative or positive, and draw the appropriate shifted supply or demand curve
4. compare the new equilibrium price and quantity to the original ones.

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3.8 - DEMAND, SUPPLY, AND EFFICIENCY

Learning Objectives

- Contrast consumer surplus, producer surplus, and social surplus
- Explain why price floors and price ceilings can be inefficient
- Analyze demand and supply as a social adjustment mechanism

The familiar demand and supply diagram holds within it the concept of economic efficiency. One typical way that economists define efficiency is when it is impossible to improve the situation of one party without imposing a cost on another. Conversely, if a situation is inefficient, it becomes possible to benefit at least one party without imposing costs on others.

Efficiency in the demand and supply model has the same basic meaning: The economy is getting as much benefit as possible from its scarce resources and all the possible gains from trade have been achieved. In other words, the optimal amount of each good and service is produced and consumed.

Consumer Surplus, Producer Surplus, Social Surplus

Consider a market for tablet computers, as Figure 3.8a shows. The equilibrium price is $80 and the equilibrium quantity is 28 million. To see the benefits to consumers, look at the segment of the demand curve above the equilibrium point and to the left. This portion of the demand curve shows that at least some demanders would have been willing to pay more than $80 for a tablet.

For example, point J shows that if the price were $90, 20 million tablets would be sold. Those consumers who would have been willing to pay $90 for a tablet based on the utility they expect to receive from it, but who were able to pay the equilibrium price of $80, clearly received a benefit beyond what they had to pay. Remember, the demand curve traces consumers' willingness to pay for different quantities. The amount that

individuals would have been willing to pay, minus the amount that they actually paid, is called **consumer surplus**. Consumer surplus is the area labeled F—that is, the area above the market price and below the demand curve.

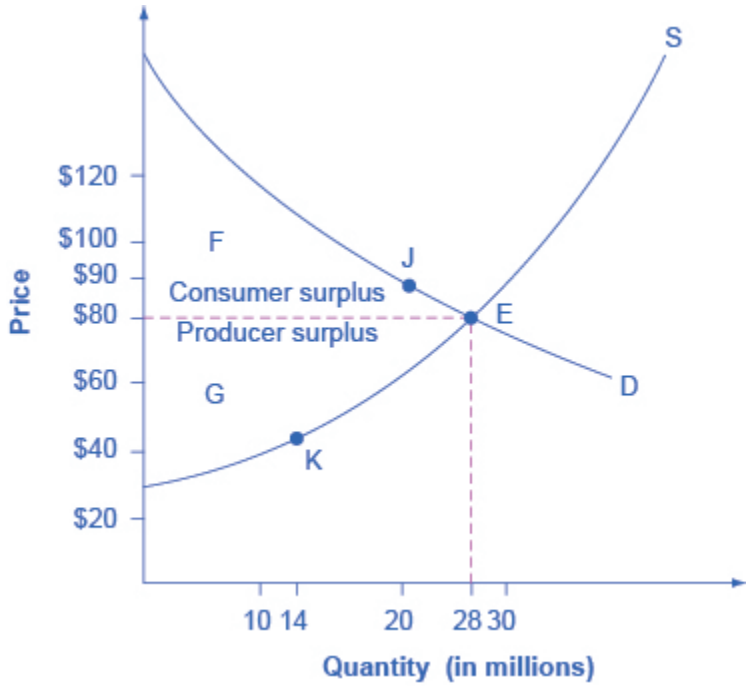

Figure 3.8a Consumer and Producer Surplus. Figure by Steven A. Greenlaw & David Shapiro (OpenStax), licensed under CC BY 4.0.

Figure 3.8a Consumer and Producer Surplus (Text Version)

The vertical axis is Price ($) in $20 increments and the horizontal axis is Quantity (in millions) in increments of 2. Supply curve (S) is curved sloping from left to right. The demand curve (D) is curved and slopes downward left to right. The Supply curve (S) and demand curve (D) intersects at Point E (28 million quantity, $80).
The dotted line running from Point E to the vertical axis price at $80 denotes the space for consumer surplus (F) and Producer surplus (G). Consumer surplus (F) occurs the left of point E above $80 and below the where the demand curve (D) slopes downward. Producer surplus (G) occurs the left of point E below $80 and above the where the supply curve (D) slopes upwards.
Point K (14 million quantity, $45) occurs earlier in the supply curve (S).
Point J (20 million quantity, $90) occurs along the demand curve (D).

Figure 3.23 Consumer and **Producer Surplus** The somewhat triangular area labeled by F shows the area of consumer surplus, which shows that the equilibrium price in the market was less than what many of the consumers were willing to pay. Point J on the demand curve shows that, even at the price of $90, consumers

would have been willing to purchase a quantity of 20 million. The somewhat triangular area labeled by G shows the area of producer surplus, which shows that the equilibrium price received in the market was more than what many of the producers were willing to accept for their products. For example, point K on the supply curve shows that at a price of $45, firms would have been willing to supply a quantity of 14 million.

The supply curve shows the quantity that firms are willing to supply at each price. For example, point K in Figure 3.8a illustrates that, at $45, firms would still have been willing to supply a quantity of 14 million. Those producers who would have been willing to supply the tablets at $45, but who were instead able to charge the equilibrium price of $80, clearly received an extra benefit beyond what they required to supply the product. The extra benefit producers receive from selling a good or service, measured by the price the producer actually received minus the price the producer would have been willing to accept is called producer surplus. In Figure 3.8a, producer surplus is the area labeled G—that is, the area between the market price and the segment of the supply curve below the equilibrium.

The sum of consumer surplus and producer surplus is **social surplus**, also referred to as **economic surplus** or **total surplus**. In Figure 3.8a we show social surplus as the area F + G. Social surplus is larger at equilibrium quantity and price than it would be at any other quantity. This demonstrates the economic efficiency of the market equilibrium. In addition, at the efficient level of output, it is impossible to produce greater consumer surplus without reducing producer surplus, and it is impossible to produce greater producer surplus without reducing consumer surplus.

Inefficiency of Price Floors and Price Ceilings

The imposition of a price floor or a price ceiling will prevent a market from adjusting to its equilibrium price and quantity, and thus will create an inefficient outcome. However, there is an additional twist here. Along with creating inefficiency, price floors and ceilings will also transfer some consumer surplus to producers, or some producer surplus to consumers.

Imagine that several firms develop a promising but expensive new drug for treating back pain. If this therapy is left to the market, the equilibrium price will be $600 per month and 20,000 people will use the drug, as shown in Figure 3.8b (a). The original level of consumer surplus is T + U and producer surplus is V + W + X. However, the government decides to impose a price ceiling of $400 to make the drug more affordable. At this price ceiling, firms in the market now produce only 15,000.

As a result, two changes occur. First, an inefficient outcome occurs and the total surplus of society is reduced. The loss in social surplus that occurs when the economy produces at an inefficient quantity is called **deadweight loss**. In a very real sense, it is like money thrown away that benefits no one. In Figure 3.8b (a), the deadweight loss is the area U + W. When deadweight loss exists, it is possible for both consumer and

producer surplus to be higher, in this case because the price control is blocking some suppliers and demanders from transactions they would both be willing to make.

A second change from the price ceiling is that some of the producer surplus is transferred to consumers. After the price ceiling is imposed, the new consumer surplus is T + V, while the new producer surplus is X. In other words, the price ceiling transfers the area of surplus (V) from producers to consumers. Note that the gain to consumers is less than the loss to producers, which is just another way of seeing the deadweight loss.

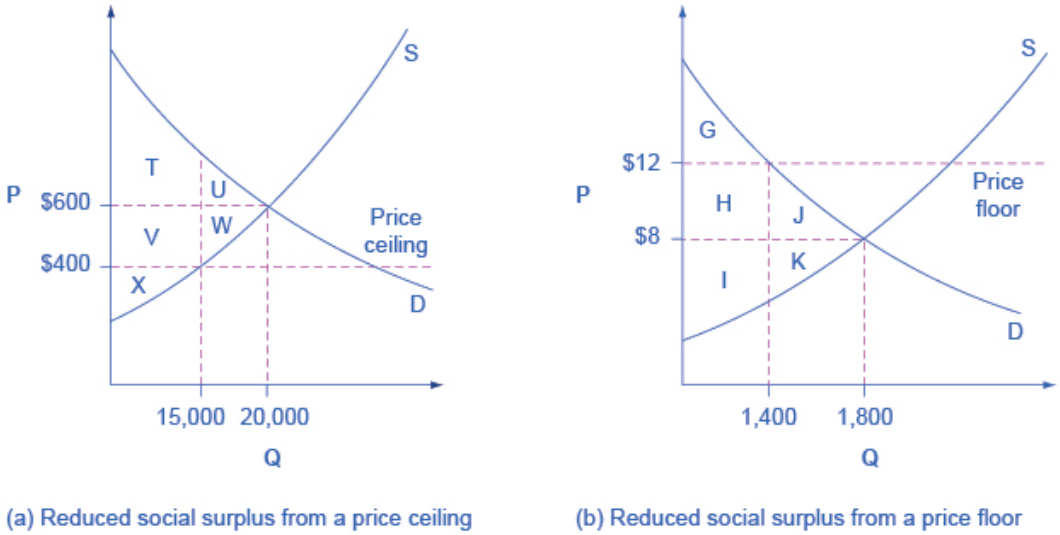

Figure 3.8b Efficiency and Price Floors and Ceilings. Figure by Steven A. Greenlaw & David Shapiro (OpenStax), licensed under CC BY 4.0.

Figure 3.8b Efficiency and Price Floors and Ceilings (Text Version)

Figure 3.8b Efficiency and Price Floors and Ceilings contains 2 graphs: Graph A is the reduced social surplus from a price ceiling, Graph B is the reduced social surplus from a price floor. Both graphs have the vertical axis is Price (P) and the horizontal axis is Quantity (Q).

Graph A is the reduced social surplus from a price ceiling: The supply curve (S) slopes upward from left to right and the demand curve (D) slopes downward right to left. The point where S and D intersect is the original equilibrium price (20,000 quantity, $600). The Price ceiling is at $400 and is denoted by straight horizontal dotted line. A price ceiling is imposed at $400, so firms in the market now produce only a quantity of 15,000.
A horizontal dotted line runs from the original equilibrium price (20,000 quantity, $600) to the vertical axis Price. Vertical and horizontal dotted lines originating from their respective axis indicate the new equilibrium price (15,000 quantity, $400). The vertical dotted line runs upwards from 15,000 quantity and intersects with supply curve (S) at $400 and the and the horizontal dotted line denoting the original equilibrium price at

$600 until it reaches demand curve (D).
U is the section to the left of the original equilibrium(20,000 quantity, $600) between the horizontal dotted line of $600 and the demand curve D, occurring between 15,000 and 20,000 quantity. To the left of section U is section T which is the remaining space between the horizontal dotted line of $600 and the demand curve (D) and between 0 to 15,000 quantity.
W is the section to the left of the original equilibrium between the horizontal dotted line of $600 and the Supply curve (S), occurring between 15,000 and 20,000 quantity. To the left of section W is section V which is the remaining space between the horizontal dotted line of $600 and dotted line $400 (price ceiling) and between 0 to 15,000 quantity. The X section is below section W and is the remaining space between the horizontal dotted line $400 (price ceiling) and the supply curve (S) between 0 to 15,000 quantity.
Graph B is the reduced social surplus from a price floor: The supply curve (S) slopes upward from left to right and the demand curve (D) slopes downward right to left. The point where S and D intersect is the original equilibrium price (1,800 quantity, $8). The Price floor is at $12 and is denoted by straight horizontal dotted line. A price floor is imposed at $12, which means that quantity demanded falls to 1,400: the new equilibrium is at (1,400 quantity, $12).
A horizontal dotted line runs from the original equilibrium price (1,800 quantity, $8) to the vertical axis Price. Vertical and horizontal dotted lines originating from their respective axis indicate the new equilibrium price (1,400 quantity, $12). The vertical dotted line runs upwards from 1,400 quantity and intersects with supply curve (S) and continues through the horizontal dotted line denoting the original equilibrium price at $8 until it reaches demand curve (D) at the price floor ($12).
J is the section to the left of the original equilibrium (1,800 quantity, $8) between the horizontal dotted line of $8 and the demand curve (D), occurring between 1,800 and 1,400 quantity. To the left of section J is section H which is the remaining space between the horizontal dotted line of $8 and dotted line $12 (price floor) and between 0 to 1,400 quantity. Above Section H is section G which is the remaining space between the price floor ($12) and the demand curve (D) between 0 and 1,400 quantity.
K is the section to the left of the original equilibrium between the horizontal dotted line of $8 and the Supply curve (S), occurring between 1,800 and 1,400 quantity. To the left of section K is section I which is the remaining space between the horizontal dotted line of $8 and the supply curve (S) from 0 and 1,400 quantity.

Figure 3.8b Efficiency and Price Floors and Ceilings (a) The original equilibrium price is $600 with a quantity of 20,000. Consumer surplus is T + U, and producer surplus is V + W + X. A price ceiling is imposed at $400, so firms in the market now produce only a quantity of 15,000. As a result, the new consumer surplus is T + V, while the new producer surplus is X. (b) The original equilibrium is $8 at a quantity of 1,800. Consumer surplus is G + H + J, and producer surplus is I + K. A price floor is imposed at $12, which means that **quantity demanded** falls to 1,400. As a result, the new consumer surplus is G, and the new producer surplus is H + I.

Figure 3.8b (b) shows a price floor example using a string of struggling movie theaters, all in the same city. The

current equilibrium is $8 per movie ticket, with 1,800 people attending movies. The original consumer surplus is G + H + J, and producer surplus is I + K. The city government is worried that movie theaters will go out of business, reducing the entertainment options available to citizens, so it decides to impose a price floor of $12 per ticket. As a result, the quantity demanded of movie tickets falls to 1,400. The new consumer surplus is G, and the new producer surplus is H + I. In effect, the price floor causes the area H to be transferred from consumer to producer surplus, but also causes a deadweight loss of J + K.

This analysis shows that a price ceiling, like a law establishing rent controls, will transfer some producer surplus to consumers—which helps to explain why consumers often favor them. Conversely, a price floor like a guarantee that farmers will receive a certain price for their crops will transfer some consumer surplus to producers, which explains why producers often favor them. However, both price floors and price ceilings block some transactions that buyers and sellers would have been willing to make, and creates deadweight loss. Removing such barriers, so that prices and quantities can adjust to their equilibrium level, will increase the economy's social surplus.

Demand and Supply as a Social Adjustment Mechanism

The demand and supply model emphasizes that prices are not set only by demand or only by supply, but by the interaction between the two. In 1890, the famous economist Alfred Marshall wrote that asking whether supply or demand determined a price was like arguing "whether it is the upper or the under blade of a pair of scissors that cuts a piece of paper." The answer is that both blades of the demand and supply scissors are always involved.

The adjustments of equilibrium price and quantity in a market-oriented economy often occur without much government direction or oversight. If the coffee crop in Brazil suffers a terrible frost, then the supply curve of coffee shifts to the left and the price of coffee rises. Some people—call them the coffee addicts—continue to drink coffee and pay the higher price. Others switch to tea or soft drinks. No government commission is needed to figure out how to adjust coffee prices, which companies will be allowed to process the remaining supply, which supermarkets in which cities will get how much coffee to sell, or which consumers will ultimately be allowed to drink the brew. Such adjustments in response to price changes happen all the time in a market economy, often so smoothly and rapidly that we barely notice them.

Think for a moment of all the seasonal foods that are available and inexpensive at certain times of the year, like fresh corn in midsummer, but more expensive at other times of the year. People alter their diets and restaurants alter their menus in response to these fluctuations in prices without fuss or fanfare. For both the U.S. economy and the world economy as a whole, markets—that is, demand and supply—are the primary social mechanism for answering the basic questions about what is produced, how it is produced, and for whom it is produced.

Bring It Home

Why Can We Not Get Enough of Organic?

Organic food is grown without synthetic pesticides, chemical fertilizers or genetically modified seeds. In recent decades, the demand for organic products has increased dramatically. The Organic Trade Association reported sales increased from $1 billion in 1990 to $35.1 billion in 2013, more than 90% of which were sales of food products.

Why, then, are organic foods more expensive than their conventional counterparts? The answer is a clear application of the theories of supply and demand. As people have learned more about the harmful effects of chemical fertilizers, growth hormones, pesticides and the like from large-scale factory farming, our tastes and preferences for safer, organic foods have increased. This change in tastes has been reinforced by increases in income, which allow people to purchase pricier products, and has made organic foods more mainstream. This has led to an increased demand for organic foods. Graphically, the demand curve has shifted right, and we have moved up the supply curve as producers have responded to the higher prices by supplying a greater quantity.

In addition to the movement along the supply curve, we have also had an increase in the number of farmers converting to organic farming over time. This is represented by a shift to the right of the supply curve. Since both demand and supply have shifted to the right, the resulting equilibrium quantity of organic foods is definitely higher, but the price will only fall when the increase in supply is larger than the increase in demand. We may need more time before we see lower prices in organic foods. Since the production costs of these foods may remain higher than conventional farming, because organic fertilizers and pest management techniques are more expensive, they may never fully catch up with the lower prices of non-organic foods.

As a final, specific example: The Environmental Working Group's "Dirty Dozen" list of fruits and vegetables, which test high for pesticide residue even after washing, was released in April 2013. The inclusion of strawberries on the list has led to an increase in demand for organic strawberries, resulting in both a higher equilibrium price and quantity of sales.

Key Concepts and Summary

Consumer surplus is the gap between the price that consumers are willing to pay, based on their preferences, and the market equilibrium price. Producer surplus is the gap between the price for which producers are willing to sell a product, based on their costs, and the market equilibrium price. Social surplus is the sum of consumer surplus and producer surplus. Total surplus is larger at the equilibrium quantity and price than it will be at any other quantity and price. Deadweight loss is loss in total surplus that occurs when the economy produces at an inefficient quantity.

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3.9 - PRICE CEILINGS AND PRICE FLOORS

Learning Objectives

- Explain price controls, price ceilings, and price floors
- Analyze demand and supply as a social adjustment mechanism

To this point in the chapter, we have been assuming that markets are free, that is, they operate with no government intervention. In this section, we will explore the outcomes, both anticipated and otherwise, when government does intervene in a market either to prevent the **price** of some good or service from rising "too high" or to prevent the price of some good or service from falling "too low".

Economists believe there are a small number of fundamental principles that explain how economic agents respond in different situations. Two of these principles, which we have already introduced, are the laws of demand and supply.

Governments can pass laws affecting market outcomes, but no law can negate these economic principles. Rather, the principles will become apparent in sometimes unexpected ways, which may undermine the intent of the government policy. This is one of the major conclusions of this section.

Controversy sometimes surrounds the prices and quantities established by demand and supply, especially for products that are considered necessities. In some cases, discontent over prices turns into public pressure on politicians, who may then pass legislation to prevent a certain price from climbing "too high" or falling "too low."

The demand and supply model shows how people and firms will react to the incentives that these laws provide to control prices, in ways that will often lead to undesirable consequences. Alternative policy tools can often achieve the desired goals of price control laws, while avoiding at least some of their costs and tradeoffs.

Price Ceilings

Laws that government enact to regulate prices are called **price controls**. Price controls come in two flavors. A **price ceiling** keeps a price from rising above a certain level (the "ceiling"), while a **price floor** keeps a price from falling below a given level (the "floor"). This section uses the demand and supply framework to analyze price ceilings. The next section discusses price floors.

A price ceiling is a legal maximum price that one pays for some good or service. A government imposes price ceilings in order to keep the price of some necessary good or service affordable. For example, in 2005 during Hurricane Katrina, the price of bottled water increased above $5 per gallon. As a result, many people called for price controls on bottled water to prevent the price from rising so high. In this particular case, the government did not impose a price ceiling, but there are other examples of where price ceilings did occur.

In many markets for goods and services, demanders outnumber suppliers. Consumers, who are also potential voters, sometimes unite behind a political proposal to hold down a certain price. In some cities, such as Albany, renters have pressed political leaders to pass rent control laws, a price ceiling that usually works by stating that landlords can raise rents by only a certain maximum percentage each year. Some of the best examples of rent control occur in urban areas such as New York, Washington D.C., or San Francisco.

Rent control becomes a politically hot topic when rents begin to rise rapidly. Everyone needs an affordable place to live. Perhaps a change in tastes makes a certain suburb or town a more popular place to live. Perhaps locally-based businesses expand, bringing higher incomes and more people into the area. Such changes can cause a change in the demand for rental housing, as Figure 3.9a illustrates. The original equilibrium (E_0) lies at the intersection of supply curve S_0 and demand curve D_0, corresponding to an equilibrium price of $500 and an equilibrium quantity of 15,000 units of rental housing. The effect of greater income or a change in tastes is to shift the demand curve for rental housing to the right, as the data in Table 3.9a shows and the shift from D_0 to D_1 on the graph. In this market, at the new equilibrium E_1, the price of a rental unit would rise to $600 and the equilibrium quantity would increase to 17,000 units.

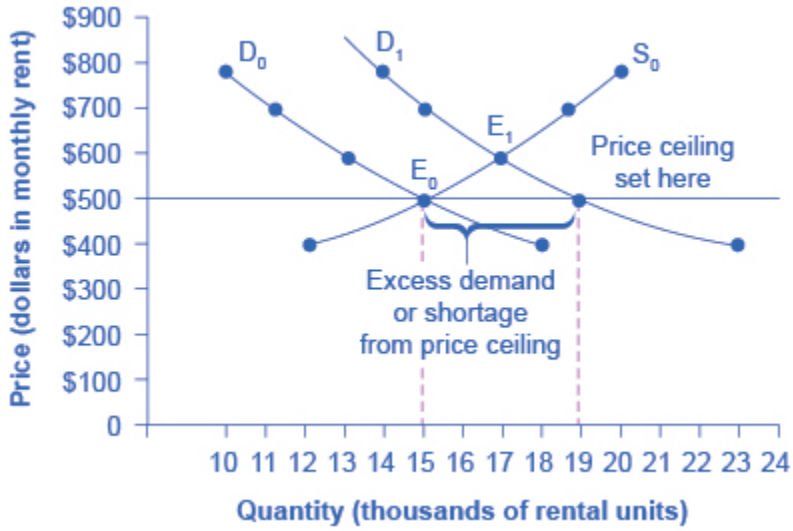

Figure 3.9a A Price Ceiling Example—Rent Control. Figure by Steven A. Greenlaw & David Shapiro (OpenStax), licensed under CC BY 4.0.

Figure 3.9a A Price Ceiling Example—Rent Control (Text Version)

The vertical axis is Price (dollars in monthly rent) in increments of $100 and the horizontal axis is Quantity (thousands of rental units) going up by increments by a thousand.
D_0 is the original demand curve that slopes downward left to right. S_0 is the supply curve and slopes upward from left to right. The original intersection of demand and supply occurs at E_0 (15,000 rental units, $500 in monthly rent). If demand shifts from D_0 to the left to the new demand curve D_1,which still slopes downward left to right.
After the shift the new equilibrium would be at E_1 (17,000 rental units, $600 in monthly rent) occurring at the intersection of S_0 and D_1. But if there is a price ceiling at $500 (denoted by a flat line at $500) then the price is not permitted to rise, therefore instead of E_1 (17,000 rental units, $600 in monthly rent), the quantity supplied remains at 15,000. However, after the change in demand, the quantity demanded rises to 19,000, resulting in a shortage resulting in a new point intersecting D_1 and the price ceiling at ($19,000 rental units, $500 in monthly rent).

Figure 3.9a A Price Ceiling Example—Rent Control: The original intersection of demand and supply occurs at E0. If demand shifts from D0 to D1, the new equilibrium would be at E1—unless a price ceiling prevents the price from rising. If the price is not permitted to rise, the quantity supplied remains at 15,000. However, after the change in demand, the quantity demanded rises to 19,000, resulting in a shortage.

Table 3.9a Rent Control

Price	Original Quantity Supplied	Original Quantity Demanded	New Quantity Demanded
$400	12,000	18,000	23,000
$500	15,000	15,000	19,000
$600	17,000	13,000	17,000
$700	19,000	11,000	15,000
$800	20,000	10,000	14,000

Suppose that a city government passes a rent control law to keep the price at the original equilibrium of $500 for a typical apartment. In Figure 3.9a, the horizontal line at the price of $500 shows the legally fixed maximum price set by the rent control law. However, the underlying forces that shifted the demand curve to the right are still there. At that price ($500), the quantity supplied remains at the same 15,000 rental units, but the quantity demanded is 19,000 rental units. In other words, the quantity demanded exceeds the quantity supplied, so there is a shortage of rental housing. One of the ironies of price ceilings is that while the price ceiling was intended to help renters, there are actually fewer apartments rented out under the price ceiling (15,000 rental units) than would be the case at the market rent of $600 (17,000 rental units).

Price ceilings do not simply benefit renters at the expense of landlords. Rather, some renters (or potential renters) lose their housing as landlords convert apartments to co-ops and condos. Even when the housing remains in the rental market, landlords tend to spend less on maintenance and on essentials like heating, cooling, hot water, and lighting. The first rule of economics is you do not get something for nothing—everything has an opportunity cost. Thus, if renters obtain "cheaper" housing than the market requires, they tend to also end up with lower quality housing.

Price ceilings are enacted in an attempt to keep prices low for those who need the product. However, when the market price is not allowed to rise to the equilibrium level, quantity demanded exceeds quantity supplied, and thus a shortage occurs. Those who manage to purchase the product at the lower price given by the price ceiling will benefit, but sellers of the product will suffer, along with those who are not able to purchase the product at all. Quality is also likely to deteriorate.

Price Floors

A price floor is the lowest price that one can legally pay for some good or service. Perhaps the best-known example of a price floor is the minimum wage, which is based on the view that someone working full time should be able to afford a basic standard of living. The federal minimum wage in 2016 was $7.25 per hour, although some states and localities have a higher minimum wage. The federal minimum wage yields an annual

income for a single person of $15,080, which is slightly higher than the Federal poverty line of $11,880. As the cost of living rises over time, the Congress periodically raises the federal minimum wage.

Price floors are sometimes called "price supports," because they support a price by preventing it from falling below a certain level. Around the world, many countries have passed laws to create agricultural price supports. Farm prices and thus farm incomes fluctuate, sometimes widely. Even if, on average, farm incomes are adequate, some years they can be quite low. The purpose of price supports is to prevent these swings.

The most common way price supports work is that the government enters the market and buys up the product, adding to demand to keep prices higher than they otherwise would be. According to the Common Agricultural Policy reform passed in 2013, the European Union (EU) will spend about 60 billion euros per year, or 67 billion dollars per year (with the November 2016 exchange rate), or roughly 38% of the EU budget, on price supports for Europe's farmers from 2014 to 2020.

Figure 3.9b illustrates the effects of a government program that assures a price above the equilibrium by focusing on the market for wheat in Europe. In the absence of government intervention, the price would adjust so that the quantity supplied would equal the quantity demanded at the equilibrium point E_0, with price P_0 and quantity Q_0. However, policies to keep prices high for farmers keeps the price above what would have been the market equilibrium level—the price Pf shown by the dashed horizontal line in the diagram. The result is a quantity supplied in excess of the quantity demanded (Qd). When quantity supplied exceeds quantity demanded, a surplus exists.

Economists estimate that the high-income areas of the world, including the United States, Europe, and Japan, spend roughly $1 billion per day in supporting their farmers. If the government is willing to purchase the **excess supply** (or to provide payments for others to purchase it), then farmers will benefit from the price floor, but taxpayers and consumers of food will pay the costs. Agricultural economists and policy makers have offered numerous proposals for reducing farm subsidies. In many countries, however, political support for subsidies for farmers remains strong. This is either because the population views this as supporting the traditional rural way of life or because of industry's lobbying power of the agro-business.

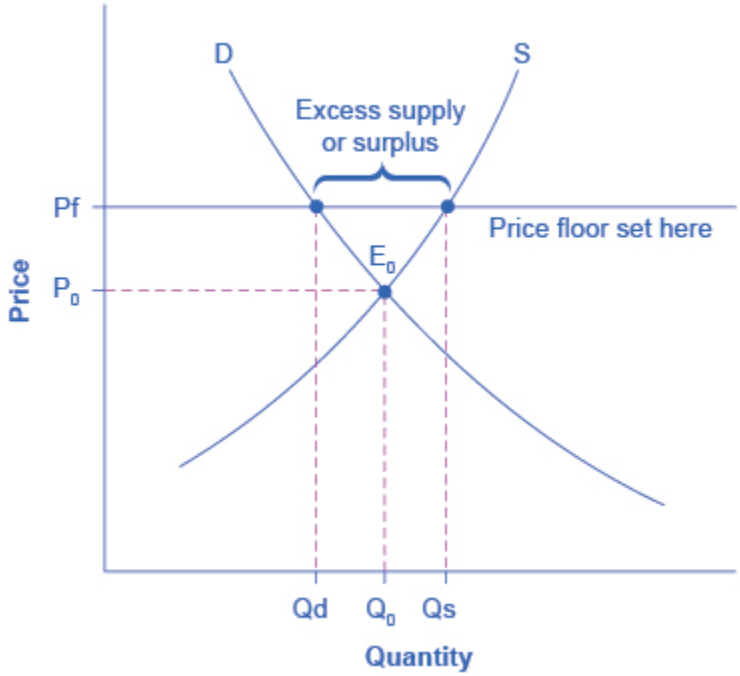

Figure 3.9b European Wheat Prices: A Price Floor Example. Figure by Steven A. Greenlaw & David Shapiro (OpenStax), licensed under CC BY 4.0.

Figure 3.9b European Wheat Prices: A Price Floor Example (Text Version)

The vertical axis is Price (P) and the horizontal axis is Quantity (Q).
The demand curve (D) slopes in a downward curve from left to right. The supply curve (S) slopes downward from right to left. The intersection of demand (D) and supply (S) would be at the equilibrium point E0 at (Q0, P0). However, a price floor set at Pf holds the price above E_0 and prevents it from falling.
The Price floor (Pf) is denoted by a flat line intersecting with the S and D curves above point E_0, creating two new points where they intersect. The result of the price floor is that the quantity supplied Qs (occurring at the intersection of Pf and S and to the right of Q_0) exceeds the quantity demanded Qd (occurring at the intersection of Pf and D and to the left of Q_0). The difference between these two points shows the excess supply, also called a surplus.

Figure 3.9b European Wheat Prices: A Price Floor Example The intersection of demand (D) and supply (S) would be at the equilibrium point E0. However, a price floor set at Pf holds the price above E0 and prevents it from falling. The result of the price floor is that the quantity supplied Qs exceeds the quantity demanded Qd. There is excess supply, also called a surplus.

Key Concepts and Summary

Price ceilings prevent a price from rising above a certain level. When a price ceiling is set below the equilibrium price, quantity demanded will exceed quantity supplied, and excess demand or shortages will result. Price floors prevent a price from falling below a certain level. When a price floor is set above the equilibrium price, quantity supplied will exceed quantity demanded, and excess supply or surpluses will result. Price floors and price ceilings often lead to unintended consequences.

Attribution

Except where otherwise noted, this chapter is adapted from "Price Ceilings and Price Floors (https://openstax.org/books/principles-microeconomics-2e/pages/3-4-price-ceilings-and-price-floors)" and "Key Concepts and Summary" In *Principles of Economics 2e (https://openstax.org/details/books/principles-economics-2e)* (OpenStax) by Steven A. Greenlaw & David Shapiro, licensed under CC BY 4.0./ Adaptations include addition of key concepts and summary. Access for free at https://openstax.org/books/principles-microeconomics-2e/pages/1-introduction

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3.10 - SELF-CHECK, CRITICAL THINKING & REVIEW QUESTIONS

Self-Check Questions

1. Review Figure 3.5c.Suppose the price of gasoline is $1.60 per gallon. Is the quantity demanded higher or lower than at the equilibrium price of $1.40 per gallon? What about the quantity supplied? Is there a shortage or a surplus in the market? If so, how much?
2. Why do economists use the *ceteris paribus* assumption?
3. In an analysis of the market for paint, an economist discovers the facts listed below. State whether each of these changes will affect supply or demand, and in what direction.
    1. There have recently been some important cost-saving inventions in the technology for making paint.
    2. Paint is lasting longer, so that property owners need not repaint as often.
    3. Because of severe hailstorms, many people need to repaint now.
    4. The hailstorms damaged several factories that make paint, forcing them to close down for several months.
4. Many changes are affecting the market for oil. Predict how each of the following events will affect the equilibrium price and quantity in the market for oil. In each case, state how the event will affect the supply and demand diagram. Create a sketch of the diagram if necessary.
    1. Cars are becoming more fuel efficient, and therefore get more miles to the gallon.
    2. The winter is exceptionally cold.
    3. A major discovery of new oil is made off the coast of Norway.
    4. The economies of some major oil-using nations, like Japan, slow down.
    5. A war in the Middle East disrupts oil-pumping schedules.

6. Landlords install additional insulation in buildings.
7. The price of solar energy falls dramatically.
8. Chemical companies invent a new, popular kind of plastic made from oil

5. Let's think about the market for air travel. From August 2014 to January 2015, the price of jet fuel increased roughly 47%. Using the four-step analysis, how do you think this fuel price increase affected the equilibrium price and quantity of air travel?
6. A tariff is a tax on imported goods. Suppose the U.S. government cuts the tariff on imported flat screen televisions. Using the four-step analysis, how do you think the tariff reduction will affect the equilibrium price and quantity of flat screen TVs?
7. What is the effect of a price ceiling on the quantity demanded of the product? What is the effect of a price ceiling on the quantity supplied? Why exactly does a price ceiling cause a shortage?
8. Does a price ceiling change the equilibrium price?
9. What would be the impact of imposing a price floor below the equilibrium price?
10. Does a price ceiling increase or decrease the number of transactions in a market? Why? What about a price floor?
11. If a price floor benefits producers, why does a price floor reduce social surplus?

Check your answers

1. Since $1.60 per gallon is above the equilibrium price, the quantity demanded would be lower at 550 gallons and the quantity supplied would be higher at 640 gallons. (These results are due to the laws of demand and supply, respectively.) The outcome of lower Qd and higher Qs would be a surplus in the gasoline market of 640 – 550 = 90 gallons.
2. To make it easier to analyze complex problems. *Ceteris paribus* allows you to look at the effect of one factor at a time on what it is you are trying to analyze. When you have analyzed all the factors individually, you add the results together to get the final answer.
3. An improvement in technology that reduces the cost of production will cause an increase in supply. Alternatively, you can think of this as a reduction in price necessary for firms to supply any quantity. Either way, this can be shown as a rightward (or downward) shift in the supply curve.

    1. An improvement in product quality is treated as an increase in tastes or preferences, meaning consumers demand more paint at any price level, so demand increases or shifts to the right. If this seems counterintuitive, note that demand in the future for the longer-lasting paint will fall, since consumers are essentially shifting demand from

the future to the present.

2. An increase in need causes an increase in demand or a rightward shift in the demand curve.
3. Factory damage means that firms are unable to supply as much in the present. Technically, this is an increase in the cost of production. Either way you look at it, the supply curve shifts to the left.

4. More fuel-efficient cars means there is less need for gasoline. This causes a leftward shift in the demand for gasoline and thus oil. Since the demand curve is shifting down the supply curve, the equilibrium price and quantity both fall.

    1. Cold weather increases the need for heating oil. This causes a rightward shift in the demand for heating oil and thus oil. Since the demand curve is shifting up the supply curve, the equilibrium price and quantity both rise.
    2. A discovery of new oil will make oil more abundant. This can be shown as a rightward shift in the supply curve, which will cause a decrease in the equilibrium price along with an increase in the equilibrium quantity. (The supply curve shifts down the demand curve so price and quantity follow the law of demand. If price goes down, then the quantity goes up.)
    3. When an economy slows down, it produces less output and demands less input, including energy, which is used in the production of virtually everything. A decrease in demand for energy will be reflected as a decrease in the demand for oil, or a leftward shift in demand for oil. Since the demand curve is shifting down the supply curve, both the equilibrium price and quantity of oil will fall.
    4. Disruption of oil pumping will reduce the supply of oil. This leftward shift in the supply curve will show a movement up the demand curve, resulting in an increase in the equilibrium price of oil and a decrease in the equilibrium quantity.
    5. Increased insulation will decrease the demand for heating. This leftward shift in the demand for oil causes a movement down the supply curve, resulting in a decrease in the equilibrium price and quantity of oil.
    6. Solar energy is a substitute for oil-based energy. So if solar energy becomes cheaper, the demand for oil will decrease as consumers switch from oil to solar. The decrease in demand for oil will be shown as a leftward shift in the demand curve. As the demand curve shifts down the supply curve, both equilibrium price and quantity for oil will fall.
    7. A new, popular kind of plastic will increase the demand for oil. The increase in demand will be shown as a rightward shift in demand, raising the equilibrium price and

quantity of oil.

5. Step 1. Draw the graph with the initial supply and demand curves. Label the initial equilibrium price and quantity. Step 2. Did the economic event affect supply or demand? Jet fuel is a cost of producing air travel, so an increase in jet fuel price affects supply. Step 3. An increase in the price of jet fuel caused an increase in the cost of air travel. We show this as an upward or leftward shift in supply. Step 4. A leftward shift in supply causes a movement up the demand curve, increasing the equilibrium price of air travel and decreasing the equilibrium quantity.
6. Step 1. Draw the graph with the initial supply and demand curves. Label the initial equilibrium price and quantity.Step 2. Did the economic event affect supply or demand? A tariff is treated like a cost of production, so this affects supply.Step 3. A tariff reduction is equivalent to a decrease in the cost of production, which we can show as a rightward (or downward) shift in supply.Step 4. A rightward shift in supply causes a movement down the demand curve, lowering the equilibrium price and raising the equilibrium quantity.
7. A price ceiling (which is below the equilibrium price) will cause the quantity demanded to rise and the quantity supplied to fall. This is why a price ceiling creates a shortage.
8. A price ceiling is just a legal restriction. Equilibrium is an economic condition. People may or may not obey the price ceiling, so the actual price may be at or above the price ceiling, but the price ceiling does not change the equilibrium price.
9. A price ceiling is a legal maximum price, but a price floor is a legal minimum price and, consequently, it would leave room for the price to rise to its equilibrium level. In other words, a price floor below equilibrium will not be binding and will have no effect.
10. Assuming that people obey the price ceiling, the market price will be below equilibrium, which means that Qd will be more than Qs. Buyers can only buy what is offered for sale, so the number of transactions will fall to Qs. This is easy to see graphically. By analogous reasoning, with a price floor the market price will be above the equilibrium price, so Qd will be less than Qs. Since the limit on transactions here is demand, the number of transactions will fall to Qd. Note that because both price floors and price ceilings reduce the number of transactions, social surplus is less.
11. Because the losses to consumers are greater than the benefits to producers, so the net effect is negative. Since the lost consumer surplus is greater than the additional producer surplus, social surplus falls.

Critical Thinking Questions

1. Review Figure 3.5c. Suppose the government decided that, since gasoline is a necessity, its price should be legally capped at $1.30 per gallon. What do you anticipate would be the outcome in the gasoline market?
2. Explain why the following statement is false: "In the goods market, no buyer would be willing to pay more than the equilibrium price."
3. Explain why the following statement is false: "In the goods market, no seller would be willing to sell for less than the equilibrium price."
4. Consider the demand for hamburgers. If the price of a substitute good (for example, hot dogs) increases and the price of a complement good (for example, hamburger buns) increases, can you tell for sure what will happen to the demand for hamburgers? Why or why not? Illustrate your answer with a graph.
5. How do you suppose the demographics of an aging population of "Baby Boomers" in the United States will affect the demand for milk? Justify your answer.
6. We know that a change in the price of a product causes a movement along the demand curve. Suppose consumers believe that prices will be rising in the future. How will that affect demand for the product in the present? Can you show this graphically?
7. Suppose there is a soda tax to curb obesity. What should a reduction in the soda tax do to the supply of sodas and to the equilibrium price and quantity? Can you show this graphically? *Hint*: Assume that the soda tax is collected from the sellers.
8. Use the four-step process to analyze the impact of the advent of the iPod (or other portable digital music players) on the equilibrium price and quantity of the Sony Walkman (or other portable audio cassette players).
9. Use the four-step process to analyze the impact of a reduction in tariffs on imports of iPods on the equilibrium price and quantity of Sony Walkman-type products.
10. Suppose both of these events took place at the same time. Combine your analyses of the impacts of the iPod and the tariff reduction to determine the likely impact on the equilibrium price and quantity of Sony Walkman-type products. Show your answer graphically.
11. Most government policy decisions have winners and losers. What are the effects of raising the minimum wage? It is more complex than simply producers lose and workers gain. Who are the winners and who are the losers, and what exactly do they win and lose? To what

extent does the policy change achieve its goals?

12. Agricultural price supports result in governments holding large inventories of agricultural products. Why do you think the government cannot simply give the products away to poor people?
13. Can you propose a policy that would induce the market to supply more rental housing units?
14. What term would an economist use to describe what happens when a shopper gets a "good deal" on a product?
15. Explain why voluntary transactions improve social welfare.
16. Why would a free market never operate at a quantity greater than the equilibrium quantity? *Hint:* What would be required for a transaction to occur at that quantity?

Review Questions

1. What determines the level of prices in a market?
2. What does a downward-sloping demand curve mean about how buyers in a market will react to a higher price?
3. Will demand curves have the same exact shape in all markets? If not, how will they differ?
4. Will supply curves have the same shape in all markets? If not, how will they differ?
5. What is the relationship between quantity demanded and quantity supplied at equilibrium? What is the relationship when there is a shortage? What is the relationship when there is a surplus?
6. How can you locate the equilibrium point on a demand and supply graph?
7. If the price is above the equilibrium level, would you predict a surplus or a shortage? If the price is below the equilibrium level, would you predict a surplus or a shortage? Why?
8. When the price is above the equilibrium, explain how market forces move the market price to equilibrium. Do the same when the price is below the equilibrium.
9. What is the difference between the demand and the quantity demanded of a product, say milk? Explain in words and show the difference on a graph with a demand curve for milk.
10. What is the difference between the supply and the quantity supplied of a product, say milk?

Explain in words and show the difference on a graph with the supply curve for milk.

11. When analyzing a market, how do economists deal with the problem that many factors that affect the market are changing at the same time?
12. Name some factors that can cause a shift in the demand curve in markets for goods and services.
13. Name some factors that can cause a shift in the supply curve in markets for goods and services.
14. How does one analyze a market where both demand and supply shift?
15. What causes a movement along the demand curve? What causes a movement along the supply curve?
16. Does a price ceiling attempt to make a price higher or lower?
17. How does a price ceiling set below the equilibrium level affect quantity demanded and quantity supplied?
18. Does a price floor attempt to make a price higher or lower?
19. How does a price floor set above the equilibrium level affect quantity demanded and quantity supplied?
20. What is consumer surplus? How is it illustrated on a demand and supply diagram?
21. What is producer surplus? How is it illustrated on a demand and supply diagram?
22. What is total surplus? How is it illustrated on a demand and supply diagram?
23. What is the relationship between total surplus and economic efficiency?
24. What is deadweight loss?

Problems

1. Review Figure 3.5c . Suppose the price of gasoline is $1.00. Will the quantity demanded be lower or higher than at the equilibrium price of $1.40 per gallon? Will the quantity supplied be lower or higher? Is there a shortage or a surplus in the market? If so, of how much?
2. Table 3.10a shows information on the demand and supply for bicycles, where the quantities of bicycles are measured in thousands.

Price
$120
$150
$180
$210
$240

1. What is the quantity demanded and the quantity supplied at a price of $210?
2. At what price is the quantity supplied equal to 48,000?
3. Graph the demand and supply curve for bicycles. How can you determine the equilibrium price and quantity from the graph? How can you determine the equilibrium price and quantity from the table? What are the equilibrium price and equilibrium quantity?
4. If the price was $120, what would the quantities demanded and supplied be? Would a shortage or surplus exist? If so, how large would the shortage or surplus be?

3. The computer market in recent years has seen many more computers sell at much lower prices. What shift in demand or supply is most likely to explain this outcome? Sketch a demand and supply diagram and explain your reasoning for each.

    1. A rise in demand
    2. A fall in demand
    3. A rise in supply
    4. A fall in supply

4. Table 3.10b illustrates the market's demand and supply for cheddar cheese. Graph the data and find the equilibrium. Next, create a table showing the change in quantity demanded or quantity supplied, and a graph of the new equilibrium, in each of the following situations:

        1. The price of milk, a key input for cheese production, rises, so that the supply decreases by 80 pounds at every price.
        2. A new study says that eating cheese is good for your health, so that demand increases by 20% at every price.

Table 3.10b

Price per Pound	Qd	Qs
$3.00	750	540
$3.20	700	600
$3.40	**650**	**650**
$3.60	620	700
$3.80	600	720
$4.00	590	730

5. Table 3.10c shows the supply and demand for movie tickets in a city. Graph demand and supply and identify the equilibrium. Then calculate in a table and graph the effect of the following two changes.

    a. Three new nightclubs open. They offer decent bands and have no cover charge, but make their money by selling food and drink. As a result, demand for movie tickets falls by six units at every price.
    b. The city eliminates a tax that it placed on all local entertainment businesses. The result is that the quantity supplied of movies at any given price increases by 10%.

Table 3.10c

Price per Ticket	Qd	Qs
$5.00	26	16
$6.00	24	18
$7.00	22	20
$8.00	21	21
$9.00	20	22

6. A low-income country decides to set a price ceiling on bread so it can make sure that bread is affordable to the poor. Table 3.10d provides the conditions of demand and supply. What are the equilibrium price and equilibrium quantity before the price ceiling? What will the excess demand or the shortage (that is, quantity demanded minus quantity supplied) be if the price ceiling is set at $2.40? At $2.00? At $3.60?

Table 3.10d

Price	Qd	Qs
$1.60	9,000	5,000
$2.00	8,500	5,500
$2.40	8,000	6,400
$2.80	**7,500**	**7,500**
$3.20	7,000	9,000
$3.60	6,500	11,000
$4.00	6,000	15,000

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3.11 - LEARN BY DOING: SHORTAGE AND SURPLUS

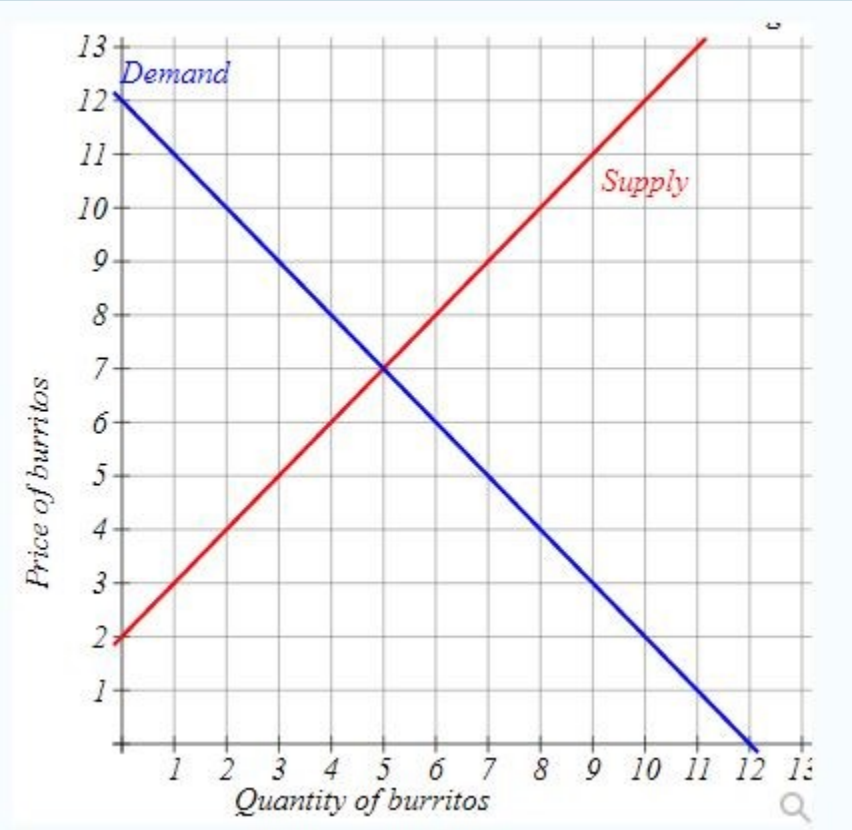
Try It

Rather than have you read more about shortage and surplus, we'd prefer to have you practice what you've learned so far and see for yourself if you understand it.

These questions allow you to get as much practice as you need, as you can click the link at the top of the first question ("Try another version of these questions") to get a new version of the questions. Practice until you feel comfortable doing these questions.

An interactive H5P element has been excluded from this version of the text. You can view it online here: https://ecampusontario.pressbooks.pub/laboureconomics/?p=713#h5p-10

Try it (Text Version)



H5P Graph. Graph by Lumen Learning, licensed under CC BY.

H5P Graph (Text Version)

The vertical axis is price of bagels and the horizontal axis is quantity of bagels. The demand curve slopes downward from left to right and the supply curve slopes upward from right to left. The demand and supply curve intersects at 7 price of bagels and 3 quantity of bagels. See table below for graph data.

Graph data

Supply Curve (quantity of bagels, price of bagels)	Demand Curve (quantity of bagels, price of bagels)
0 quantity of bagels, 4 price of bagels	0 quantity of bagels, 10 price of bagels
1 quantity of bagels, 5 price of bagels	1 quantity of bagels, 9 price of bagels
2 quantity of bagels, 6 price of bagels	2 quantity of bagels, 8 price of bagels
3 quantity of bagels, 7 price of bagels	3 quantity of bagels, 7 price of bagels
4 quantity of bagels, 8 price of bagels	4 quantity of bagels, 6 price of bagels
5quantity of bagels, 9 price of bagels	5quantity of bagels, 5 price of bagels
6 quantity of bagels, 10 price of bagels	6 quantity of bagels, 4 price of bagels
7 quantity of bagels, 11 price of bagels	7 quantity of bagels, 3 price of bagels
8 quantity of bagels, 12 price of bagels	8 quantity of bagels, 2 price of bagels
9 quantity of bagels, 13 price of bagels	9 quantity of bagels, 1 price of bagels
–	10 quantity of bagels, 0 price of bagels

Use the graph above to answer the following questions:

1. First consider a situation without any government interventions and no price controls. In that case equilibrium quantity is: _____
   Tip: At the equilibrium quantity, quantity supplied equals to quality demanded
2. First consider a situation without any government interventions and no price controls. In that case equilibrium quantity is: _____
   Tip: At the equilibrium price, quantity supplied equals to quantity demanded
3. Now suppose that the government imposes a Price Ceiling equal to $7!
   As a result of this new policy, quantity demanded is: _____
   Tip: First consider if the price ceiling is binding or non binding. If binding, trace that price to the demand curve
4. Now suppose that the government imposes a Price Ceiling equal to $7!
   As a result of this new policy, quantity supplied is:_____
   Tip: First consider if the price ceiling is binding or non binding. If binding, trace that price to the supply curve
5. As a result of this Price Ceiling the market is experiencing:

   a. Surplus
   b. This price control is non-binding. There will be neither a shortage nor a surplus.

c. Shortage

6. The amount of surplus/shortage equals _____.
   Tip: If this price ceiling is binding you should be looking at the difference between the quantity demanded and the quantity supplied in question above.

Check Your answer: [1]

Activity source: "Learn By Doing: Shortage and Surplus" In by Lumen Learning, licensed under CC BY. / Converted to H5P and Text.

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1. **Question 1)** 3 , **Question 2)** 5, **Question 3)** 3, **Question 4)** 3, **Question 5)** This price control is non-binding. There will be neither a shortage nor a surplus. , **Question 6)** 0

3.12 - REVIEW AND PRACTICE

Summary

In this chapter we have examined the model of demand and supply. We found that a demand curve shows the quantity demanded at each price, all other things unchanged. The law of demand asserts that an increase in price reduces the quantity demanded and a decrease in price increases the quantity demanded, all other things unchanged. The supply curve shows the quantity of a good or service that sellers will offer at various prices, all other things unchanged. Supply curves are generally upward sloping: an increase in price generally increases the quantity supplied, all other things unchanged.

The equilibrium price occurs where the demand and supply curves intersect. At this price, the quantity demanded equals the quantity supplied. A price higher than the equilibrium price increases the quantity supplied and reduces the quantity demanded, causing a surplus. A price lower than the equilibrium price increases the quantity demanded and reduces the quantity supplied, causing a shortage. Usually, market surpluses and shortages are short-lived. Changes in demand or supply, caused by changes in the determinants of demand and supply otherwise held constant in the analysis, change the equilibrium price and output. The circular flow model allows us to see how demand and supply in various markets are related to one another.

Concept Problems

1. What do you think happens to the demand for pizzas during the Super Bowl? Why?
2. Which of the following goods are likely to be classified as normal goods or services? Inferior? Defend your answer.

    1. Beans
    2. Tuxedos
    3. Used cars
    4. Used clothing
    5. Computers
    6. Books reviewed in *The New York Times*
    7. Macaroni and cheese
    8. Calculators
    9. Cigarettes
    10. Caviar
    11. Legal services

3. Which of the following pairs of goods are likely to be classified as substitutes? Complements? Defend your answer.

    1. Peanut butter and jelly
    2. Eggs and ham
    3. Nike brand and Reebok brand sneakers
    4. IBM and Apple Macintosh brand computers
    5. Dress shirts and ties
    6. Airline tickets and hotels
    7. Gasoline and tires
    8. Beer and wine
    9. Faxes and first-class mail
    10. Cereal and milk
    11. Cereal and eggs

4. A study found that lower airfares led some people to substitute flying for driving to their

vacation destinations. This reduced the demand for car travel and led to reduced traffic fatalities, since air travel is safer per passenger mile than car travel. Using the logic suggested by that study, suggest how each of the following events would affect the number of highway fatalities in any one year.

1. An increase in the price of gasoline
2. A large reduction in rental rates for passenger vans
3. An increase in airfares

5. Children under age 2 are now allowed to fly free on U.S. airlines; they usually sit in their parents' laps. Some safety advocates have urged that they be required to be strapped in infant seats, which would mean their parents would have to purchase tickets for them. Some economists have argued that such a measure would actually increase infant fatalities. Can you say why?
6. The graphs below show four possible shifts in demand or in supply that could occur in particular markets. Relate each of the events described below to one of them.Figure 3.25

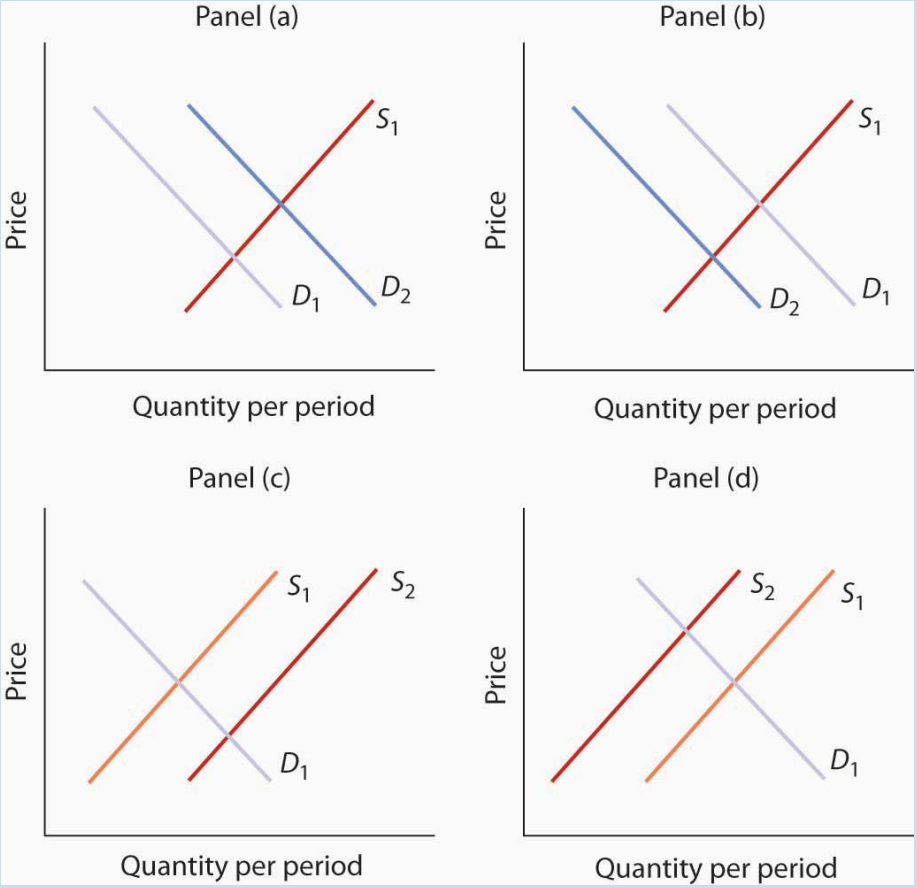

Figure 3.12a. Figure by University of Minnesota, licensed under CC BY-NC-SA 4.0.

Figure 3.12a (Text Version)

Figure 3.12a contains 4 graphs, panel A, B, C, and D. All graphs have the vertical axis Price and horizontal axis Quantity per period.

Panel A: The original supply curve (S_1) is a straight line sloping upwards left to right and occurs in the central-right area of the graph. The original demand curve (D_1) occurs in the middle of the graph sloping downward in a straight line from left to right intersecting lower down the original supply curve (S_1). The new demand curve (D_2) shifts from $D_1$to the left and now intersects the middle of S_1.

Panel B: The original supply curve (S_1) is a straight line sloping upwards left to right and occurs in the central-right area of the graph. The original demand curve (D_1) occurs towards the left side of the graph sloping downward in a straight line from left to right intersecting the middle of S_1. The new demand curve (D2) shifts from D_1 to the right and now intersects lower down the original supply curve (S_1).

Panel C: The original demand curve (D_1) is a straight line sloping downward in a straight line from left to right and occurs in the central-left area of the graph. The original supply curve (S_1) occurs towards the left side of the graph sloping upwards in a straight line from left to right intersecting the middle of D_1. The new supply curve (S2) shifts from S_1 to the right and now intersects lower down the original demand curve (D_1).

Panel D: The original demand curve (D_1) is a straight line sloping downward in a straight line from left to right and occurs in the central-right area of the graph. The original supply curve (S_1) occurs towards the right side of the graph sloping upwards in a straight line from left to right intersecting the middle of D_1. The new supply curve (S_2) shifts from S_1 to the left and now intersects higher up the original demand curve (D_1).

1. How did the heavy rains in South America in 1997 affect the market for coffee?
2. The Surgeon General decides french fries are not bad for your health after all and issues a report endorsing their use. What happens to the market for french fries?
3. How do you think rising incomes affect the market for ski vacations?
4. A new technique is discovered for manufacturing computers that greatly lowers their production cost. What happens to the market for computers?
5. How would a ban on smoking in public affect the market for cigarettes?

7. As low-carb diets increased in popularity, egg prices rose sharply. How might this affect the monks' supply of cookies or private retreats? (See the Case in Point on the Monks of St. Benedict's.)
8. Gasoline prices typically rise during the summer, a time of heavy tourist traffic. A "street talk" feature on a radio station sought tourist reaction to higher gasoline prices. Here was one response: "I don't like 'em [the higher prices] much. I think the gas companies just use any excuse to jack up prices, and they're doing it again now." How does this tourist's perspective differ from that of economists who use the model of demand and supply?
9. The introduction to the chapter argues that preferences for coffee changed in the 1990s and that excessive rain hurt yields from coffee plants. Show and explain the effects of these two circumstances on the coffee market.
10. With preferences for coffee remaining strong in the early part of the century, Vietnam entered the market as a major exporter of coffee. Show and explain the effects of these two circumstances on the coffee market.
11. The study on the economics of obesity discussed in the Case in Point in this chapter on that topic also noted that another factor behind rising obesity is the decline in cigarette smoking as the price of cigarettes has risen. Show and explain the effect of higher cigarette prices on

the market for food. What does this finding imply about the relationship between cigarettes and food?

12. In 2004, *The New York Times* reported that India might be losing its outsourcing edge due to rising wages (Scheiber, 2004) The reporter noted that a recent report "projected that if India continued to produce college graduates at the current rate, demand would exceed supply by 20% in the main outsourcing markets by 2008." Using the terminology you learned in this chapter, explain what he meant to say was happening in the market for Indian workers in outsourcing jobs. In particular, is demand for Indian workers increasing or decreasing? Is the supply of Indian workers increasing or decreasing? Which is shifting faster? How do you know?
13. For more than a century, milk producers have produced skim milk, which contains virtually no fat, along with regular milk, which contains 4% fat. But a century ago, skim milk accounted for only about 1% of total production, and much of it was fed to hogs. Today, skim and other reduced-fat milks make up the bulk of milk sales. What curve shifted, and what factor shifted it?
14. Suppose firms in the economy were to produce fewer goods and services. How do you think this would affect household spending on goods and services? (*Hint:* Use the circular flow model to analyze this question.)

Numerical Problems

Problems 1–5 are based on the graph in Figure 3.26 below.

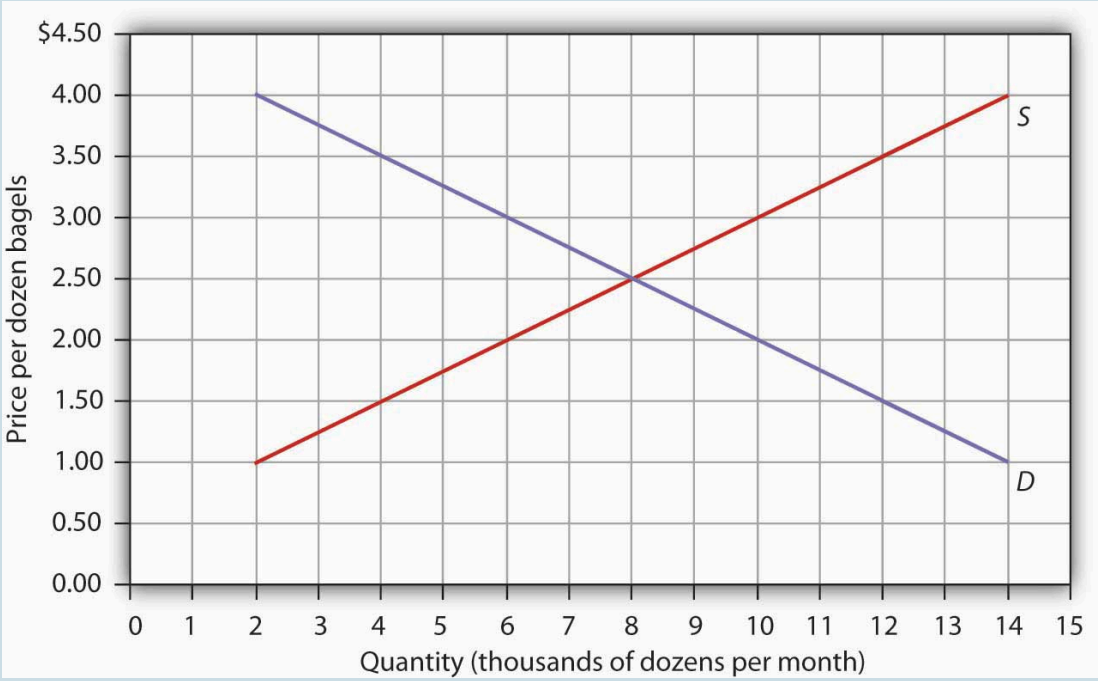

Figure 3.12b. Figure by University of Minnesota, licensed under CC BY-NC-SA 4.0.

Figure 3.12b (Text Version)

Figure 3.12b depicts a graph with the vertical axis Price (per dozen bagels), ranging from $0 to $4.50 increasing with increments of $0.50, and the horizontal axis Quantity (thousands of dozens per month) ranging from 0 to 15 with increasing increments of 1.

The supply curve (S) is a straight line sloping upwards from left to right starting at (2 thousand dozen bagels per month, $1.00 per dozen bagels). The demand curve (D) is a straight line sloping downwards from left to right starting at (2 thousand dozen bagels per month, $4.00 per dozen bagels). The S and D curves intersect at (8 thousand dozen bagels per month, $2.50 per dozen bagels).

Figure 3.12b Supply Curve data points

Points	Price per dozen bagels ($)	Quantity (thousands of dozens per month)
Point 1	1.00	2
Point 2	1.50	4
Point 3	2.00	6
Point 4	2.50	8
Point 5	3.00	10
Point 6	3.50	12
Point 7	4.00	14

Figure 3.12b Demand Curve data points

Points	Price per dozen bagels ($)	Quantity (thousands of dozens per month)
Point 1	4.00	2
Point 2	3.50	4
Point 3	3.00	6
Point 4	2.50	8
Point 5	2.00	10
Point 6	1.50	12
Point 7	1,.00	14

1. At a price of $1.50 per dozen, how many bagels are demanded per month?
2. At a price of $1.50 per dozen, how many bagels are supplied per month?
3. At a price of $3.00 per dozen, how many bagels are demanded per month?
4. At a price of $3.00 per dozen, how many bagels are supplied per month?
5. What is the equilibrium price of bagels? What is the equilibrium quantity per month?

Problems 6–9 are based on the model of demand and supply for coffee as shown in Figure 3.17 "Changes in Demand and Supply" You can graph the initial demand and supply curves by using the following values, with all quantities in millions of pounds of coffee per month:

Problems 6–9 Table 3.12a

Price ($)	Quantity demanded	Quantity supplied
3	40	10
4	35	15
5	30	20
6	25	25
7	20	30
8	15	35
9	10	40

1. Suppose the quantity demanded rises by 20 million pounds of coffee per month at each price. Draw the initial demand and supply curves based on the values given in the table above. Then draw the new demand curve given by this change, and show the new equilibrium price and quantity.
2. Suppose the quantity demanded falls, relative to the values given in the above table, by 20 million pounds per month at prices between $4 and $6 per pound; at prices between $7 and $9 per pound, the quantity demanded becomes zero. Draw the new demand curve and show the new equilibrium price and quantity.
3. Suppose the quantity supplied rises by 20 million pounds per month at each price, while the quantities demanded retain the values shown in the table above. Draw the new supply curve and show the new equilibrium price and quantity.
4. Suppose the quantity supplied falls, relative to the values given in the table above, by 20 million pounds per month at prices above $5; at a price of $5 or less per pound, the quantity supplied becomes zero. Draw the new supply curve and show the new equilibrium price and quantity.

Problems 10–15 are based on the demand and supply schedules for gasoline below (all quantities are in thousands of gallons per week):

Problems 10–15 Table 3.12b

Price per gallon ($)	Quantity demanded	Quantity supplied
1	8	0
2	7	1
3	6	2
4	5	3
5	4	4
6	3	5
7	2	6
8	1	7

1. Graph the demand and supply curves and show the equilibrium price and quantity.
2. At a price of $3 per gallon, would there be a surplus or shortage of gasoline? How much would the surplus or shortage be? Indicate the surplus or shortage on the graph.
3. At a price of $6 per gallon, would there be a surplus or shortage of gasoline? How much would the surplus or shortage be? Show the surplus or shortage on the graph.
4. Suppose the quantity demanded increased by 2,000 gallons per month at each price. At a price of $3 per gallon, how much would the surplus or shortage be? Graph the demand and supply curves and show the surplus or shortage.
5. Suppose the quantity supplied decreased by 2,000 gallons per month at each price for prices between $4 and $8 per gallon. At prices less than $4 per gallon the quantity supplied becomes zero, while the quantities demanded retain the values shown in the table. At a price of $4 per gallon, how much would the surplus or shortage be? Graph the demand and supply curves and show the surplus or shortage.
6. If the demand curve shifts as in problem 13 and the supply curve shifts as in problem 14, without drawing a graph or consulting the data, can you predict whether equilibrium price increases or decreases? What about equilibrium quantity? Now draw a graph that shows what the new equilibrium price and quantity are.

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Original Source References

Scheiber, N. (2004, May 9). As a center for outsourcing, India could be losing its edge. *New York Times,* p. BU3.

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3.13 - READING LIST

1. Economic and financial indicators [New Tab] (https://www.economist.com/economic-and-financial-indicators)

Reading List compiled by Norm Smith.

CHAPTER 4: LABOUR MARKET DECISIONS OF HOUSEHOLD AND FIRMS (SUPPLY AND DEMAND IN LABOUR MARKETS)

4.1 - INTRODUCTION TO LABOUR AND FINANCIAL MARKETS

Learning Objectives

- Learn to examine ways that supply and demand apply to labour and financial markets

So far in this module, you have examined applications of supply and demand and how these concepts explain shortages, surpluses, and allocative efficiency. In this section, we will look at a couple more examples of supply and demand, and instead of focusing on markets for goods and services, we will see how these same principles apply to labour and financial markets.

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4.2 - LABOUR MARKET EQUILIBRIUM AND WAGE DETERMINANTS

Learning Objectives

- Employ the marginal decision rule to determine the equilibrium cost of labor
- Describe the factors that determine the wage rate
- Describe nonmonetary factors that affect wage rates
- Identify the relationship between performance and wages
- Explain how wages are determines by marginal revenue productivity
- Discuss the factors that influence the shape and position of the labor supply curve
- Examine the role of unions and collective bargaining in labor-firm relations

Conditions of Equilibrium

Equilibrium in the labor market requires that the marginal revenue product of labor is equal to the wage rate, and that $\frac{MPL}{PL} = \frac{MPK}{PK}$.

The labor market differs somewhat from the market for goods and services because labor demand is a derived demand; labor is not desired for its own sake but rather because it aids in producing output. Firms determine their demand for labor through a lens of profit maximization, ultimately seeking to produce the optimum level of output and the lowest possible cost.

Labor Market Equilibrium

In order to find the equilibrium quantity and price of labor, economists generally make several assumptions:

- The marginal product of labor (MPL) is decreasing;
- Firms are price-takers in the goods market (cannot affect the price of output) as well as in the labor market (cannot affect the wage rate);
- The supply of labor is elastic and increases with the wage rate (upward sloping supply); and
- Firms are profit-maximizers.

The marginal revenue product of labor (MRPL) is equal to the MPL multiplied by the price of output. The MRPL represents the additional revenue that a firm can expect to gain from employing one additional unit of labor – it is the marginal benefit to the firm from labor. Under the above assumptions, the MRPL is decreasing as the quantity of labor increases, and firms can increase profit by hiring more labor if the MRPL is greater than the marginal cost of that additional unit of labor – the wage rate. Thus, firms will hire more labor when the MRPL is greater than the wage rate, and stop hiring as soon as the two values are equal. The point at which the MRPL equals the prevailing wage rate is the labor market equilibrium.

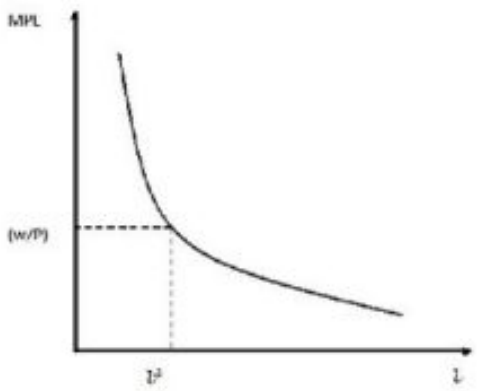

Figure 4.2a Graph by HpSSE licensed under CC BY-SA 3.0.

Optimal Demand for Labor: The optimal demand for labor is located where the marginal product equals the real wage rate. The curved line, sloping downward from left to right, represents the falling marginal product of labor, the y-axis is the marginal product/wage rate, and the x-axis is the quantity of labor.

Optimizing Capital and Labor

In the long run, firms maximize profit by choosing the optimal combination of labor and **capital** to produce a given amount of output. It's possible that an automobile company could manufacture 1,000 cars using only expensive, technologically advanced robots and machinery (capital) that do not require any human participation. It's also possible that the company could produce the same number of vehicles using only

employee work (labor), without any assistance from machines or technology. For most industries, however, relying solely on capital or solely on labor is more expensive than using some combination of the two.

Figure 4.2b Solar wafer manufacturing (https://www.flickr.com/photos/oregondot/3347740006/) by Oregon Department of Transportation licensed under CC-BY.

Factory Worker: Most firms need a combination of both labor and capital in order to produce their product.

Firms use the marginal decision rule in order to decide what combination of labor, capital, and other factors of production to use in the creation of output. The marginal decision rule says that a firm will shift spending among factors of production as long as the marginal benefit of such a shift exceeds the marginal cost. Imagine that a firm must decide whether to spend an additional dollar on labor. To determine the marginal benefit of that dollar, we divide the marginal product of labor (MP_L) by it's price (the wage rate, P_L): MP_L/P_L. If capital and labor are the only factors of production, then spending an additional $1 on labor while holding the total cost constant means taking $1 out of capital. The cost of that action will be the output lost from cutting back on capital, which is the ratio of the marginal product of capital (MP_K) to the price of capital (the rental rate, P_K). Thus, the cost of cutting back on capital is MP_K/P_K.

If the marginal benefit of additional labor, MP_L/P_L, exceeds the marginal cost, MP_K/PK, then the firm will be better off by spending more on labor and less on capital. On the other hand, if MP_K/P_K is greater than MP_L/P_L, the firm will be better off spending more on capital and less on labor. The equilibrium – the point at which the firm is producing the maximum amount of output at a given cost – occurs where $MP_L/P_L=MP_K/P_K$.

The Wage Rate

The wage rate is determined by the intersection of supply of and demand for labor.

When labor is an input to production, firms hire workers. Firms are demand labor and workers provide it at a price called the wage rate. Colloquially, "wages" refer to just the dollar amount paid to a worker, but in economics, it refers to total compensation (i.e. it includes benefits).

The marginal benefit of hiring an additional unit of labor is called the marginal product of labor: it is the additional revenue generated from the last unit of labor. In theory, as with other inputs to production, firms will hire workers until the wage rate (marginal cost) equals the marginal revenue product of labor (marginal benefit).

Changes in Supply and Demand

In competitive markets, the demand curve for labor is the same as the marginal revenue curve. Thus, shifts in the demand for labor are a function of changes in the marginal product of labor. This can occur for a number of reasons. First of all, you can imagine that a new product or company is created that represents new demand for labor of a certain type. There are also three main factors that would shift the labor demand curve:

1. Technology which affects the output of a unit of labor.
2. Changes in the price of the output which affect the value of the unit of labor.
3. Changes in the price of labor relative to other factors of production.

In the long run, the supply of labor is a function of the population. A decrease in the supply of labor will typically cause an increase in the wage rate. The fact that a reduction in supply tends to strengthen wages explains why **unions** and other professional associations have often sought to limit the number of workers in their particular industry. Physicians, for example, have a financial incentive to enforce rigorous training, licensing, and certification requirements in order to limit the number of practitioners and keep the labor supply low.

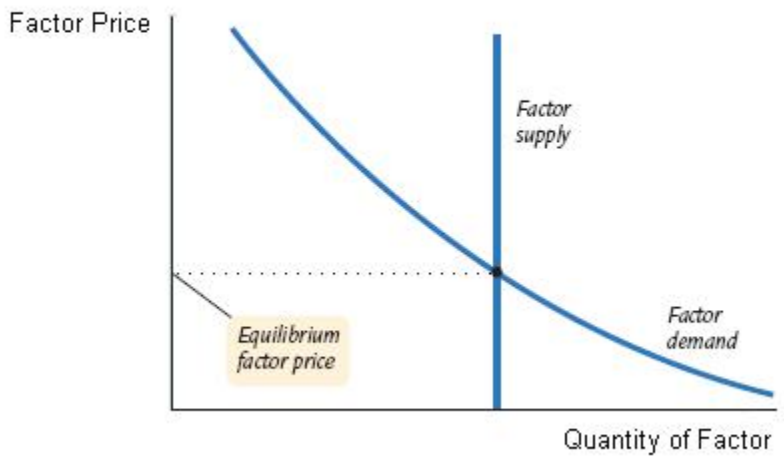

Figure 4.2c. Wage Rate in the Long Run: In the long run the supply of labor is fixed and demand is downward-sloping. The wage rate is determined by their intersection.Factor Compensation (https://en.wikipedia.org/wiki/File:Factor_compensation.jpg) by HpSSE under CC BY-SA 3.0.

Compensation Differentials

Some differences in wage rates across places, occupations, and demographic groups can be explained by compensation **differentials**.

According to the basic theory of the labor market, there ought to be one equilibrium wage rate that applies to all workers across industries and countries. Of course this is not the case; doctors typically make more per hour than retail clerks, and workers in the United States typically earn a higher wage than workers in India. These wage differences are called compensation differentials and can be explained by many factors, such as differences in the skills of the workers, the country or geographical area in which jobs are performed, or the characteristics of the jobs themselves.

Education Differentials

One common source of differences in wage rates is human capital. More skilled and educated workers tend to have higher wages because their **marginal product** of labor tends to be higher. Additionally, the differential pay for more education tends to compensate workers for the time, effort, and foregone wages from obtaining the necessary training. If all jobs paid the same rate, for example, fewer people would go through the expense

and effort of law school. The compensation differential ensures that individuals are willing to invest in their own human capital.

Figure 4.2d. Education Differentials: Workers seek increased compensation by attaining higher levels of education The Graduates (https://www.flickr.com/photos/sakeeb/4647211575) by Sakeeb Sabakka licensed under CC BY 2.0.

Geographic Compensation Differentials

If a certain part of a country is a particularly attractive area to live in and if labor mobility is perfect, then more and more workers will move to that area, which in turn will increase the supply of labor and depress wages. If the attractiveness of that area compared to other areas does not change, the wage rate will be set at such a rate that workers will be indifferent between living in areas that are more attractive but with a lower wage and living in areas which are more attractive with a higher wage. In this way, a sustained equilibrium with different wage rates across different areas can occur.

Discrimination and Compensation Differentials

In the United States, minorities and women make lower wages on average than Caucasian men. Some of this is due to historical trends affecting these groups that result in less human capital or a concentration in certain lower-paying occupations. Another source of differing wage rates, however, is **discrimination**. Several studies have shown that, in the United States, several minority groups (including black men and women, Hispanic men and women, and white women) suffer from decreased wage earning for the same job with the same performance levels and responsibilities as white males.

Compensating Differential

Not to be confused with a compensation differential, a compensating differential is a term used in labor economics to analyze the relation between the wage rate and the unpleasantness, risk, or other undesirable attributes of a particular job. It is defined as the additional amount of income that a given worker must be offered in order to motivate them to accept a given undesirable job, relative to other jobs that worker could perform. One can also speak of the compensating differential for an especially desirable job, or one that provides special benefits, but in this case the differential would be negative: that is, a given worker would be willing to accept a lower wage for an especially desirable job, relative to other jobs.

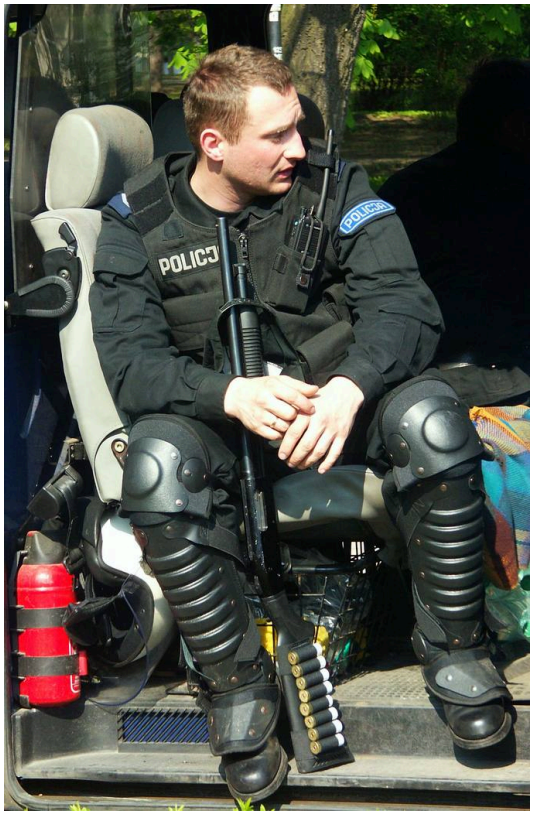

Figure 4.2e. Hazard Differential: Hazard pay is a type of compensating differential. Occupations that are dangerous, such as police work, will typically have higher pay to compensate for the risk associated with that job. Polish police (riot contol squad) (https://commons.wikimedia.org/wiki/File:Police_Poland_2_AB.jpg#/media/File:Police_Poland_2_AB.jpg) by Andrzej Barabasz (Chepry) licensed under CC BY-SA 3.0.

Performance and Pay

Theoretically there is a direct connection between job performance and pay, but in reality other factors often distort this relationship.

According to economic theory, workers' wages are equal to the **marginal revenue product** of their labor. If one employee is very productive he or she will have a high marginal revenue product: one additional hour of their work will produce a significant increase in output. It follows that more productive employees should have higher wages than less productive employees. Imagine if this were not true: a firm decides to pay a highly productive worker less than the marginal revenue product of his labor. Any other firm could make a profit by offering a higher salary to attract the productive employee to their company, and the worker's wage would rise. Theoretically, therefore, there is a direct relationship between job performance and pay.

We know that this is not always the case in reality. Wages are determined not only by one's productivity, but also by seniority, networking, ambition, and luck. It is very rare for an entry-level worker to make the same wage as an experienced member of the same profession regardless of their relative levels of productivity because the older worker has had time to receive pay raises and promotions for which the younger employee is simply not eligible. Discrimination is sometimes responsible for members of minority racial or gender groups receiving wages that are less than wages for the majority group even when productivity levels are the same. Finally, outside forces, such as unions or government regulations, can distort pay rates.

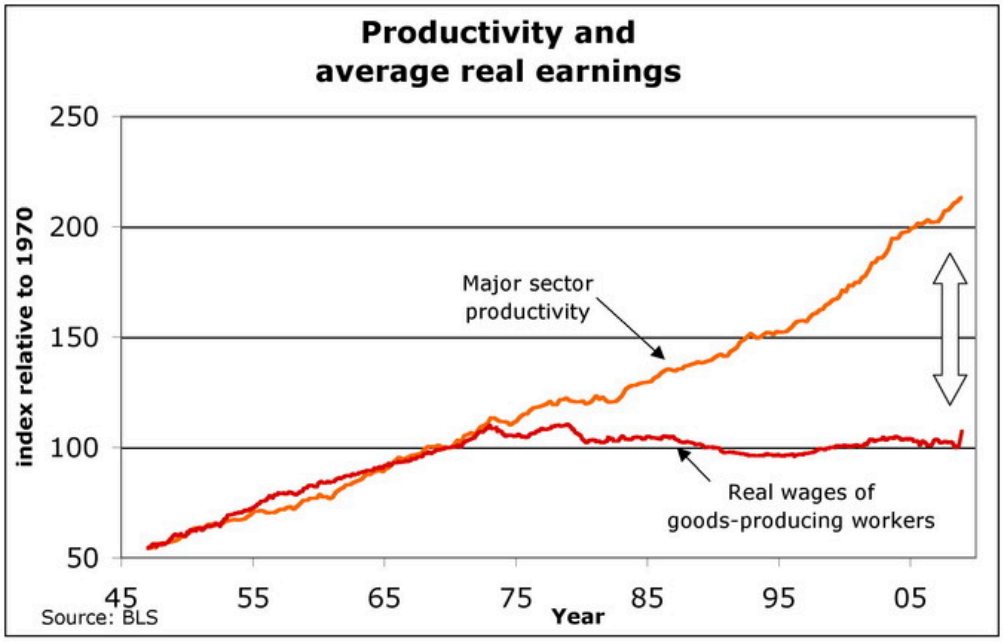

Figure 4.2f. Wages and Productivity in the U.S.: On a macroeconomic level, this graph shows the disconnect, beginning around 1975, between the productivity of labor and the wage rate in the U.S. If the economic theory were correct in the real world, wages and productivity would increase together. Graph by U.S. Department of Labor, Bureau of Labor Statistics falls under Public Domain.

Linking Performance and Pay

Some of the disconnect between performance and pay can be addressed with alternate pay schemes. While a salary or hourly pay does not directly take into account the quality of work, performance-related pay compensates workers with higher levels of productivity directly. One example is **commission**-based pay. In this type of pay scheme, workers receive some percentage of the profit that they generate for their company. This may be paid on top of a baseline salary or may be the only form of compensation. This type of system is very common among car salespeople and insurance brokers.

Another alternative is piece-work, in which employees are paid a fixed rate for every unit produced or action performed, regardless of the time it takes. This is common in settings where it is easy to measure the output of **piece work**, such as when a garment worker is paid per each piece of cloth sewn or a telemarketer is paid for every call placed.

Marginal Revenue Productivity and Wages

In a perfectly competitive market, the wage rate is equal to the marginal revenue product of labor.

Just as in any market, the price of labor, the wage rate, is determined by the intersection of supply and demand. When the supply of labor increases the equilibrium price falls, and when the demand for labor increases the equilibrium price rises. In the long run the supply of labor is a simple function of the size of the population, so in order to understand changes in wage rates we focus on the demand for labor.

To determine demand in the labor market we must find the **marginal revenue product** of labor (MRPL), which is based on the marginal productivity of labor (MPL) and the price of output. Conceptually, the MRPL represents the additional revenue that the firm can generate by adding one additional unit of labor (recall that MPL is the additional output from the additional unit of labor). Thus, MRPL is simply the product of MPL and the price of the output.

The MPL is generally decreasing: adding a 100th unit of labor will not increase output as much as adding a 99th. Since competitive industries are price takers and cannot change the price of output by changing their level of production, the MRPL curve will have the same downward slope as the MPL curve.

From the perspective of the firm, the MRPL is the **marginal benefit** to the firm of hiring an additional unit of labor. We know that a profit-maximizing firm will increase its factors of production until their marginal benefit is equal to the marginal cost. Therefore, firms will continue to add labor (hire workers) until the MRPL equals the wage rate. Thus, workers earn a wage equal to the marginal revenue product of their labor. For example, in a perfectly competitive market, an employee who earns $20/hour has a marginal productivity that is worth exactly $20.

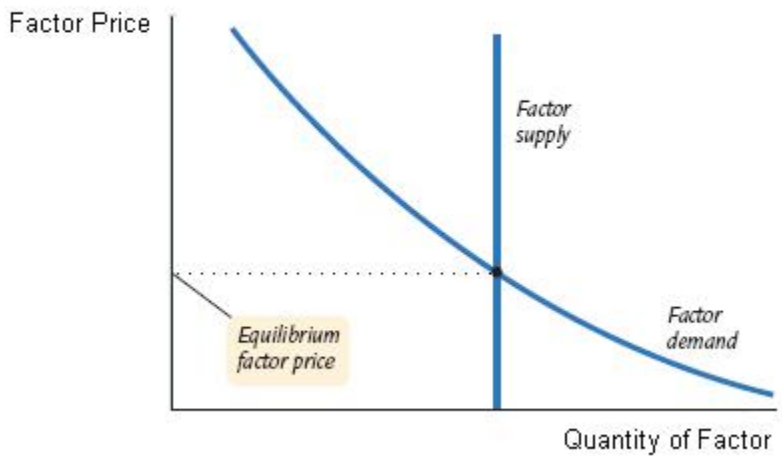

Figure 4.2g. Marginal Product and Wages: The graph shows that a factor of production – in our case, labor – has a fixed supply in the long run, so the wage rate is determined by the factor demand curve – in our case, the marginal revenue product of labor. The intersection of vertical supply and the downward sloping demand gives the wage rate. Factor Compensation (https://en.wikipedia.org/wiki/File:Factor_compensation.jpg) by HpSSE under CC BY-SA 3.0.

Changes in Equilibrium for Shifts in Market Supply and Market Demand

A shift in the supply or demand of labor will cause a change in the market equilibrium.

As in all competitive markets, the equilibrium price and quantity of labor is determined by supply and demand.

Labor Supply

Labour supply curves are derived from the 'labor-leisure' trade-off. More hours worked earn higher incomes but necessitate a cut in the amount of other things workers enjoy such as going to movies, hanging out with friends, or sleeping. The **opportunity cost** of working is leisure time and vis versa. Considering this tradeoff, workers collectively offer a set of labor to the market which economists call the supply of labor.

To see how changes in wages affect the supply of labor, suppose wages rise. This increases the cost of leisure and causes the supply of labor to rise – this is the *substitution effect*, which states that as the relative price of

one good increases, consumption of that good will decrease. However, there is also an *income effect* – an increased wage means higher income, and since leisure is a **normal good**, the quantity of leisure demanded will go up. In general, at low wage levels the substitution effect dominates the income effect and higher wages cause an increase in the supply of labor. At high incomes, however, the negative income effect could offset the positive substitution effect and higher wage levels could actually cause labor to decrease. A worker making $800/hour who receives a raise to $1200/hour may not have much use for the extra money and may choose to work less while maintaining the same standard of living, for example. This creates a supply curve that bends backwards, initially increasing with the wage rate but later decreasing.

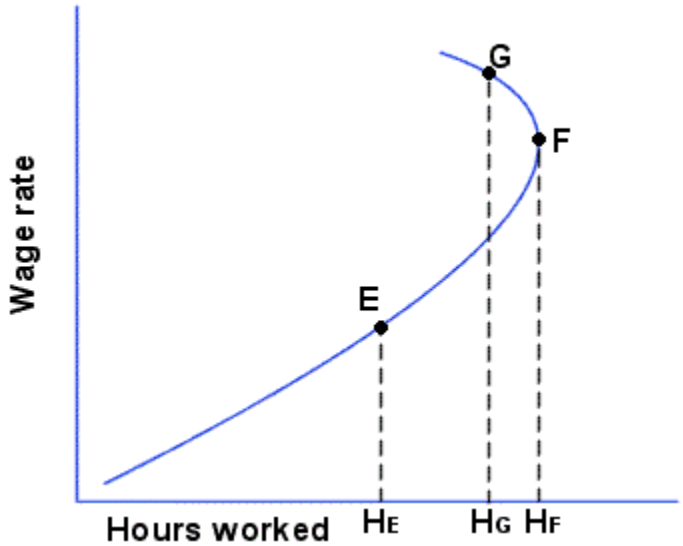

Figure 4.2h. Backward Bending Supply: While normally hours of labor supplied will increase with the wage rate, the income effect may produce the opposite effect at high wage levels. Graph (https://commons.wikimedia.org/wiki/File:Labour_supply_small.png) by Maksim licensed under CC BY-SA 3.0.

Figure 4.2h. Backward Bending Supply (Text Version)

The vertical axis is wage rate and horizontal axis is hours worked (H). The labour supply curve slopes upwards from left to right and curves backward. Three points occur progressively along the supply curve: Point E at H_E occurs on the the upward trend of the curve, furthest to the left along the horizontal axis ; Point F at H_F occurs next along the supply curve line in the bend, furthest to the right along the horizontal axis; and Point G at H_G occurs last along the supply curve line where the line has bent backwards, occurs between point H_E and H_F along the horizontal axis.

Backward Bending Supply: While normally hours of labor supplied will increase with the wage rate, the income effect may produce the opposite effect at high wage levels.

People supply labor in order to increase their utility —just as they demand goods and services in order to increase their utility. The supply curve for labor will shift in response to changes in the same factors that shift demand for goods and services. These include changes in preferences, changes in income, changes in population, and changes in expectations. A change in preferences that causes people to prefer more leisure, for example, will shift the supply curve to the left, creating a lower level of employment and a higher wage rate.

Labor Demand

An increase in the demand for labor will increase both the level of employment and the wage rate. We have already seen that the demand for labor is based on the marginal product of labor and the price of output. Thus, any factor that affects productivity or output prices will also shift labor demand. Some of these factors include:

- Available technology (marginal productivity of labor)
- The skills or education of the workforce (marginal productivity of labor)
- Level of physical capital (marginal productivity of labor)
- Price of physical capital (price of output)
- Price of substitute or complement goods (price of output)
- Consumer preferences (price of output)

All of the above may cause the demand for labor to shift and change the equilibrium quantity and price of labor.

Labor Union Impacts on Equilibrium

Unions are organizations of workers that seek to improve working conditions and raise the equilibrium wage rate.

A labor union is an organization of workers who have banded together to achieve common goals. The primary activity of the union is to bargain with the employer on behalf of union members and negotiate labor contracts. The most common purpose of associations or unions is maintaining or improving the conditions of employment, which may include the negotiation of wages, work rules, complaint procedures, promotions, benefits, workplace safety, and policies.

In order to achieve these goals unions engage in **collective bargaining:** the process of negotiation between a

company's management and a labor union. When collective bargaining fails, union members may go on **strike**, refusing to work until a firm addresses the workers' grievances.

Union Impacts on Equilibrium

Fundamentally, unions seek higher wages for its member workers (though, here "wages" encompasses all types of compensation, not just cash paid to the workers by the employer).

The effect of unions on the labor market equilibrium can be analyzed like any other price increase. If employers (those who demand labor) have an inelastic demand for labor, the increase in wages (the price of labor) will not translate into a drop in employment (quantity of labor supplied). If, however, their demand is elastic, employers will simply respond to union demands for higher wages by hiring fewer workers.

However, the reality of unions is more complex. As an organized body, unions are also active in the political realm. They can lobby for legislation that will affect the market not only for labor, but also for the goods they produce. For example, unions may advocate for trade restrictions to protect the markets in which they work from foreign competition. By preventing domestic firms from having to compete with unrestricted foreign firms, they can ensure that consumers do not have lower cost alternatives which would drive employers who pay a higher union wage out of business.

Figure 4.2i. Union Members Strike: One tool that unions may use to raise wages is to go on strike. Union strike rally Oxford 2006. Photo (https://en.wikipedia.org/wiki/File:UnisonStrikeRallyOxford20060328_KaihsuTai.jpg) by Kaihsu licensed under CC BY-SA 3.0.

Key Points

- Firms will hire more labor when the marginal revenue product of labor is greater than the wage rate, and stop hiring as soon as the two values are equal.
- The point at which the MRPL equals the prevailing wage rate is the labor market equilibrium.
- The marginal decision rule says that a firm will shift spending among factors of production as long as the marginal benefit of such a shift exceeds the marginal cost.
- If the marginal benefit of additional labor, MPL/PL, exceeds the marginal cost, MPK/PK, then the firm will be better off by spending more on labor and less on capital.
- According to the marginal decision rule, equilibrium in the labor market must occur where MPL/PL=MPK/PK.
- An increase in demand or a reduction in supply will raise wages; an increase in supply or a

reduction in demand will lower them.

- The demand curve depends on the marginal product of labor and the price of the good labor produces. If the demand curve shifts to the right, either because productivity or the price of output has increased, wages will be pushed up.
- In the long run the supply of labor is simply a function of the population size, but in the short run it depends on variables such as worker preferences, the skills and training a job requires, and wages available in alternative occupations.
- Although basic economic theory suggests that there ought to be one prevailing wage rate for all labor, this is not the case.
- Wage differences are called compensation differentials and can be explained by many factors, such as differences in the skills of the workers, the country or geographical area in which jobs are performed, or the characteristics of the jobs themselves.
- One common source of differences in wage rates is human capital. More skilled and educated workers tend to have higher wages because their marginal product of labor tends to be higher.
- If a certain area is a desirable place to live, the supply of labor will be higher than in other areas and wages will be lower. This is a type of geographical differential.
- Discrimination against gender or racial groups can cause compensation differentials.
- A compensating differential is the additional amount of income that a given worker must be offered in order to motivate them to accept a given undesirable job, relative to other jobs that worker could perform.
- According to economic theory, workers' wages are equal to the marginal revenue product of their labor. If one employee is very productive he or she will have a high marginal revenue product.
- In reality, wages are determined not only by one's productivity, but also by seniority, networking, ambition, and luck.
- Some of the disconnect between performance and pay can be addressed with alternate pay schemes.
- In the long run the supply of labor is a simple function of the size of the population, so in order to understand changes in wage rates we focus on the demand for labor.
- The marginal product of labor (MPL) is the increase in output that a firm experiences from adding one additional unit of labor.
- The marginal benefit to the firm of hiring an additional unit of labor is called the marginal revenue product of labor (MRPL). It is calculated by multiplying MPL by the price of the output.

- The MRPL represents the firm's demand curve for labor, which means that the firm will continue to hire more labor until the MRPL is equal to the wage rate.
- The opportunity cost of leisure is the wages lost while not working; as wages rise, the cost of leisure increases.
- The substitution effect means that when wages rise, people are likely to substitute more labor for less leisure.
- However, the income effect means that as people become wealthier, their demand for normal goods such as leisure increases.
- Typically the substitution effect dominates the supply of labor at normal wage rates, but the income effect may come to dominate at higher wage rates. This creates a backward bending labor supply curve.
- The supply curve for labor will shift in response to changes in preferences, changes in income, changes in population, and changes in expectations.
- The demand curve for labor will shift in response to changes in human capital, changes in technology, changes in the price of complements or substitutes for output, and changes in consumer preferences.
- Unions ' primary work involves negotiating wages, work rules, complaint procedures, promotions, benefits, workplace safety and policies with company management.
- If the labor market is a competitive one in which wages are determined by demand and supply, increasing the wage requires either increasing the demand for labor or reducing the supply.
- Increasing demand for labor requires increasing the marginal product of labor or raising the price of the good produced by labor.
- Unions can restrict the supply of labor in two ways: slowing the growth of the labor force and promoting policies that make it difficult for workers to enter a particular craft.

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4.3 - LABOUR-LEISURE CHOICES

Learning Objectives

- Interpret labour-leisure budget constraint graphs
- Predict consumer choices based on wages and other compensation
- Explain the backward-bending supply curve of labour

People do not obtain **utility** just from products they purchase. They also obtain utility from leisure time. Leisure time is time not spent at work. The decision-making process of a utility-maximizing household applies to what quantity of hours to work in much the same way that it applies to purchases of goods and services. Choices made along the **labour-leisure budget constraint**, as wages shift, provide the logical underpinning for the labour **supply curve**. The discussion also offers some insights about the range of possible reactions when people receive higher wages, and specifically about the claim that if people are paid higher wages, they will work a greater quantity of hours—assuming that they have a say in the matter.

According to the Bureau of Labor Statistics, U.S. workers averaged 38.6 hours per week on the job in 2014. This average includes part-time workers; for full-time workers only, the average was 42.5 hours per week. Table 6.4.1 shows that more than half of all workers are on the job 35 to 48 hours per week, but significant proportions work more or less than this amount.

Table 4.3a breaks down the average hourly compensation received by private industry workers, including wages and benefits. Wages and salaries are about three-quarters of total compensation received by workers; the rest is in the form of health insurance, vacation pay, and other benefits. The compensation workers receive differs for many reasons, including experience, education, skill, talent, membership in a laboir union, and the presence of discrimination against certain groups in the labour market.

Table 4.3a Persons at Work, by Average Hours Worked per Week in 2013 (Total number of workers: 137.7 million)(Source: U.S. Bureau of Labor Statistics, 2022a)

Hours Worked per Week	Number of Workers	Percentage of Workforce
1–14 hours	6.9 million	5.0%
15–34 hours	27.6 million	20.1%
35–40 hours	68.5 million	49.9%
41–48 hours	11.9 million	8.6%
49–59 hours	13.3 million	9.6%
60 hours and over	9.3 million	6.8%

Table 4.3b Hourly Compensation: Wages, Benefits, and Taxes in 2014 (Source: U.S. Bureau of Labor Statistics, (https://www.bls.gov/news.release/pdf/ecec.pdf) 2022b)

Compensation, Wage, Salary, and Benefits	**$30.92 per hour**
Wages and Salaries	**$20.92**
Benefits	
Vacation	$2.09
Supplemental Pay	$0.84
Insurance	$2.15
Health Benefits	$2.36
Retirement and Savings	$1.24
Defined Benefit	$0.57
Defined Contribution	$0.064
Legally Required	$2.46

The Labour-Leisure Budget Constraint

How do workers make decisions about the number of hours to work? Again, let's proceed with a concrete example. The economic logic is precisely the same as in the case of a **consumption choice budget constraint**, but the labels are different on a labour-leisure budget constraint.

Vivian has 70 hours per week that she could devote either to work or to leisure, and her wage is $10/hour. The lower budget constraint in Figure 4.3a shows Vivian's possible choices. The horizontal axis of this diagram measures both leisure and labour, by showing how Vivian's time is divided between leisure and labour. Hours of leisure are measured from left to right on the horizontal axis, while hours of labour are measured from right to left. Vivian will compare choices along this budget constraint, ranging from 70 hours of leisure and no **income** at point S to zero hours of leisure and $700 of income at point L. She will choose the point that provides her with the highest **total utility**. For this example, let's assume that Vivian's utility-maximizing choice occurs at Point O, with 30 hours of leisure, 40 hours of work, and $400 in weekly income.

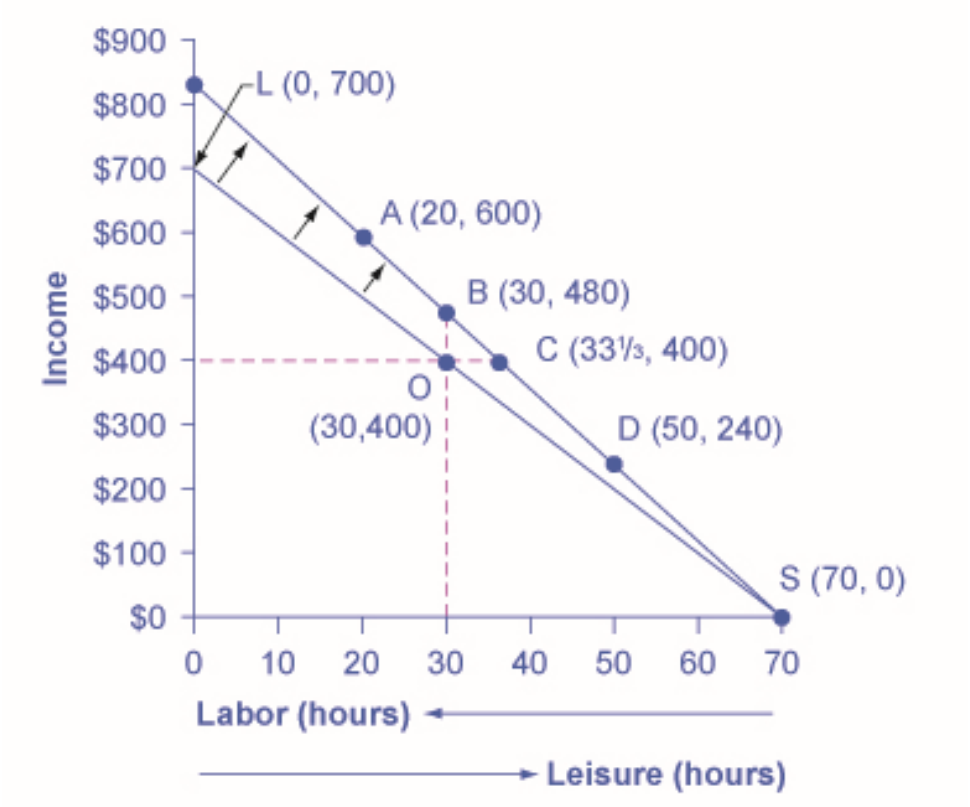

Figure 4.3a How a Rise in Wages Alters the Utility-Maximizing Choice.
How a Rise in Wages Alters the Utility-Maximizing Choice by OpenStax, licensed under CC BY 4.0.

Figure 4.3a, How a Rise in Wages Alters the Utility-Maximizing Choice, shows Vivian's original choice is Point O on the lower **opportunity set**. A rise in her wage causes her opportunity set to swing upward. In response to the increase in wages, Vivian can make a range of different choices available to her: a choice like Point D, which involves less work; and a choice like Point B, which involves the same amount of work but more income; or a choice like Point A, which involves more work and considerably more income. Vivian's personal preferences will determine which choice she makes.

For Vivian to discover the labour-leisure choice that will maximize her utility, she does not have to place numerical values on the total and marginal utility that she would receive from every level of income and leisure. All that really matters is that Vivian can compare, in her own mind, whether she would prefer more leisure or more income, given the tradeoffs she faces. If Vivian can say to herself: "*I'd really rather work a little less and have more leisure, even if it means less income,*" or "*I'd be willing to work more hours to make some extra income,*" then as she gradually moves in the direction of her preferences, she will seek out the utility-maximizing choice on her labour-leisure budget constraint.

Now imagine that Vivian's wage level increases to $12/hour. A higher wage will mean a new budget constraint that tilts up more steeply; conversely, a lower wage would have led to a new budget constraint that

was flatter. How will a change in the wage and the corresponding shift in the budget constraint affect Vivian's decisions about how many hours to work?

Vivian's choices of quantity of hours to work and income along her new budget constraint can be divided into several categories, using the dashed horizontal and vertical lines in Figure 4.3a that go through her original choice (Point O). One set of choices in the upper-left portion of the new budget constraint involves more hours of work (that is, less leisure) and more income, at a point like A with 20 hours of leisure, 50 hours of work, and $600 of income (that is, 50 hours of work multiplied by the new wage of $12 per hour). A second choice would be to work exactly the same 40 hours, and to take the benefits of the higher wage in the form of income that would now be $480, at choice Point B. A third choice would involve more leisure and the same income at point C (that is, $33 - 1/3$) hours of work multiplied by the new wage of $12per hour equals $400 of total income). A fourth choice would involve less income and much more leisure at a point like Point D, with a choice like 50 hours of leisure, 20 hours of work, and $240 in income.

In effect, Vivian can choose whether to receive the benefits of her wage increase in the form of more income, or more leisure, or some mixture of these two. With this range of possibilities, it would be unwise to assume that Vivian (or anyone else) will necessarily react to a wage increase by working substantially more hours. Maybe they will; maybe they will not.

Applications of Utility Maximizing with the Labour-Leisure Budget Constraint

The theoretical insight that higher wages will sometimes cause an increase in hours worked, sometimes cause hours worked not to change by much, and sometimes cause hours worked to decline, has led to labour supply curves that look like the one in Figure 4.3b. The bottom-left portion of the labour supply curve slopes upward, which reflects the situation of a person who reacts to a higher wage by supplying a greater quantity of labour. The middle, close-to-vertical portion of the labour supply curve reflects the situation of a person who reacts to a higher wage by supplying about the same quantity of labour. The very top portion of the labour supply curve is called a **backward-bending supply curve for labour**, which is the situation of high-wage people who can earn so much that they respond to a still-higher wage by working fewer hours. Read the following Clear It Up feature for more on the number of hours the average person works each year.

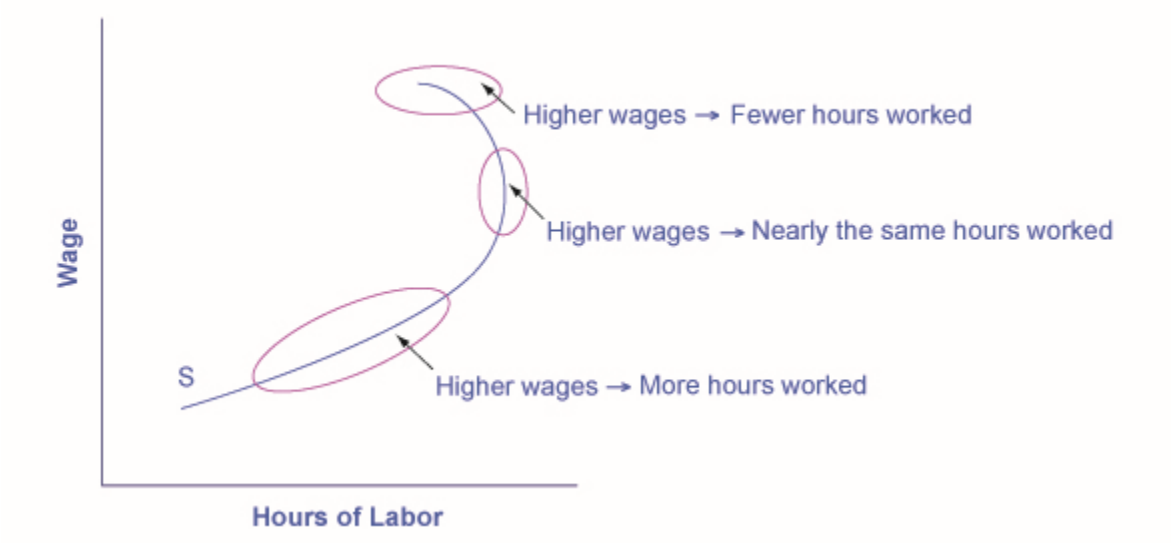

Figure 4.3b. A Backward-Bending Supply Curve of Labour. A Backward-Bending Supply Curve of Labour by OpenStax, licensed under CC BY 4.0.

Figure 4.3b. A Backward-Bending Supply Curve of Labour has the vertical axis is wage and horizontal axis is hours of labour. The bottom upward-sloping portion of the labour supply curve shows that as wages increase over this range, the quantity of hours worked also increases. The middle, nearly vertical portion of the labour supply curve shows that as wages increase over this range, the quantity of hours worked changes very little. The backward-bending portion of the labour supply curve at the top shows that as wages increase over this range, the quantity of hours worked actually decreases. All three of these possibilities can be derived from how a change in wages causes movement in the labour-leisure budget constraint, and thus different choices by individuals.

Example 6.4.1: Is America a nation of workaholics?

Americans work a lot. Table 4.3c shows average hours worked per year in the United States, Canada, Japan, and several European countries, with data from 2013. To get a perspective on these numbers, someone who works 40 hours per week for 50 weeks per year, with two weeks off, would work 2,000 hours per year. The gap in hours worked is a little astonishing; the 250 to 300 hour gap between how much Americans work and how much Germans or the French work amounts to roughly six to seven weeks less of work per year. Economists who study these international patterns debate the extent to which average Americans and Japanese have a preference for working more than, say, Germans, or whether German workers and employers face particular kinds of taxes and regulations that lead to fewer hours worked. Many countries have laws that regulate the work week and dictate holidays and the standards of "normal" vacation time vary from country to country. It is also

interesting to take the amount of time spent working in context; it is estimated that in the late nineteenth century in the United States, the average work week was over 60 hours per week—leaving little to no time for leisure.

Table 4.3c: Average Hours Worked Per Year in Select Countries(Source: Organization For Economic Co-Operation And Development [OECD], n.d.)

Country	Average Annual Hours Actually Worked per Employed Person
United States	1,824
Spain	1,799
Japan	1,759
Canada	1,751
United Kingdom	1,669
Sweden	1,585
Germany	1,443
France	1,441

The different responses to a rise in wages—more hours worked, the same hours worked, or fewer hours worked—are patterns exhibited by different groups of workers in the U.S. economy. Many full-time workers have jobs where the number of hours is held relatively fixed, partly by their own choice and partly by their employer's practices. These workers do not much change their hours worked as wages rise or fall, so their supply curve of labour is inelastic. However, part-time workers and younger workers tend to be more flexible in their hours, and more ready to increase hours worked when wages are high or cut back when wages fall.

The **backward-bending supply curve for labour**, when workers react to higher wages by working fewer hours and having more income, is not observed often in the short run. However, some well-paid professionals, like dentists or accountants, may react to higher wages by choosing to limit the number of hours, perhaps by taking especially long vacations, or taking every other Friday off. Over a long-term perspective, the backward-bending supply curve for labour is common. Over the last century, Americans have reacted to gradually rising wages by working fewer hours; for example, the length of the average work-week has fallen from about 60 hours per week in 1900 to the present average of less than 40 hours per week.

Recognizing that workers have a range of possible reactions to a change in wages casts some fresh insight on a perennial political debate: the claim that a reduction in income taxes—which would, in effect, allow people to

earn more per hour—will encourage people to work more. The leisure-income budget set points out that this connection will not hold true for all workers. Some people, especially part-timers, may react to higher wages by working more. Many will work the same number of hours. Some people, especially those whose incomes are already high, may react to the tax cut by working fewer hours. Of course, cutting taxes may be a good or a bad idea for a variety of reasons, not just because of its impact on work incentives, but the specific claim that tax cuts will lead people to work more hours is only likely to hold for specific groups of workers and will depend on how and for whom taxes are cut.

Key Concepts and Summary

When making a choice along the labour-leisure budget constraint, a household will choose the combination of labour, leisure, and income that provides the most utility. The result of a change in wage levels can be higher work hours, the same work hours, or lower work hours.

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Organization For Economic Co-Operation And Development [OECD]. (n.d.). *Average annual hours actually worked per worker* [Data Set]. stats.oecd.org/Index.aspx?DataSetCode=ANHRS

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4.4 - LABOUR AND FINANCIAL MARKETS

Learning Objectives

- Describe how the theories of supply & demand can be applied to labor markets and financial markets
- Use the four-step process to predict how economic conditions cause a change in supply, demand, and equilibrium

The theories of supply and demand do not apply just to markets for goods. They apply to any market, even markets for labor and financial services. **Labour markets** are markets for employees or jobs. **Financial markets** are markets for saving or borrowing.

When we think about demand and supply curves in goods and services markets, it is easy to picture who the demanders and suppliers are: businesses produce the products and households buy them. Who are the demanders and suppliers in labor and financial service markets? In labor markets job seekers (individuals) are the suppliers of labor, while firms and other employers who hire labor are the demanders for labor. For example, the grocery store needs workers, or in other words, has a demand for labor. That labor is supplied by grocery workers. In financial markets, any individual or firm who saves contributes to the supply of money, and any who borrows (person, firm, or government) contributes to the demand for money.

As a college student, you most likely participate in both labor and financial markets. Employment is a fact of life for most college students: in 2011, according to the BLS, 52% of undergraduates worked part time and another 20% worked full time. Most college students are also heavily involved in financial markets, primarily as borrowers. Among full-time students, about half take out a loan to help finance their education each year, and those loans average about $6,000 per year. Many students also borrow for other expenses, like purchasing a car. We can analyze labor markets and financial markets with the same tools we use to analyze demand and supply in the goods markets. Let's take a look at a few examples.

Supply and Demand in Labor Markets

Economic events can change the equilibrium salary (or wage) and quantity of labor. Consider how the wave of new information technologies, like computer and telecommunications networks, has affected low-skill and high-skill workers in the U.S. economy. From the perspective of employers who demand labor, these new technologies are often a substitute for low-skill laborers like file clerks who used to keep file cabinets full of paper records of transactions. However, the same new technologies are a complement to high-skill workers like managers, who benefit from the technological advances by being able to monitor more information, communicate more easily, and juggle a wider array of responsibilities. So, how will the new technologies affect the wages of high-skill and low-skill workers? For this question, let's again use the four-step process of analyzing how shifts in supply or demand affect a market.

Technology and wage inequality: The four-step process

Step 1. What did the markets for low-skill labor and high-skill labor look like before the arrival of the new technologies?

In Figure 4.4a. (a) and Figure 4.4a. (b), S_0 is the original supply curve for labor and D_0 is the original demand curve for labor in each market. In each graph, the original point of equilibrium, E_0, occurs at the price W_0 and the quantity Q_0.

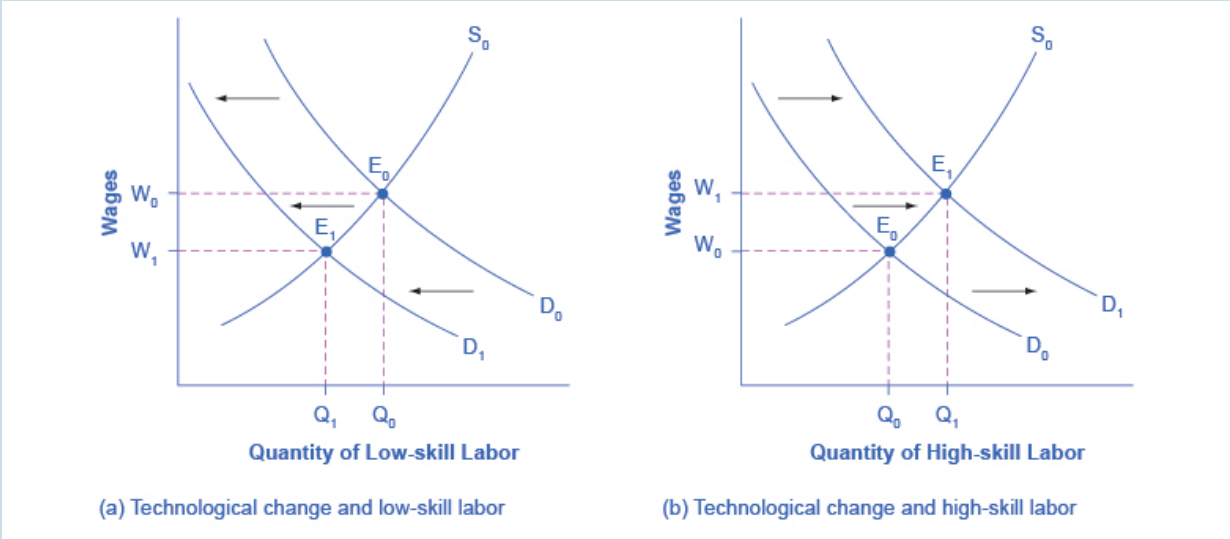

Figure 4.4a. (a) The demand for low-skill labor shifts to the left when technology can do the job previously done by these workers. (b) New technologies can also increase the demand for high-skill labor in fields such as information technology and network administration. Technology and Wages: Applying Demand and Supply by Steven A. Greenlaw & Timothy Taylor (OpenStax), licensed under CC BY.

Figure 4.4a (Text Version)

Figure 4.4a contains two graphs: Graph A – Technological change and low-skill labour, Graph B – Technological change and high-skill labour.

Graph A: The graph has the vertical axis Wages (W) and Quantity of Low-Skill Labour (Q). The original supply curve (S_0) slopes upward from left to right. The original demand Curve (D_0) slopes downward from left to right. S_0 and D_0 intersect at the original equilibrium (E_0) at price W_0 and quantity Q_0 . D_0 shifts to the left and now intersects S_0 at a new equilibrium (E_1) at price W_1 and quantity Q_1.

Graph B: The graph has the vertical axis Wages (W) and Quantity of High-Skill Labour (Q). The original supply curve (S_0) slopes upward from left to right. The original demand Curve (D_0) slopes downward from left to right. S_0 and D_0 intersect at the original equilibrium (E_0) at price W_0 and quantity Q_0 . D_1 shifts to the right and now intersects S_0 at a new equilibrium (E_1) at price W_1 and quantity Q_1.

Step 2. Does the new technology affect the supply of labor from households or the demand for labor from firms?

Step 3. Will the new technology increase or decrease demand?

Step 4. Compare the new equilibrium price and quantity to the original equilibrium price.

Check your answers[1]

So, the demand and supply model predicts that the new computer and communications technologies will raise the pay of high-skill workers but reduce the pay of low-skill workers. Indeed, from the 1970s to the mid-2000s, the wage gap widened between high-skill and low-skill labor. According to the National Center for Education Statistics, in 1980, for example, a college graduate earned about 30% more than a high school graduate with comparable job experience, but by 2012, a college graduate earned about 60% more than an otherwise comparable high school graduate. Many economists believe that the trend toward greater wage inequality across the U.S. economy was primarily caused by the new technologies.

Supply and Demand in Financial Markets

Now let's examine how the theories of supply and demand also affect financial markets. Imagine that the U.S. economy became viewed as a less desirable place for foreign investors to put their money because of fears about the growth of the U.S. public debt. Using the four-step process for analyzing how changes in supply and demand affect equilibrium outcomes, how would increased U.S. public debt affect the equilibrium price and quantity for capital in U.S. financial markets?

The effect of growing U.S. debt: The four-step process

Step 1. Draw a diagram showing demand and supply for financial capital that represents the original scenario in which foreign investors are pouring money into the U.S. economy.

1. **Step 2 Answer:** The technology change described here affects demand for labor by firms that hire workers. **Step 3 Answer:** Based on the description earlier, as the substitute for low-skill labor becomes available, demand for low-skill labor will shift to the left, from D_0 to D_1. As the technology complement for high-skill labor becomes cheaper, demand for high-skill labor will shift to the right, from D_0 to D1. **Step 4 Answer:** The new equilibrium for low-skill labor, shown as point E_1 with price W_1 and quantity Q_1, has a lower wage and quantity hired than the original equilibrium, E_0. The new equilibrium for high-skill labor, shown as point E_1 with price W_1 and quantity Q_1, has a higher wage and quantity hired than the original equilibrium (E0).

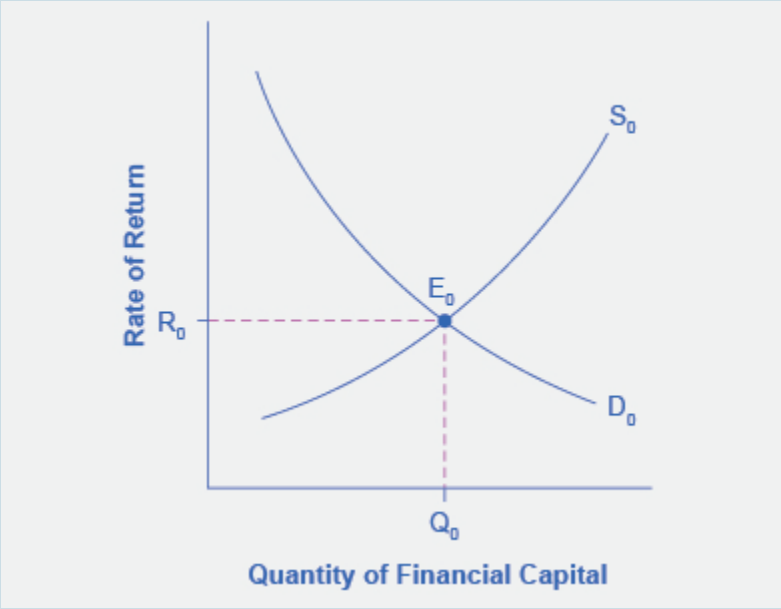

Figure 4.4b The United States as a Global Borrower Before U.S. Debt Uncertainty by Steven A. Greenlaw & Timothy Taylor (OpenStax), licensed under CC BY.

Figure 4.4b (Text Version)

The graph has a vertical axis is rate of return (R) and a horizontal axis Quantity if financial capital (Q). The demand curve (D_0) slopes downward from left to right and the supply curve (S_0) slopes upward from left to right. The original equilibrium E_0 occurs where S_0 and D_0 intersect at interest rate R_0 and quantity of financial investment Q_0.

Figure 4.4b : Figure 4.4b shows a demand curve, D_0, and a supply curve, S_0, where the supply of capital includes the funds arriving from foreign investors. The original equilibrium E_0 occurs at interest rate R_0 and quantity of financial investment Q_0.The graph shows the demand for financial capital and supply of financial capital into the U.S. financial markets by the foreign sector before the increase in uncertainty regarding U.S. public debt. The original equilibrium (E_0) occurs at an equilibrium rate of return (R_0) and the equilibrium quantity is at Q_0.

Step 2. Will the diminished confidence in the U.S. economy as a place to invest affect demand or supply of financial capital?

Step 3. Will supply increase or decrease? When the enthusiasm of foreign investors' for investing their money in the U.S. economy diminishes, the supply of financial capital shifts to the left. Figure 4.4c shows the supply curve shift from S_0 to S1.

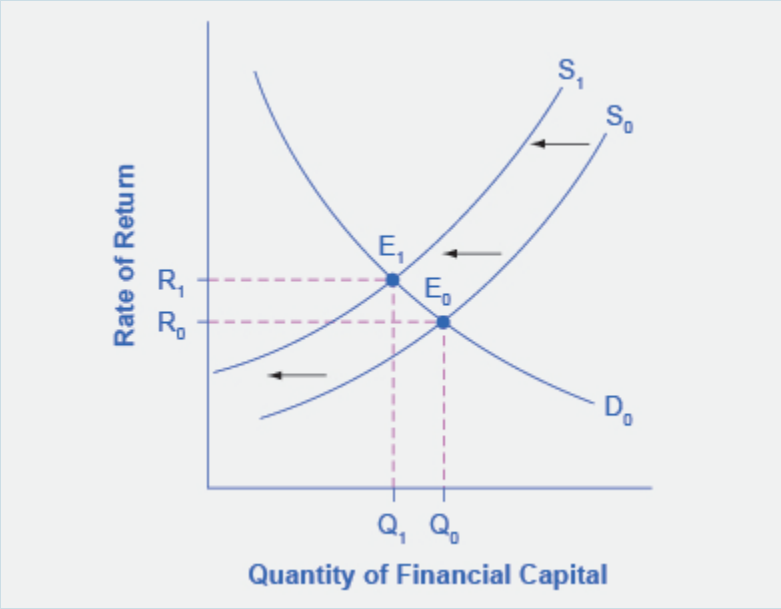

Figure 4.4c The United States as a Global Borrower Before and After U.S. Debt Uncertainty by Steven A. Greenlaw & Timothy Taylor (OpenStax), licensed under CC BY.

Figure 4.4c (Text Version)

Figure 4.4c uses Figure 2 as a base. The graph has a vertical axis is rate of return (R) and a horizontal axis Quantity if financial capital (Q). The original demand curve (D_0) slopes downward from left to right and the original supply curve (S_0) slopes upward from left to right. The original equilibrium E_0 occurs where S_0 and D_0 intersect at interest rate R_0 and quantity of financial investment Q_0. The supply curve shift from S_0 to the left to S_1. The original demand curve (D_0) now intersects with the new supply curve (S_1) at the new equilibrium E_1 interest rate R_1 and quantity of financial investment Q_1.

Figure 4.4c. The graph shows the demand for financial capital and supply of financial capital into the U.S. financial markets by the foreign sector before and after the increase in uncertainty regarding U.S. public debt. The original equilibrium (E_0) occurs at an equilibrium rate of return (R_0) and the equilibrium quantity is at Q_0.

Step 4. Compare the new equilibrium price and quantity to the original equilibrium price.

Check your answer[2]

2. **Step 2 Answer:** Yes, it will affect supply. Many foreign investors look to the U.S. financial markets to store their money in safe financial vehicles with low risk and stable returns. As the U.S. debt increases, debt servicing will increase—that is, more current income will be used to pay the

In a modern, developed economy, financial capital often moves invisibly through electronic transfers between one bank account and another. Yet these flows of funds can be analyzed with the same tools of demand and supply as markets for goods or labor.

Try It

An interactive H5P element has been excluded from this version of the text. You can view it online here: https://ecampusontario.pressbooks.pub/laboureconomics/?p=650#h5p-2

Try It – Text version

1. After hurricane Harvey hit Texas and flooded thousands of homes, there was a critical need for cleaning, repair and rebuilding. In the labor market for home repair, the demand would be represented by:
    a. construction and home repair firms, while the supply would be represented by the construction workers
    b. construction workers looking for work and the supply would be represented by the construction firms providing jobs.
    c. homeowners wanting home repair and the supply would be represented by construction and home repair firms.
2. After hurricane Harvey, you would expect the wages for home repair workers to:
    a. decrease as more workers enter the market.

---

interest rate on past debt. Increasing U.S. debt also means that businesses may have to pay higher interest rates to borrow money, because business is now competing with the government for financial resources. **Step 4 Answer**: The economy has experienced an enormous inflow of foreign capital. According to the U.S. Bureau of Economic Analysis, by the third quarter of 2014, U.S. investors had accumulated $24.6 trillion of foreign assets, but foreign investors owned a total of $30.8 trillion of U.S. assets. If foreign investors were to pull their money out of the U.S. economy and invest elsewhere in the world, the result could be a significantly lower quantity of financial investment in the United States, available only at a higher interest rate. This reduced inflow of foreign financial investment could impose hardship on U.S. consumers and firms interested in borrowing.

b. increase as the supply of home repair workers decreases.
c. increase as the demand for home repair workers increases.

Check your Answers: [3]

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3. 1. (a) In labor markets, firms represent the demand for labor and the workers make up the supply for labor. 2. (c) As a large number of additional homeowners demand home repair, the demand for the service and the labor needed for home repair increases and therefore the wages of that labor also increases.

4.5 - PUTTING IT TOGETHER: APPLICATIONS OF SUPPLY AND DEMAND

This module showed that the theories of supply and demand can be applied to a variety of real world issues. Market outcomes can be evaluated based on the amount of net value created for society, which can be measured by consumer, producer and social surplus. Price ceilings and price floors result in deadweight loss–the loss of economic value caused by operating at an inefficient quantity of output.

Let's return to the example of the minimum wage. Careful analysis shows that imposition of, or increases in the minimum wage have significant distributional effects. In other words, there are winners and losers from the policy. The winners are workers who continue to have a job, but are now paid a higher salary. The losers are businesses who have to pay more for their employees. This increase in production costs will be passed on, in part to consumers who will end up paying higher prices for the businesses' products. So consumers lose also. The big losers, though, are the people who had jobs at the lower wage, but lose them when the minimum wage is increased. Which employees are most likely to lose their jobs, the most experienced and skilled, or the least experienced and skilled? Don't forget that ultimately what matters is the size of these effects. These are the technical details that policy analysts will look at before making any recommendations to decision makers.

Consider Groupon, a website which offers significant discounts on purchases at businesses people frequently use. It's not unusual to obtain 50% off the normal price. Why do customers like Groupon? Because it increases the consumer surplus they obtain on purchases.

Figure 4.5a. Image (https://www.flickr.com/photos/jeepersmedia/16163681065) by Mike Mozart, licensed under CC BY 2.0.

Why do businesses offer Groupon campaigns? Part of it is advertising, to attract customers who aren't familiar with those businesses. Some businesses offer regular Groupon deals. They must be doing this to increase their producer surplus (i.e., profit). This is likely part of a larger strategy, called *price discrimination,* which you will learn more about when you study the theory of the firm. For now, it is enough to understand that Groupon campaigns enhance producer surplus.

Since both consumer surplus and producer surplus increase, we can say that total economic (or social) surplus has increased. This is just another way of saying that transactions benefit both parties, or as economists would say, this is a more efficient outcome for society. Computing the additional consumer and producer surplus tells us by how much economic surplus has increased.

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4.6 - LABOUR MARKETS

Learning Objectives

- Describe labour markets; explain why the value of the marginal product of labour is the demand for labour

What is the labour market?

The labour market is the term that economists use for all the different markets for labour. There is no single labour market. Rather, there is a different market for every different type of labour. Labour differs by type of work (e.g. retail sales vs. scientist), skill level (entry level or more experienced), and geographic location (the market for administrative assistants is probably more local or regional than the market for university presidents). While each labour market is different, they all tend to respond to similar disturbances in similar ways. For example, when wages go up for one type of job in an industry, they tend to go up in other types of jobs too. When economists talk about the labour market, they are describing these similarities.

The labour market, like all markets, has a demand and a supply. Why do firms demand labour? Why is an employer willing to pay you for your work? It's not because the employer likes you or is socially conscious. Rather, it's because your labour is worth something to the employer–your work brings in revenues to the

firm. How much is an employer willing to pay? That depends on the skills and experience you bring to the firm.

If a firm wants to maximize profits, it will never pay more (in terms of wages and benefits) for a worker than the value of his or her marginal productivity to the firm. We call this the **first rule of labour markets**.

Suppose a worker can produce two widgets per hour and the firm can sell each widget for $4 each. Then the worker is generating $8 per hour in revenues to the firm, and a profit-maximizing employer will pay the worker up to, but no more than, $8 per hour, because that is what the worker is worth to the firm.

Recall the definition of marginal product. Marginal product is the additional output a firm can produce by adding one more worker to the production process. Since employers often hire labour by the hour, we'll define marginal product as the additional output the firm produces by adding one more worker hour to the production process. In this module, we assume that workers are homogeneous—they have the same background, experience and skills and they put in the same amount of effort. Thus, marginal product depends on the capital and technology with which workers have to work.

A typist can type more pages per hour with an electric typewriter than a manual typewriter, and he or she can type even more pages per hour with a personal computer and word processing software. A ditch digger can dig more cubic feet of dirt in an hour with a backhoe than with at shovel.

We can define the demand for labour as the marginal product of labour times the value of that output to the firm.

Table 4.6a. Marginal Product of Labour

# Workers (L)	1	2	3	4
MP_L	4	3	2	1

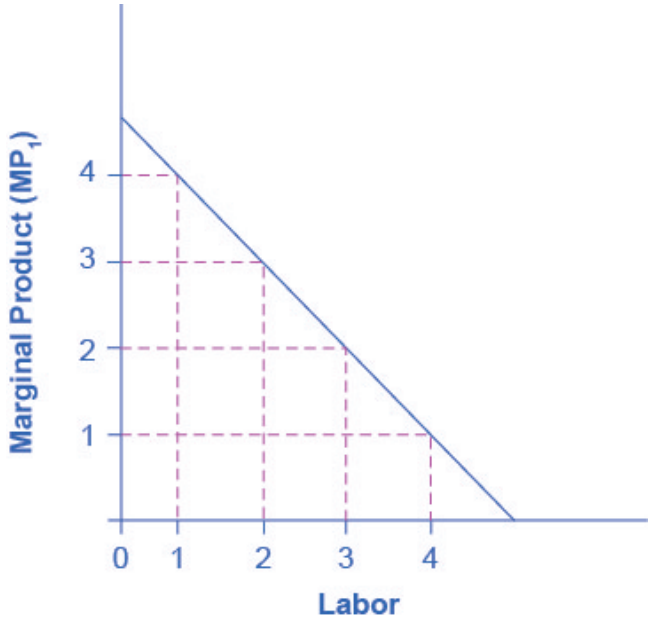

Table 4.6a. Marginal Product of Labour.
Because of fixed capital, the marginal product of labour declines as the employer hires additional workers. Marginal Product of Labor by Steven A. Greenlaw & David Shapiro (OpenStax), licensed under CC BY.

On what does the value of each worker's marginal product depend? If we assume that the employer sells its output in a perfectly competitive market, the value of each worker's output will be the market price of the product. Thus:

$$\text{Demand for Labour} = \text{MP}_L \times \text{P} = \text{Value of the Marginal Product of Labour}.$$

We show this in Table 2, which is an expanded version of Table 1.

Table 4.6b. Value of the Marginal Product of Labour

# Workers (L)	1	2	3	4
MP_L	4	3	2	1
Price of Output	$4	$4	$4	$4
VMP_L	$16	$12	$8	$4

Note that the value of each additional worker is less than the ones who came before.

Thus, the demand for labour (that is, the value of the **marginal product of labour** is downward sloping as the firm hires additional labour.

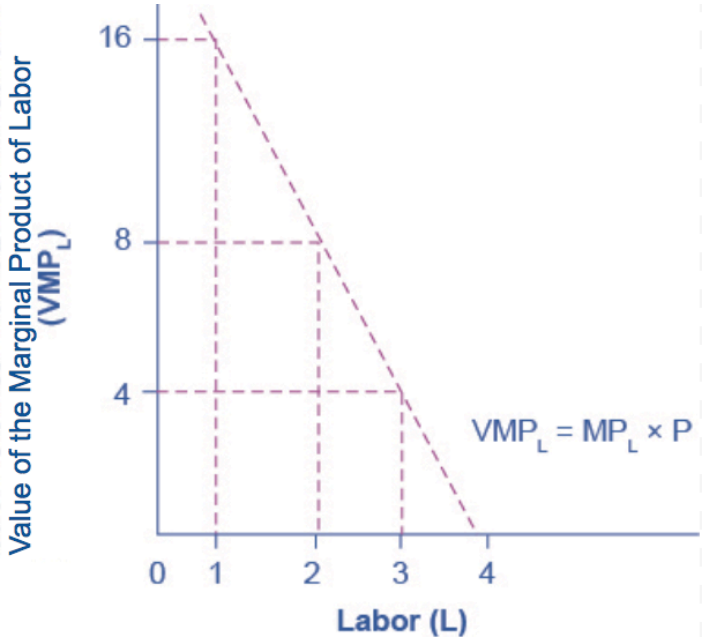

Figure 4.6b. Value of the Marginal Product of Labour. For firms operating in a competitive output market, the value of additional output sold is the price the firms receive for the output. Since MPL declines with additional labour employed, while that marginal product is worth the market price, the value of the marginal product declines as employment increases. Value of the Marginal Product of Labor by Steven A. Greenlaw & David Shapiro (OpenStax), licensed under CC BY.

Watch It

The video *The Marginal Product of Labour* takes us through the example of a restaurant interested in hiring janitors. With clean facilities, a restaurant will make more money, but they must consider the cost of a janitor versus the benefit from their labour. Watch the selected clip from this video to see how this correlates to a supply and demand graph.

Watch The Marginal Product of Labor (https://www.youtube.com/watch?v=G7ai5LAehqg) (10 mins)

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Video Source: Marginal Revolution University. (2015, April 7). *The marginal product of labor [Video]*. YouTube. https://www.youtube.com/watch?v=G7ai5LAehqg. Licensed under CC BY-ND 4.0.

Try It

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Try It – Text Version

1. Which of the following is correct concerning labour markets?
    a. Labour markets lack the supply and demand economic model.
    b. Labour differs by type of work.
    c. There is one type of labour market.
2. The demand for labour is the price of output multiplied by the marginal product of labour which is also the _____.
    a. value of the marginal product of labour
    b. minimum marginal product of labour
    c. maximum marginal product of labour

Check your Answers: [1]

1. **Question 1.** b) For example, retail sales, educators, and scientists. **Question 2.** a) The demand for labour, that is, the value of the marginal product of labour is downward sloping as the firm hires additional labour. For firms operating in a competitive output market, the value of additional output sold is the price the firms receive for the output. Since MPL declines with additional labour employed, while that marginal product is worth the market price, the value of the marginal product declines as employment increases.

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Try It

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Try it 2 – Text version

1. The table below shows data for the production of Pineapples for an individual firm. Given this data, what is the marginal product of labour when quantity increases from 2 by one unit?

Workers vs Pineapple Production

Number of workers	Number of Pineapples
0	0
1	10
2	18
3	24
4	28
5	30

2. The table below shows data for the production of Bags for an individual firm. Given this data, what is marginal product of labour when quantity increases from 10 by ten units? Hint: Marginal product is the additional output of one more worker. Mathematically, Marginal product is the change in total output divided by the change in labour

Workers vs Bag production

Number of workers	Number of Bags
0	0
10	20
20	36
30	48
40	56
50	60

3. The table below shows data for the production of Jackets for an individual firm operating in a perfectly competitive market. Suppose that the price of Jackets is $3. Given this data, calculate the Marginal Product of Labour (MP_L) and the Value of the Marginal Product of Labour (VMP_L) if the quantity of output was 30 jackets.

Workers vs. Jacket production

Number of workers	Number of Jackets
0	0
10	80
20	144
30	192
40	224
50	240

Hint: Marginal product is the additional output of one more worker. Mathematically, Marginal product is the change in total output divided by the change in labour. $\mathrm{VMP}_L = \mathrm{MP}_L \times \mathrm{P}$

Check your Answers: [2]

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2. **Question 1)** 6. **Question 2)** 1.6 **Question 3)** MPL = 4.8, VMPL=14.4

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4.7 - THE DEMAND FOR LABOUR

Learning Objectives

- Explain and graph the demand for labour in perfectly competitive output markets
- Explain and graph the demand for labour in imperfectly competitive output markets
- Demonstrate how supply and demand interact to determine the market wage rate

Demand for Labour in Perfectly Competitive Output Markets

The question for any firm is how much labour to hire.

We can define a **perfectly competitive labour market** as one where firms can hire all the labour they wish at the going market wage. Think about secretaries in a large city. Employers who need secretaries can probably hire as many as they need if they pay the going wage rate.

Graphically, this means that firms face a horizontal supply curve for labour, as seen in Figure 4.7a Equilibrium Employment for Firms in a Competitive Labour Market.

Given the market wage, profit maximizing firms hire workers up to the point where: $W_{mkt} = VMP_L$

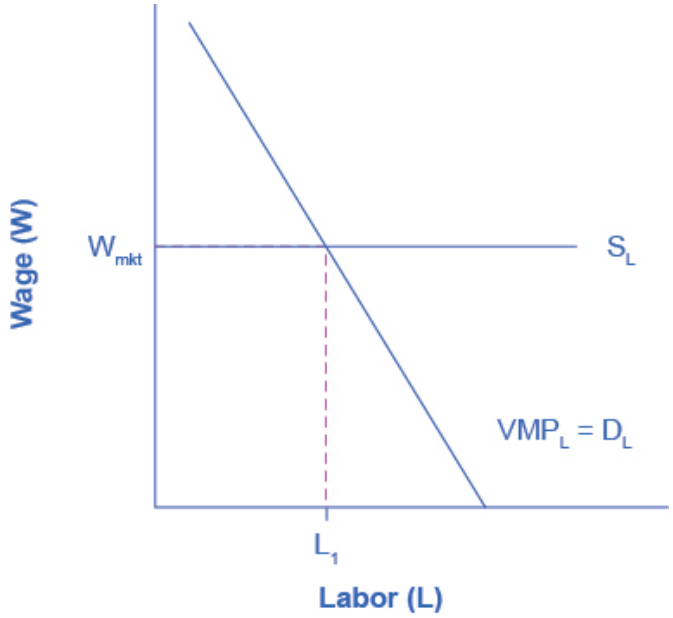

Figure 4.7a Equilibrium Employment for Firms in a Competitive Labour Market. In a perfectly competitive labour market, firms can hire all the labour they want at the going market wage. Therefore, they hire workers up to the point L_1 where the going market wage equals the value of the marginal product of labour. Figure by Steven A. Greenlaw & David Shapiro (OpenStax), licensed under CC BY 4.0.

Figure 4.7a Equilibrium Employment for Firms in a Competitive Labour Market (Text Version)

The graph shows the Marginal Product of Labour. The x-axis is Labour. The y-axis is Wage. The curve proceeds from right to left in a downward direction. A horizontal line (S_L) indicating the going market wage projects from about halfway up the y-axis at point W_{mkt}. Where the curve and the horizontal line meet, it is point L_1. $W_{mkt} = VMP_L$

Derived Demand

Economists describe the demand for inputs like labour as a derived demand. Since the demand for labour is MPL*P, it is dependent on the demand for the product the firm is producing. We show this by the P term in the demand for labour. An increase in demand for the firm's product drives up the product's price, which increases the firm's demand for labour. Thus, we derive the demand for labour from the demand for the firm's output.

Try It

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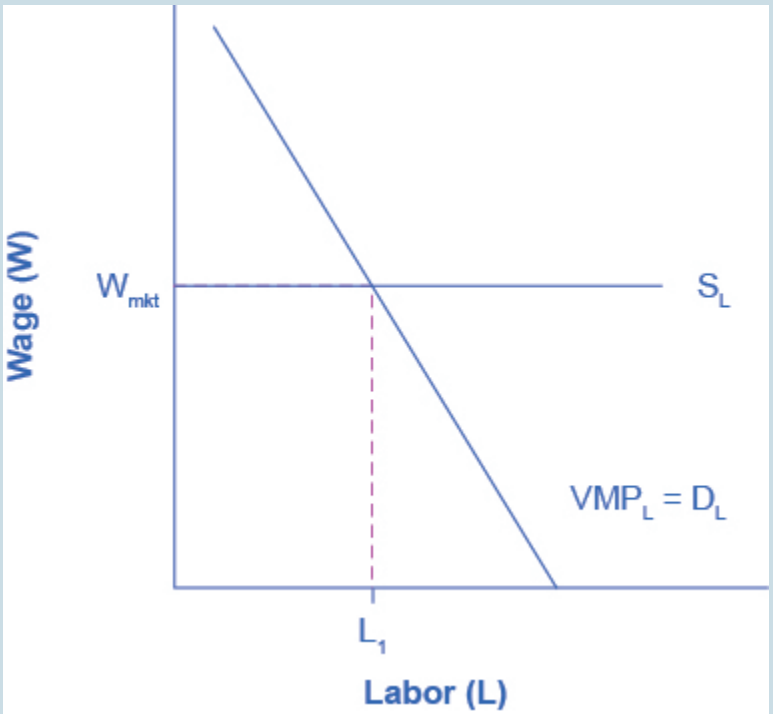
Try It – Text version



H5P Figure. Image by Steven A. Greenlaw, & David Shapiro (openstax), licensed under CC BY 4.0.

H5P Figure (Text Version)

The graph shows the Marginal Product of Labour. The x-axis is Labour. The y-axis is Wage. The curve proceeds from right to left in a downward direction. A horizontal line (S_L) indicating the going market wage projects from about halfway up the y-axis at point W_{mkt}. Where the curve and the horizontal line meet, it is point L_1. $\mathrm{VMP_L} = \mathrm{D_L}$.

1. Considering the figure above, the demand for labour is considered a(n) _____.
    a. Perfect competitive labour market
    b. Derived demand labour market
    c. Imperfectly competitive labour market

Check your Answers: [1]

Activity source: "The Demand for Labor (https://courses.lumenlearning.com/wm-microeconomics/

1. 1. a) Correct. In a perfectly competitive labour market, firm can hire all the labour they want at the going market wage. Therefore, they hire workers up to the point L1 where the going market wage equals the value of the marginal product of labour.

chapter/the-demand-for-labor/)" In by Lumen Learning, licensed under CC BY. / Converted to H5P and Text.

Demand for Labour in Imperfectly Competitive Output Markets

If an employer does not sell its output in a perfectly competitive industry, it faces a downward sloping demand curve for output. This means that in order to sell additional output the firm must lower its price. This is true if the firm is a monopoly, but it's also true if the firm is an oligopoly or monopolistically competitive. In this situation, the value of an additional unit of output sold is the marginal revenue, rather than the price. This means that a worker's marginal product is valued by the marginal revenue, not the price. Thus, the demand for labour is the marginal product times the marginal revenue, which we call the **marginal revenue product**.$\text{The Demand for Labour} = \text{MP}_\text{L} \times \text{MR} = \text{Marginal Revenue Product}$

Table 4.7a. Marginal Revenue Product of Labour

# Workers (L)	1	2	3	4
MP_L	4	3	2	1
Marginal Revenue	$4	$3	$2	$1
MRP_L	$16	$9	$4	$1

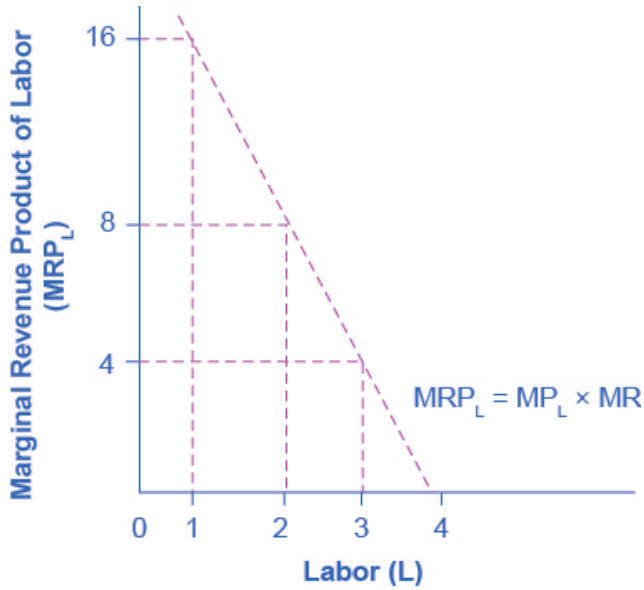


Figure 4.7b Marginal Revenue Product. For firms with some market power in their output market, the value of additional output sold is the firm's marginal revenue. Since MPL declines with additional labour employed and since MR declines with additional output sold, the firm's marginal revenue declines as employment increases. Figure by Steven A. Greenlaw & David Shapiro (OpenStax), licensed under CC BY 4.0.

Everything else remains the same as we described above in the discussion of the labour demand in perfectly competitive labour markets. Given the market wage, profit-maximizing firms will hire workers up to the point where the market wage equals the marginal revenue product, as Figure 3 shows.

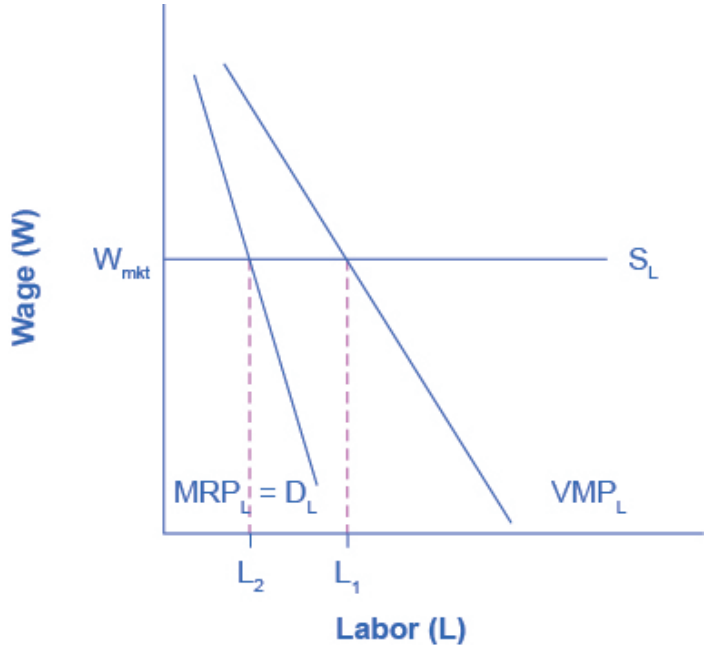


Figure 4.7c Equilibrium Level of Employment for Firms with Market Power. For firms with market power in their output market, they choose the number of workers, L_2, where the going market wage equals the firm's marginal revenue product. Note that since marginal revenue is less than price, the demand for labour for a firm which has market power in its output market is less than the demand for labour (L_1) for a perfectly competitive firm. As a result, employment will be lower in an imperfectly competitive industry than in a perfectly competitive industry. Figure by Steven A. Greenlaw & David Shapiro (OpenStax), licensed under CC BY 4.0.

Figure 4.7c Equilibrium Level of Employment for Firms with Market Power

The graph shows the Marginal Product of Labour. The x-axis is Labour. The y-axis is Wage. A horizontal line indicating the going market wage projects from about halfway up the y-axis. Two curves are included in order to demonstrate the difference for firms with market power. The first curve represents normal firms, and proceeds from right to left in a downward direction; where it intersects the Wage horizontal line, it is point L_1. The second curve, representing firms with market power, is steeper, and intersects the Wage line earlier (at a lower level of employment), at point L_2, where the going market wage equal's the firm's marginal revenue product.

Do profit maximizing employers exploit labour?

If you look back at Figure 14.6 Equilibrium Level of Employment for Firms with Market Power, you will see that the firm only pays the last worker it hires what they're worth to the firm. Every other worker brings in more revenue than the firm pays him or her. This has sometimes led to the claim that employers exploit workers because they do not pay workers what they are worth. Let's think about this claim. The first worker is worth $x to the firm, and the second worker is worth $y, but why are they worth that much? It is because of the capital and technology with which they work. The difference between workers' worth and their compensation goes to pay for the capital, and other inputs in the production process. The difference also goes to the employer's profit, without which the firm would close and workers wouldn't have a job. The firm may be earning excessive profits, but that is a different topic of discussion.

Try It

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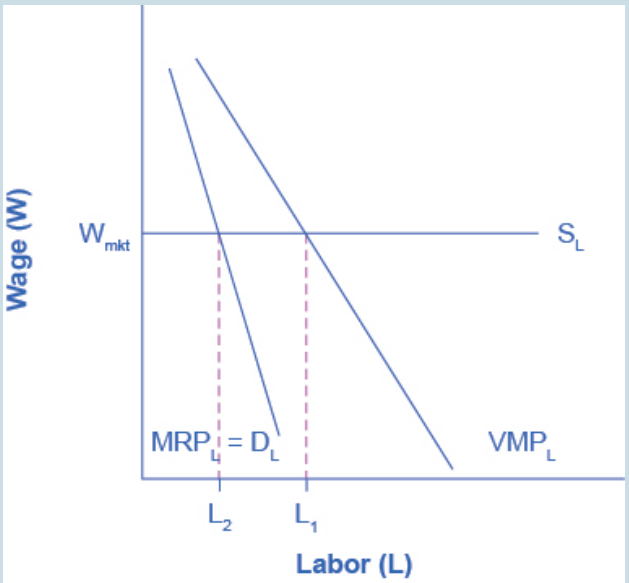

H5P Figure. Image by Steven A. Greenlaw, & David Shapiro (openstax), licensed under CC BY 4.0.

H5P Figure (Text Version)

The graph shows the Marginal Product of Labour. The x-axis is Labour. The y-axis is Wage. A horizontal line indicating the going market wage projects from about halfway up the y-axis. Two curves are included in order to demonstrate the difference for firms with market power. The first curve represents normal firms, and proceeds from right to left in a downward direction; where it intersects the Wage horizontal line, it is point L_1. The second curve, representing firms with market power, is steeper, and intersects the Wage line earlier (at a lower level of employment), at point L_2, where the going market wage equal's the firm's marginal revenue product.

1. Considering the graph above, the demand for labour is considered a(n) _____.
    a. Imperfectly competitive labour market
    b. Perfect competitive labour market
    c. Derived demand labour market

Check your Answers: [2]

2. **Question 1)** a) Correct. In a imperfectly competitive labour market, they choose the number of workers,(L2) where the going market wage equals the firm's marginal revenue product. Note that since marginal revenue is less than price, the demand for labour for a firm which has market power in its output market is less than the demand for labour(L1) for a perfectly competitive firm. As a result, employment will be lower in an imperfectly competitive industry than in a perfectly competitive industry.

Activity source: "The Demand for Labor (https://courses.lumenlearning.com/wm-microeconomics/chapter/the-demand-for-labor/)" In by Lumen Learning, licensed under CC BY. / Converted to H5P and Text.

What Determines the Going Market Wage Rate?

We learned earlier that the labour market has demand and supply curves like other markets. The demand for labour curve is a downward sloping function of the wage rate. The market demand for labour is the horizontal sum of all firms' demands for labour. The supply for labour curve is an upward sloping function of the wage rate. This is because if wages for a particular type of labour increase in a particular labour market, people with appropriate skills may change jobs, and vacancies will attract people from outside the geographic area. The market supply for labour is the horizontal summation of all individuals' supplies of labour.

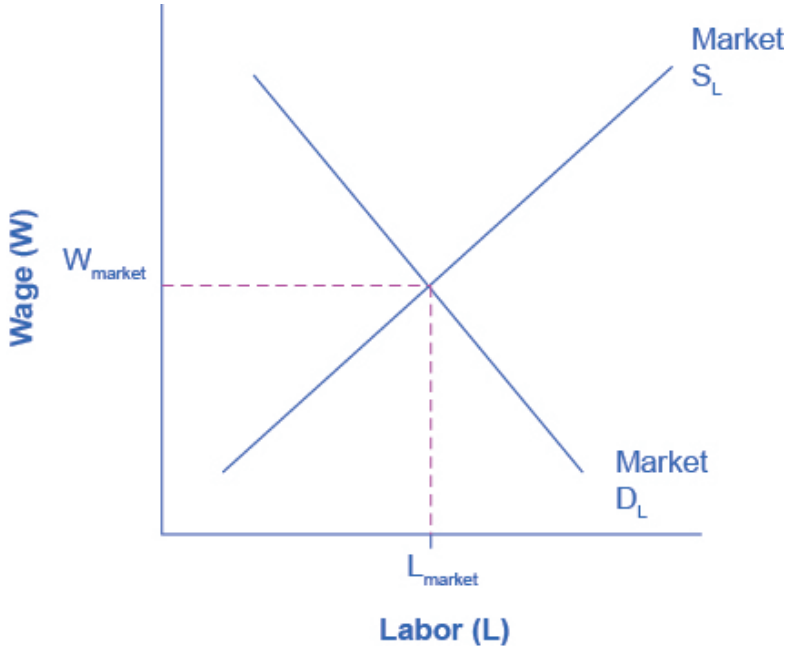

Figure 4.7d The Market Wage Rate. In a competitive labour market, the equilibrium wage and employment level are determined where the market demand for labour equals the market supply of labour. Figure by Steven A. Greenlaw & David Shapiro (OpenStax), licensed under CC BY 4.0.

Like all equilibrium prices, the market wage rate is determined through the interaction of supply and demand

in the labor market. Thus, we can see in Figure 4, the wage rate and number of workers hired in a competitive labor market.

Watch it

Watch this video for a nice overview of the labour market, and the ways that supply and demand interact to determine wages. The video will also introduce some of the key concepts we'll discuss soon, including monopsonies, unions, discrimination, and minimum wage laws.

Watch Labor Markets and Minimum Wage: Crash Course Economics #28 (https://www.youtube.com/watch?v=mWwXmH-n5Bo)(11 mins)

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Video Source: CrashCourse. (2016, March 27). *Labor markets and minimum wage: Crash course economics #28* [Video]. YouTube. https://www.youtube.com/watch?v=mWwXmH-n5Bo . Licensed under YouTube License.

Try It

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Try It – Text version

1. Supply and demand determine the labour market at equilibrium. _____ supply the labour

while _____ demand the labour. Fill in the two blanks with the appropriate terms:

a. Workers; firms
b. Firms; workers
c. Workers; consumers

Check your Answers: [3]

Activity source: "The Demand for Labor (https://courses.lumenlearning.com/wm-microeconomics/chapter/the-demand-for-labor/)" In by Lumen Learning, licensed under CC BY. / Converted to H5P and Text.

Additional Key Terms

collective bargaining:
negotiations between unions and a firm or firms
labour union:
an organization of workers that negotiates with employers over wages and working conditions
perfectly competitive labour market:
a labour market where neither suppliers of labour nor demanders of labour have any market power; thus, an employer can hire all the workers they would like at the going market wage
marginal revenue product of labour:
the marginal product of an additional worker multiplied by the marginal revenue to the firm of the additional worker's output

3. 1. a) Correct. In a competitive labour market, the equilibrium wage and employment level are determined where the market demand for labour equals the market supply of labour.

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4.8 - LABOUR SUPPLY

Learning Objectives

- If we want people to work more, should we pay them more or will that cause them to work less?

A number of physicists have changed careers to become researchers in finance or financial economics. Research in finance pays substantially better than research in physics, and yet requires many of the same mathematical skills like stochastic calculus. Physicists who see their former colleagues driving Porsches and buying summerhouses are understandably annoyed that research in finance—which is intellectually no more difficult or challenging than physics—pays so much better. Indeed, some physicists are saying that other fields—such as finance, economics, and law—"shouldn't" pay more than physics.

The difference in income between physics' researchers and finance researchers is an example of a **compensating differential**. A compensating differential is income or costs that equalize different choices. There are individuals who could become either physicists or finance researchers. At equal income, too many choose physics and too few choose finance, in the sense that there is a surplus of physicists and a shortage of finance researchers. Finance salaries must exceed physics' salaries in order to induce some of the researchers who are capable of doing either one to switch to finance, which compensates those individuals for doing the less desirable task.

Jobs that are dangerous or unpleasant must pay more than jobs requiring similar skills but without the bad attributes. Thus, oil-field workers in Alaska's North Slope, well above the Arctic Circle, earn a premium over workers in similar jobs in Houston, Texas. The premium—or differential pay—must be such that the marginal worker is indifferent between the two choices: The extra pay compensates the worker for the adverse working conditions. This is why it is known in economics' jargon by the phrase of a compensating differential.

The high salaries earned by professional basketball players are not compensating differentials. These salaries are not created because of a need to induce tall people to choose basketball over alternative jobs like painting

ceilings, but instead are payments that reflect the rarity of the skills and abilities involved. Compensating differentials are determined by alternatives, not by direct scarcity. Professional basketball players are well paid for the same reason that Picasso's paintings are expensive: There aren't very many of them relative to demand.

A compensating differential is a feature of other choices as well as career choices. For example, many people would like to live in California for its weather and scenic beauty. Given the desirability of California over, for example, Lincoln, Nebraska, or Rochester, New York, there must be a compensating differential for living in Rochester; and two significant ones are air quality and housing prices. Air quality worsens as populations rise, thus tending to create a compensating differential. In addition, the increase in housing prices also tends to compensate—housing is inexpensive in Rochester, at least compared with California. There are other compensations, besides housing, for living in Rochester—cross-country skiing and proximity to mountains and lakes, for example. Generally, employment is only a temporary factor that might compensate, because employment tends to be mobile, too, and move to the location that the workers prefer, when possible. It is not possible on Alaska's North Slope.

Housing prices also compensate for location within a city. For most people, it is more convenient—both in commuting time and for services—to be located near the central business district than in the outlying suburbs. The main compensating differentials are school quality, crime rates, and housing prices. We illustrate the ideas with a simple model of a city in the next section.

Key Takeaways

- Leisure—time spent not working—is a good like other goods, and the **utility** cost of working is less leisure.
- Labour **supply** is different from other goods because the wage enters the budget constraint twice—first as the price of leisure, and second as income from working.
- If goods and leisure are substitutes, so that an increase in L decreases the **marginal** value of goods, then an increase in wages must decrease leisure, and labour supply increases in wages.
- With strong **complements** between goods and leisure, an increase in wages induces fewer hours worked.
- Complementarity between goods and leisure is reasonable because it takes time to consume

goods.
- For most developed nations, increases in wages are associated with fewer hours worked.
- A **compensating differential** is income or costs that equalize different choices.
- Jobs that are dangerous or unpleasant must pay more than jobs requiring similar skills but without the bad attributes.
- The premium—or differential pay—must be such that the marginal worker is indifferent between the two choices: The extra pay compensates the worker for the adverse working conditions.
- City choice is also subject to compensating differentials, and significant differentials include air quality, crime rates, tax rates, and housing prices.

Exercises

1. A thought question: Does a bequest motive—the desire to give money to others—change the likelihood that goods and leisure are complements?
2. Show that an increase in the wage increases the consumption of goods; that is, x increases when the wage increases.

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4.9 - THEORY OF LABOUR MARKETS

Learning Objectives

- Describe the demand for labour in perfectly competitive output markets
- Describe the demand for labour in imperfectly competitive output markets
- Identify what determines the going market rate

Clear It Up

What is the labour market?

The labour market is the term that economists use for all the different markets for labour. There is no single labour market. Rather, there is a different market for every different type of labour. Labour differs by type of work (e.g. retail sales vs. scientist), skill level (entry level or more experienced), and location (the market for administrative assistants is probably more local or regional than the market for university presidents). While each labour market is different, they all tend to operate in similar ways. For example, when wages go up in one labour market, they tend to go up in others too. When economists talk about the labour market, they are describing these similarities.

The labour market, like all markets, has a demand and a supply. Why do firms demand labour? Why is an employer willing to pay you for your labour? It's not because the employer likes you or is socially conscious. Rather, it's because your labour is worth something to the employer–your work brings in revenues to the firm. How much is an employer willing to pay? That depends on the skills and experience you bring to the firm.

If a firm wants to maximize profits, it will never pay more (in terms of wages and benefits) for a worker than the value of his or her marginal productivity to the firm. We call this the **first rule of labour markets**.

Suppose a worker can produce two widgets per hour and the firm can sell each widget for $4 each. Then the worker is generating $8 per hour in revenues to the firm, and a profit-maximizing employer will pay the worker up to, but no more than, $8 per hour, because that is what the worker is worth to the firm.

Recall the definition of marginal product. Marginal product is the additional output a firm can produce by adding one more worker to the production process. Since employers often hire labour by the hour, we'll define marginal product as the additional output the firm produces by adding one more worker hour to the production process. In this chapter, we assume that workers are homogeneous—they have the same background, experience and skills and they put in the same amount of effort. Thus, marginal product depends on the capital and technology with which workers have to work.

A typist can type more pages per hour with an electric typewriter than a manual typewriter, and he or she can type even more pages per hour with a personal computer and word processing software. A ditch digger can dig more cubic feet of dirt in an hour with a backhoe than with at shovel.

Thus, we can define the demand for labour as the marginal product of labour times the value of that output to the firm.

Table 4.9a Marginal Product of Labour

# Workers (L)	1	2	3	4
MP_L	4	3	2	1

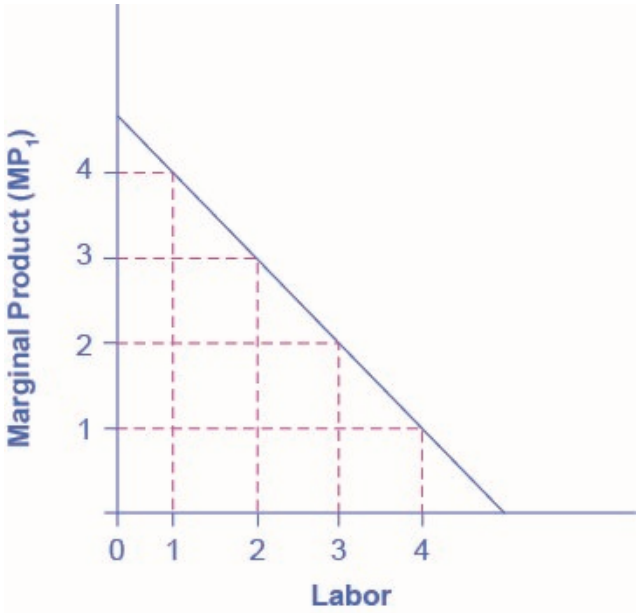

Figure 4.9a Marginal Product of Labour. Because of fixed capital, the marginal product of labour declines as the employer hires additional workers. Figure by Steven A. Greenlaw & David Shapiro (OpenStax), licensed under

On what does the value of each worker's marginal product depend? If we assume that the employer sells its output in a perfectly competitive market, the value of each worker's output will be the market price of the product. Thus,

Demand for Labour = MP_L x P = Value of the Marginal Product of Labour

The Demand for Labour = $MP_L \times P$ = Value of the Marginal Revenue Product

We show this in Table 4.9b, which is an expanded version of Table 4.9a.

Table 4.9b Marginal Revenue Product

# Workers (L)	1	2	3	4
MP_L	4	3	2	1
Price of Output	$4	$4	$4	$4
VMP_L	$16	$12	$8	$4

Note that the value of each additional worker is less than the ones who came before.

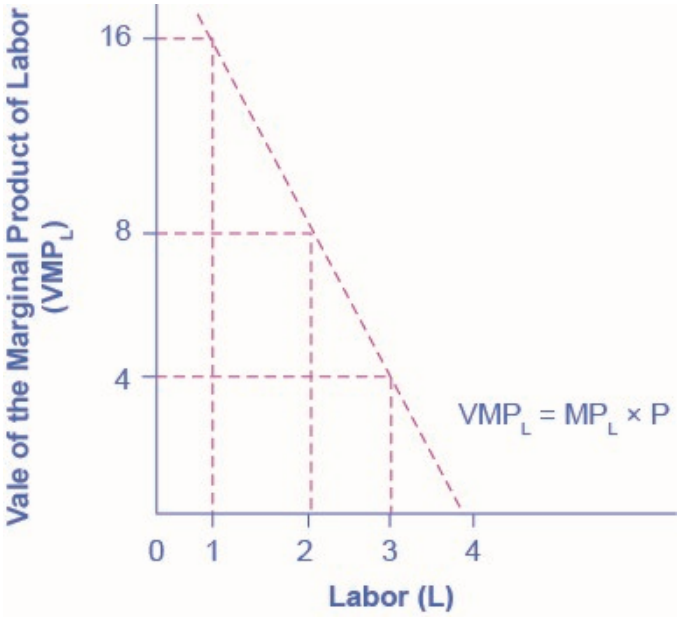

Figure 4.9b Value of the Marginal Product of Labour.For firms operating in a competitive output market, the value of additional output sold is the price the firms receive for the output. Since MPL declines with additional labour employed, while that marginal product is worth the market price, the value of the marginal product declines as employment increases. Figure by Steven A. Greenlaw & David Shapiro (OpenStax), licensed under CC BY 4.0.

Demand for Labour in Perfectly Competitive Output Markets

The question for any firm is how much labour to hire.

We can define a **Perfectly Competitive Labour Market** as one where firms can hire all the labour they wish at the going market wage. Think about secretaries in a large city. Employers who need secretaries can probably hire as many as they need if they pay the going wage rate.

Graphically, this means that firms face a horizontal supply curve for labour.

Given the market wage, profit maximizing firms hire workers up to the point where: $W_{mkt} = VMP_L$

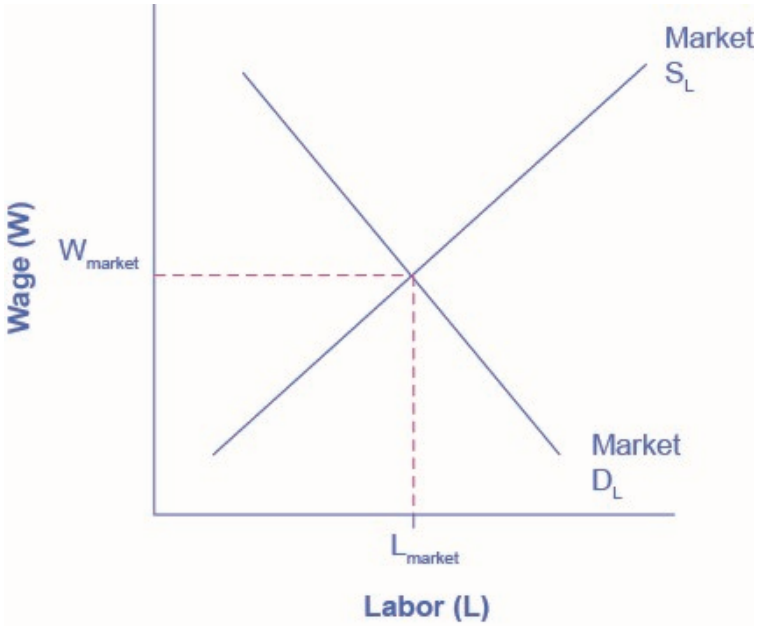

Figure 4.9c The Market Wage Rate. Figure by Steven A. Greenlaw & David Shapiro (OpenStax), licensed under CC BY 4.0.

In a perfectly competitive labour market, firms can hire all the labour they want at the going market wage. Therefore, they hire workers up to the point L_1 where the going market wage equals the value of the marginal product of labour.

Clear It Up

The probabilities assigned to events by a distribution function on a sample space are given by.

Derived Demand

Economists describe the demand for inputs like labour as a **derived demand**. Since the demand for labour is MPL*P, it is dependent on the demand for the product the firm is producing. We show this by the P term in the demand for labour. An increase in demand for the firm's product drives up the product's price, which increases the firm's demand for labour. Thus, we derive the demand for labour from the demand for the firm's output.

Demand for Labour in Imperfectly Competitive Output

Markets

If the employer does not sell its output in a perfectly competitive industry, they face a downward sloping demand curve for output, which means that in order to sell additional output the firm must lower its price. This is true if the firm is a monopoly, but it's also true if the firm is an oligopoly or monopolistically competitive. In this situation, the value of a worker's marginal product is the marginal revenue, not the price. Thus, the demand for labour is the marginal product times the marginal revenue.

$$\text{The Demand for Labour} = \text{MP}_\text{L} \times \text{MR} = \text{Marginal Revenue Product}$$

Table 4.9c Marginal Product of Labour

# Workers (L)	1	2	3	4
MP_L	4	3	2	1
Marginal Revenue	$4	$3	$2	$1
MRP_L	$16	$9	$4	$1

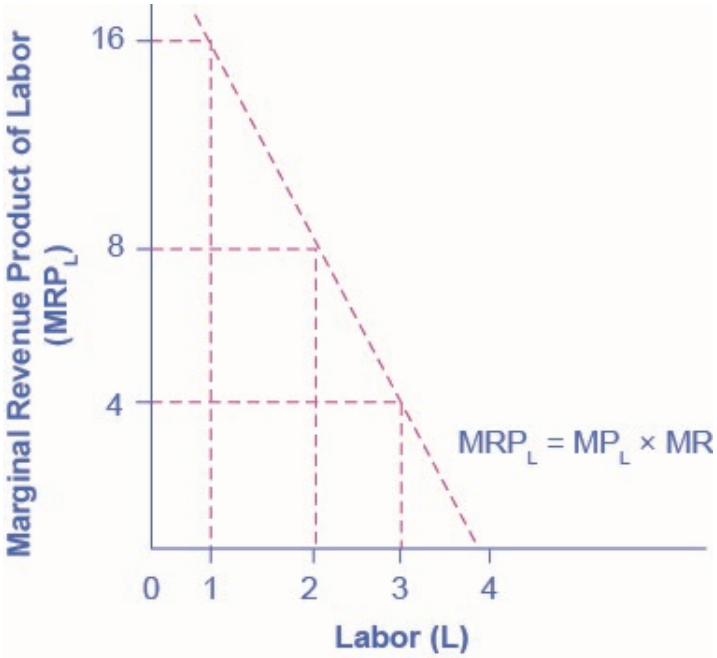

Figure 4.9d Marginal Revenue Product. For firms with some market power in their output market, the value of additional output sold is the firm's marginal revenue. Since MP_L declines with additional labour employed and since MR declines with additional output sold, the firm's marginal revenue declines as employment increases. Figure by Steven A. Greenlaw & David Shapiro (OpenStax), licensed under CC BY 4.0.

Everything else remains the same as we described above in the discussion of the labour demand in perfectly competitive labour markets. Given the market wage, profit-maximizing firms will hire workers up to the point where the market wage equals the marginal revenue product, as Figure 4.9d shows.

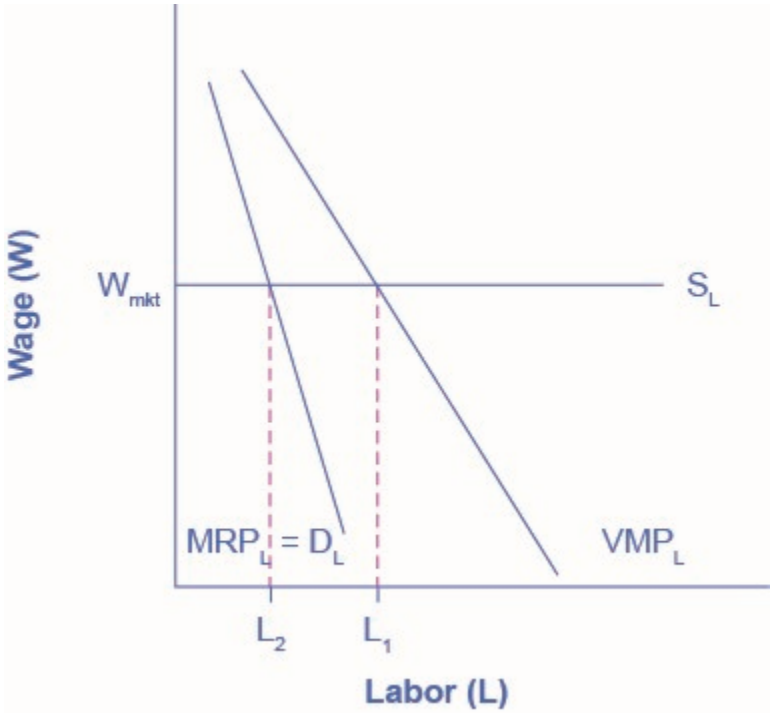

Figure 4.9e. Equilibrium Level of Employment for Firms with Market Power. For firms with market power in their output market, they choose the number of workers, L_2, where the going market wage equals the firm's marginal revenue product. Note that since marginal revenue is less than price, the demand for labour for a firm which has market power in its output market is less than the demand for labour (L_1) for a perfectly competitive firm. As a result, employment will be lower in an imperfectly competitive industry than in a perfectly competitive industry. Figure by Steven A. Greenlaw & David Shapiro (OpenStax), licensed under CC BY 4.0.

Clear It Up

The probabilities assigned to events by a distribution function on a sample space are given by.

Do Profit Maximizing Employers Exploit Labour?

Every other worker brings in more revenue than the firm pays him or her. This has sometimes led to the claim that employers exploit workers because they do not pay workers what they are worth. Let's think about this claim. The first worker is worth $x to the firm, and the second worker is worth $y, but why are they worth

that much? It is because of the capital and technology with which they work. The difference between workers' worth and their compensation goes to pay for the capital, technology, without which the workers wouldn't have a job. The difference also goes to the employer's profit, without which the firm would close and workers wouldn't have a job. The firm may be earning excessive profits, but that is a different topic of discussion.

What Determines the Going Market Wage Rate?

The labour market has demand and supply curves like other markets. The demand for labour curve is a downward sloping function of the wage rate. The market demand for labour is the horizontal sum of all firms' demands for labour. The supply for labour curve is an upward sloping function of the wage rate. This is because if wages for a particular type of labour increase in a particular labour market, people with appropriate skills may change jobs, and vacancies will attract people from outside the geographic area. The market supply for labour is the horizontal summation of all individuals' supplies of labour.

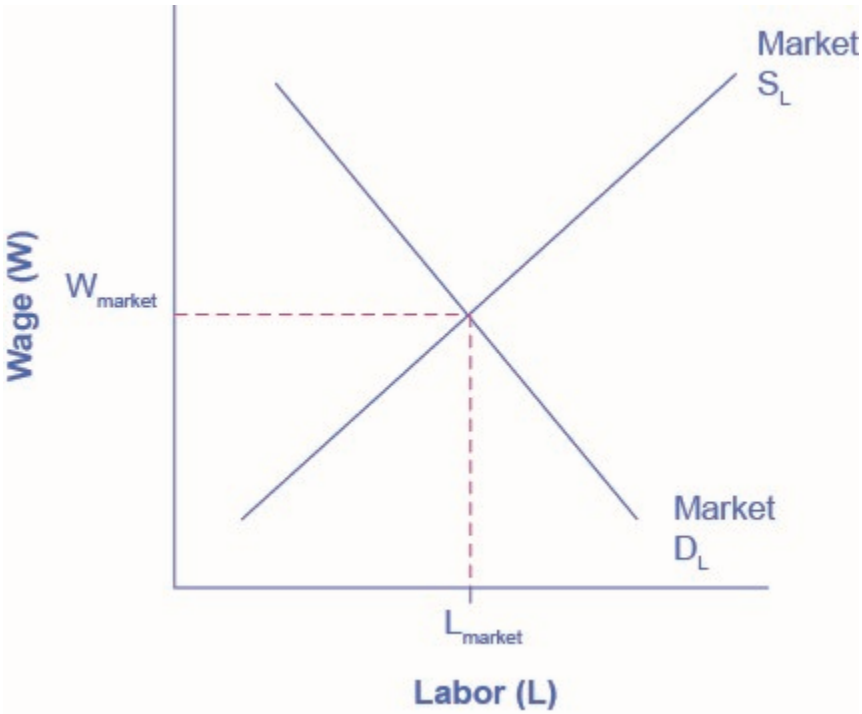

Figure 4.9f. The Market Wage Rate.In a competitive labour market, the equilibrium wage and employment level are determined where the market demand for labour equals the market supply of labour.
Like all equilibrium prices, the market wage rate is determined through the interaction of supply and demand in the labour market. Thus, we can see for competitive markets the wage rate and number of workers hired. Figure by Steven A. Greenlaw & David Shapiro (OpenStax), licensed under CC BY 4.0.

The FRED database has a great deal of data on labour markets, starting at the wage rate and number of workers hired [New Tab] (https://fred.stlouisfed.org/categories/10).

The United States Census Bureau for the Bureau of Labor Statistics publishes *The Current Population Survey*, which is a monthly survey of households (link is on that page), which provides data on labour supply, including numerous measures of the labour force size (disaggregated by age, gender and educational attainment), labour force participation rates for different demographic groups, and employment. It also includes more than 3,500 measures of earnings by different demographic groups.

The Current Employment Statistics, which is a survey of businesses, offers alternative estimates of employment across all sectors of the economy.

The link labeled "Productivity and Costs" has a wide range of data on productivity, labour costs and profits across the business sector.

Attribution

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4.10 - DEMAND AND SUPPLY AT WORK IN LABOUR MARKETS

Learning Objectives

- Predict shifts in the demand and supply curves of the labour market
- Explain the impact of new technology on the demand and supply curves of the labour market
- Explain price floors in the labour market such as minimum wage or a living wage

Markets for labour have demand and supply curves, just like markets for goods. The law of demand applies in labour markets this way: A higher salary or wage—that is, a higher price in the labour market—leads to a decrease in the quantity of labour demanded by employers, while a lower salary or wage leads to an increase in the quantity of labour demanded. The law of supply functions in labour markets, too: A higher price for labour leads to a higher quantity of labour supplied; a lower price leads to a lower quantity supplied.

Equilibrium in the Labour Market

In 2015, about 35,000 registered nurses worked in the Minneapolis-St. Paul-Bloomington, Minnesota-Wisconsin metropolitan area, according to the BLS. They worked for a variety of employers: hospitals, doctors' offices, schools, health clinics, and nursing homes.
Figure 4.10a illustrates how demand and supply determine equilibrium in this labour market. The demand and supply schedules in Table 4.10a list the quantity supplied and quantity demanded of nurses at different salaries.

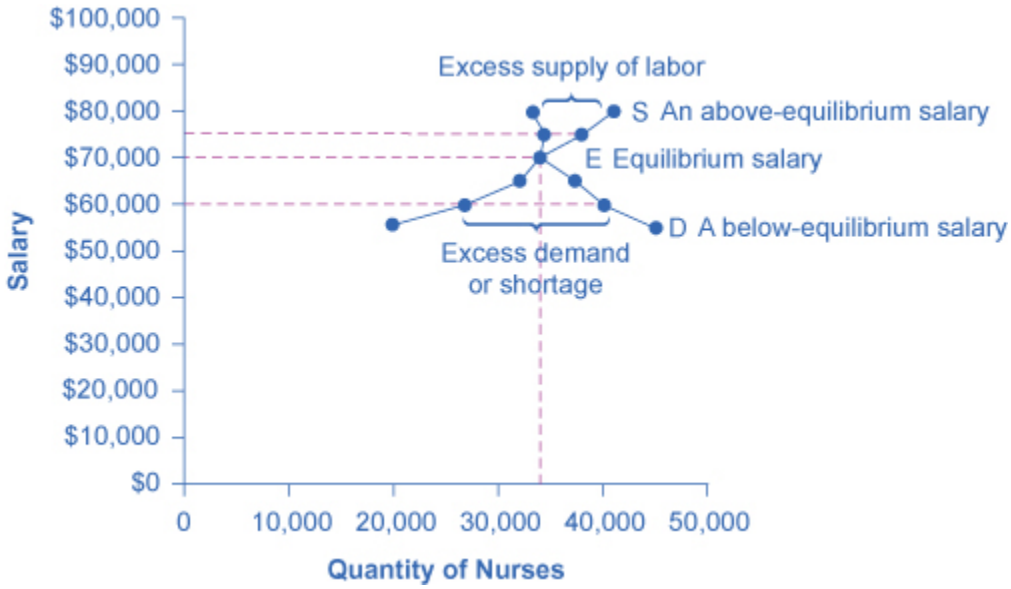

Figure 4.10a Labour Market Example: Demand and Supply for Nurses in Minneapolis-St. Paul-Bloomington. Figure by Steven A. Greenlaw & David Shapiro (OpenStax), licensed under CC BY 4.0.

Figure 4.10a (seen above) shows the demand curve (D) of those employers who want to hire nurses intersects with the supply curve (S) of those who are qualified and willing to work as nurses at the equilibrium point (E). The equilibrium salary is $70,000 and the equilibrium quantity is 34,000 nurses. At an above-equilibrium salary of $75,000, quantity supplied increases to 38,000, but the quantity of nurses demanded at the higher pay declines to 33,000. At this above-equilibrium salary, an excess supply or surplus of nurses would exist. At a below-equilibrium salary of $60,000, quantity supplied declines to 27,000, while the quantity demanded at the lower wage increases to 40,000 nurses. At this below-equilibrium salary, excess demand or a shortage exists.

Table 4.10a Demand and Supply of Nurses in Minneapolis-St. Paul-Bloomington

Annual Salary	Quantity Demanded	Quantity Supplied
$55,000	45,000	20,000
$60,000	40,000	27,000
$65,000	37,000	31,000
$70,000	34,000	34,000
$75,000	33,000	38,000
$80,000	32,000	41,000

The horizontal axis shows the quantity of nurses hired. In this example we measure labour by number of workers, but another common way to measure the quantity of labour is by the number of hours worked. The

vertical axis shows the price for nurses' labour—that is, how much they are paid. In the real world, this "price" would be total labour compensation: salary plus benefits. It is not obvious, but benefits are a significant part (as high as 30 percent) of labour compensation. In this example we measure the price of labour by salary on an annual basis, although in other cases we could measure the price of labour by monthly or weekly pay, or even the wage paid per hour. As the salary for nurses rises, the quantity demanded will fall. Some hospitals and nursing homes may reduce the number of nurses they hire, or they may lay off some of their existing nurses, rather than pay them higher salaries. Employers who face higher nurses' salaries may also try to replace some nursing functions by investing in physical equipment, like computer monitoring and diagnostic systems to monitor patients, or by using lower-paid health care aides to reduce the number of nurses they need.

As the salary for nurses rises, the quantity supplied will rise. If nurses' salaries in Minneapolis-St. Paul-Bloomington are higher than in other cities, more nurses will move to Minneapolis-St. Paul-Bloomington to find jobs, more people will be willing to train as nurses, and those currently trained as nurses will be more likely to pursue nursing as a full-time job. In other words, there will be more nurses looking for jobs in the area.

At equilibrium, the quantity supplied and the quantity demanded are equal. Thus, every employer who wants to hire a nurse at this equilibrium wage can find a willing worker, and every nurse who wants to work at this equilibrium salary can find a job. In Figure 4.10a, the supply curve (S) and demand curve (D) intersect at the equilibrium point (E). The equilibrium quantity of nurses in the Minneapolis-St. Paul-Bloomington area is 34,000, and the equilibrium salary is $70,000 per year. This example simplifies the nursing market by focusing on the "average" nurse. In reality, of course, the market for nurses actually comprises many smaller markets, like markets for nurses with varying degrees of experience and credentials. Many markets contain closely related products that differ in quality. For instance, even a simple product like gasoline comes in regular, premium, and super-premium, each with a different price. Even in such cases, discussing the average price of gasoline, like the average salary for nurses, can still be useful because it reflects what is happening in most of the submarkets.

When the price of labour is not at the equilibrium, economic incentives tend to move salaries toward the equilibrium. For example, if salaries for nurses in Minneapolis-St. Paul-Bloomington were above the equilibrium at $75,000 per year, then 38,000 people want to work as nurses, but employers want to hire only 33,000 nurses. At that above-equilibrium salary, excess supply or a surplus results. In a situation of excess supply in the labour market, with many applicants for every job opening, employers will have an incentive to offer lower wages than they otherwise would have. Nurses' salary will move down toward equilibrium.

In contrast, if the salary is below the equilibrium at, say, $60,000 per year, then a situation of excess demand or a shortage arises. In this case, employers encouraged by the relatively lower wage want to hire 40,000 nurses, but only 27,000 individuals want to work as nurses at that salary in Minneapolis-St. Paul-Bloomington. In response to the shortage, some employers will offer higher pay to attract the nurses. Other employers will have

to match the higher pay to keep their own employees. The higher salaries will encourage more nurses to train or work in Minneapolis-St. Paul-Bloomington. Again, price and quantity in the labour market will move toward equilibrium.

Shifts in Labour Demand

The demand curve for labour shows the quantity of labour employers wish to hire at any given salary or wage rate, under the *ceteris paribus* assumption. A change in the wage or salary will result in a change in the quantity demanded of labour. If the wage rate increases, employers will want to hire fewer employees. The quantity of labour demanded will decrease, and there will be a movement upward along the demand curve. If the wages and salaries decrease, employers are more likely to hire a greater number of workers. The quantity of labour demanded will increase, resulting in a downward movement along the demand curve.

Shifts in the demand curve for labour occur for many reasons. One key reason is that the demand for labour is based on the demand for the good or service that is produced. For example, the more new automobiles consumers demand, the greater the number of workers automakers will need to hire. Therefore the demand for labour is called a "derived demand." Here are some examples of derived demand for labour:

- The demand for chefs is dependent on the demand for restaurant meals.
- The demand for pharmacists is dependent on the demand for prescription drugs.
- The demand for attorneys is dependent on the demand for legal services.

As the demand for the goods and services increases, the demand for labour will increase, or shift to the right, to meet employers' production requirements. As the demand for the goods and services decreases, the demand for labour will decrease, or shift to the left. Table 4.10b shows that in addition to the derived demand for labour, demand can also increase or decrease (shift) in response to several factors.

Table 4.10b Factors That Can Shift Demand

Factors	Results
Demand for Output	When the demand for the good produced (output) increases, both the output price and profitability increase. As a result, producers demand more labour to ramp up production.
Education and Training	A well-trained and educated workforce causes an increase in the demand for that labour by employers. Increased levels of productivity within the workforce will cause the demand for labour to shift to the right. If the workforce is not well-trained or educated, employers will not hire from within that labour pool, since they will need to spend a significant amount of time and money training that workforce. Demand for such will shift to the left.
Technology	Technology changes can act as either substitutes for or complements to labour. When technology acts as a substitute, it replaces the need for the number of workers an employer needs to hire. For example, word processing decreased the number of typists needed in the workplace. This shifted the demand curve for typists left. An increase in the availability of certain technologies may increase the demand for labour. Technology that acts as a complement to labour will increase the demand for certain types of labour, resulting in a rightward shift of the demand curve. For example, the increased use of word processing and other software has increased the demand for information technology professionals who can resolve software and hardware issues related to a firm's network. More and better technology will increase demand for skilled workers who know how to use technology to enhance workplace productivity. Those workers who do not adapt to changes in technology will experience a decrease in demand.
Number of Companies	An increase in the number of companies producing a given product will increase the demand for labour resulting in a shift to the right. A decrease in the number of companies producing a given product will decrease the demand for labour resulting in a shift to the left.
Government Regulations	Complying with government regulations can increase or decrease the demand for labour at any given wage. In the healthcare industry, government rules may require that nurses be hired to carry out certain medical procedures. This will increase the demand for nurses. Less-trained healthcare workers would be prohibited from carrying out these procedures, and the demand for these workers will shift to the left.
Price and Availability of Other Inputs	Labour is not the only input into the production process. For example, a salesperson at a call center needs a telephone and a computer terminal to enter data and record sales. If prices of other inputs fall, production will become more profitable and suppliers will demand more labour to increase production. This will cause a rightward shift in the demand curve for labour. The opposite is also true. Higher prices for other inputs lower demand for labour.

Link It Up

To learn more Georgian College students can access the article Trends and Challenges for Work in the 21st Century [New Tab]. (https://georgian.primo.exlibrisgroup.com/permalink/01OCLS_GEORG/21p491/cdi_proquest_reports_218453209)

Shifts in Labour Supply

The supply of labour is upward-sloping and adheres to the law of supply: The higher the price, the greater the

quantity supplied and the lower the price, the less quantity supplied. The supply curve models the tradeoff between supplying labour into the market or using time in leisure activities at every given price level. The higher the wage, the more labour is willing to work and forego leisure activities. Table 4.10c lists some of the factors that will cause the supply to increase or decrease.

Table 4.10c Factors that Can Shift Supply

Factors	Results
Number of Workers	An increased number of workers will cause the supply curve to shift to the right. An increased number of workers can be due to several factors, such as immigration, increasing population, an aging population, and changing demographics. Policies that encourage immigration will increase the supply of labour, and vice versa. Population grows when birth rates exceed death rates. This eventually increases supply of labour when the former reach working age. An aging and therefore retiring population will decrease the supply of labour. Another example of changing demographics is more women working outside of the home, which increases the supply of labour.
Required Education	The more required education, the lower the supply. There is a lower supply of PhD mathematicians than of high school mathematics teachers; there is a lower supply of cardiologists than of primary care physicians; and there is a lower supply of physicians than of nurses.
Government Policies	Government policies can also affect the supply of labour for jobs. Alternatively, the government may support rules that set high qualifications for certain jobs: academic training, certificates or licenses, or experience. When these qualifications are made tougher, the number of qualified workers will decrease at any given wage. On the other hand, the government may also subsidize training or even reduce the required level of qualifications. For example, government might offer subsidies for nursing schools or nursing students. Such provisions would shift the supply curve of nurses to the right. In addition, government policies that change the relative desirability of working versus not working also affect the labour supply. These include unemployment benefits, maternity leave, child care benefits, and welfare policy. For example, child care benefits may increase the labour supply of working mothers. Long term unemployment benefits may discourage job searching for unemployed workers. All these policies must therefore be carefully designed to minimize any negative labour supply effects.

A change in salary will lead to a movement along labour demand or labour supply curves, but it will not shift those curves. However, other events like those we have outlined here will cause either the demand or the supply of labour to shift, and thus will move the labour market to a new equilibrium salary and quantity.

Technology and Wage Inequality: The Four-Step Process

Economic events can change the equilibrium salary (or wage) and quantity of labour. Consider how the wave of new information technologies, like computer and telecommunications networks, has affected low-skill and high-skill workers in the U.S. economy. From the perspective of employers who demand labour, these new technologies are often a substitute for low-skill labourers like file clerks who used to keep file cabinets full of paper records of transactions. However, the same new technologies are a complement to high-skill workers like managers, who benefit from the technological advances by having the ability to monitor more information, communicate more easily, and juggle a wider array of responsibilities. How will the new technologies affect the wages of high-skill and low-skill workers? For this question, the four-step process of

analyzing how shifts in supply or demand affect a market (introduced in Demand and Supply (3-introduction-to-demand-and-supply)) works in this way:

Step 1. What did the markets for low-skill labour and high-skill labour look like before the arrival of the new technologies? In Figure 4.10b (a) and Figure 4.10b (b), S_0 is the original supply curve for labour and D_0 is the original demand curve for labour in each market. In each graph, the original point of equilibrium, E_0, occurs at the price W_0 and the quantity Q_0.

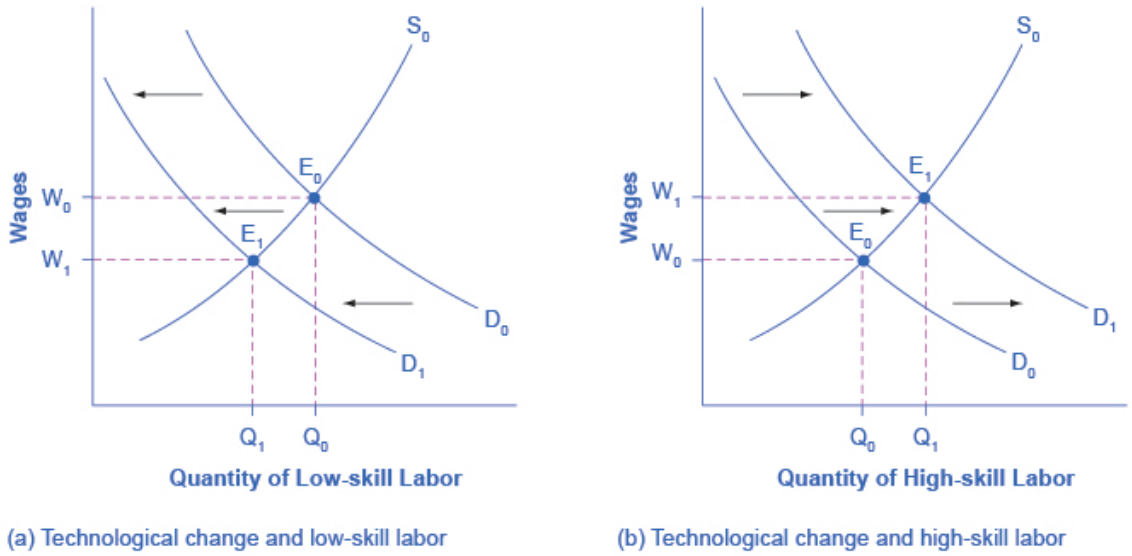

Figure 4.10b Technology and Wages: Applying Demand and Supply (a) The demand for low-skill labour shifts to the left when technology can do the job previously done by these workers. (b) New technologies can also increase the demand for high-skill labour in fields such as information technology and network administration. Figure by Steven A. Greenlaw & David Shapiro (OpenStax), licensed under CC BY 4.0.

Figure 4.10b Technology and Wages: Applying Demand and Supply (Text Version)

Contains two graphs: Graph A – Technological change and low-skill labour, Graph B – Technological change and high-skill labour.

Graph A: The graph has the vertical axis Wages (W) and Quantity of Low-Skill Labour (Q). The original supply curve (S_0) slopes upward from left to right. The original demand Curve (D_0) slopes downward from left to right. S_0 and D_0 intersect at the original equilibrium (E_0) at price W_0 and quantity Q_0 . D_0 shifts to the left and now intersects S_0 at a new equilibrium (E_1) at price W_1 and quantity Q_1.

Graph B: The graph has the vertical axis Wages (W) and Quantity of High-Skill Labour (Q). The original supply curve (S_0) slopes upward from left to right. The original demand Curve (D_0) slopes downward from

left to right. S_0 and D_0 intersect at the original equilibrium (E_0) at price W_0 and quantity Q_0 . D_1 shifts to the right and now intersects S_0 at a new equilibrium (E_1) at price W_1 and quantity Q_1.

Step 2. Does the new technology affect the supply of labour from households or the demand for labour from firms? The technology change described here affects demand for labour by firms that hire workers.

Step 3. Will the new technology increase or decrease demand? Based on the description earlier, as the substitute for low-skill labour becomes available, demand for low-skill labour will shift to the left, from D_0 to D_1. As the technology complement for high-skill labour becomes cheaper, demand for high-skill labour will shift to the right, from D_0 to D_1.

Step 4. The new equilibrium for low-skill labour, shown as point E_1 with price W_1 and quantity Q_1, has a lower wage and quantity hired than the original equilibrium, E_0. The new equilibrium for high-skill labour, shown as point E_1 with price W_1 and quantity Q_1, has a higher wage and quantity hired than the original equilibrium (E_0).

Thus, the demand and supply model predicts that the new computer and communications technologies will raise the pay of high-skill workers but reduce the pay of low-skill workers. From the 1970s to the mid-2000s, the wage gap widened between high-skill and low-skill labour. According to the National Center for Education Statistics, in 1980, for example, a college graduate earned about 30% more than a high school graduate with comparable job experience, but by 2014, a college graduate earned about 66% more than an otherwise comparable high school graduate. Many economists believe that the trend toward greater wage inequality across the U.S. economy is due to improvements in technology.

Link It Up

Learn more about the ten tech skills [New Tab] (https://readwrite.com/10-technology-skills-no-longer-in-demand/#awesm=~og2BuP53pqBEMo) that have lost relevance in today's workforce.

Price Floors in the Labour Market: Living Wages and Minimum Wages

In contrast to goods and services markets, price ceilings are rare in labour markets, because rules that prevent people from earning income are not politically popular. There is one exception: boards of trustees or stockholders, as an example, propose limits on the high incomes of top business executives.

The labour market, however, presents some prominent examples of price floors, which are an attempt to increase the wages of low-paid workers. The U.S. government sets a **minimum wage**, a price floor that makes it illegal for an employer to pay employees less than a certain hourly rate. In mid-2009, the U.S. minimum wage was raised to $7.25 per hour. Local political movements in a number of U.S. cities have pushed for a higher minimum wage, which they call a living wage. Promoters of living wage laws maintain that the minimum wage is too low to ensure a reasonable standard of living. They base this conclusion on the calculation that, if you work 40 hours a week at a minimum wage of $7.25 per hour for 50 weeks a year, your annual income is $14,500, which is less than the official U.S. government definition of what it means for a family to be in poverty. (A family with two adults earning minimum wage and two young children will find it more cost efficient for one parent to provide childcare while the other works for income. Thus the family income would be $14,500, which is significantly lower than the federal poverty line for a family of four, which was $24,250 in 2015.)

Supporters of the living wage argue that full-time workers should be assured a high enough wage so that they can afford the essentials of life: food, clothing, shelter, and healthcare. Since Baltimore passed the first living wage law in 1994, several dozen cities enacted similar laws in the late 1990s and the 2000s. The living wage ordinances do not apply to all employers, but they have specified that all employees of the city or employees of firms that the city hires be paid at least a certain wage that is usually a few dollars per hour above the U.S. minimum wage.

Figure 4.10b illustrates the situation of a city considering a living wage law. For simplicity, we assume that there is no federal minimum wage. The wage appears on the vertical axis, because the wage is the price in the labour market. Before the passage of the living wage law, the equilibrium wage is $10 per hour and the city hires 1,200 workers at this wage. However, a group of concerned citizens persuades the city council to enact a living wage law requiring employers to pay no less than $12 per hour. In response to the higher wage, 1,600 workers look for jobs with the city. At this higher wage, the city, as an employer, is willing to hire only 700 workers. At the price floor, the quantity supplied exceeds the quantity demanded, and a surplus of labour exists in this market. For workers who continue to have a job at a higher salary, life has improved. For those who were willing to work at the old wage rate but lost their jobs with the wage increase, life has not improved. Table 4.10b shows the differences in supply and demand at different wages.

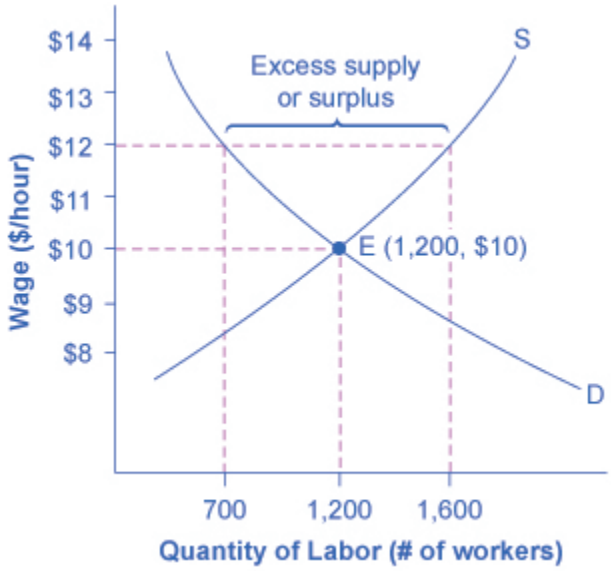

Figure 4.10b A Living Wage: Example of a Price Floor. The original equilibrium in this labour market is a wage of $10/hour and a quantity of 1,200 workers, shown at point E. Imposing a wage floor at $12/hour leads to an excess supply of labour. At that wage, the quantity of labour supplied is 1,600 and the quantity of labour demanded is only 700. Figure by Steven A. Greenlaw & David Shapiro (OpenStax), licensed under CC BY 4.0.

Figure 4.10b A Living Wage: Example of a Price Floor (Text Version)

The graph shows how a price floor results from an excess supply of labour. The vertical axis is Wage ($ per hour) and horizontal axis Quantity of Labour (number of workers). The supply curve (S) slopes upward from left to right and the demand curve (D) slopes downward left to right. S and D intersect at the equilibrium shown at Point E (1,200 workers, $10 per hour). Imposing a wage floor at $12/hour leads to an excess supply of labour. At that wage, the quantity of labour supplied is 1,600 and the quantity of labour demanded is only 700. Table 4.4 Living Wage: Example of a Price Floor details the plotted data.

Table 4.10d Living Wage: Example of a Price Floor

Wage	Quantity Labour Demanded	Quantity Labour Supplied
$8/hr	1,900	500
$9/hr	1,500	900
$10/hr	1,200	1,200
$11/hr	900	1,400
$12/hr	700	1,600
$13/hr	500	1,800
$14/hr	400	1,900

The Minimum Wage as an Example of a Price Floor

The U.S. minimum wage is a price floor that is set either very close to the equilibrium wage or even slightly below it. About 1% of American workers are actually paid the minimum wage. In other words, the vast majority of the U.S. labour force has its wages determined in the labour market, not as a result of the government price floor. However, for workers with low skills and little experience, like those without a high school diploma or teenagers, the minimum wage is quite important. In many cities, the federal minimum wage is apparently below the market price for unskilled labour, because employers offer more than the minimum wage to checkout clerks and other low-skill workers without any government prodding.

Economists have attempted to estimate how much the minimum wage reduces the quantity demanded of low-skill labour. A typical result of such studies is that a 10% increase in the minimum wage would decrease the hiring of unskilled workers by 1 to 2%, which seems a relatively small reduction. In fact, some studies have even found no effect of a higher minimum wage on employment at certain times and places—although these studies are controversial.

Let's suppose that the minimum wage lies just slightly *below* the equilibrium wage level. Wages could fluctuate according to market forces above this price floor, but they would not be allowed to move beneath the floor. In this situation, the price floor minimum wage is *nonbinding* —that is, the price floor is not determining the market outcome. Even if the minimum wage moves just a little higher, it will still have no effect on the quantity of employment in the economy, as long as it remains below the equilibrium wage. Even if the government increases minimum wage by enough so that it rises slightly above the equilibrium wage and becomes binding, there will be only a small excess supply gap between the quantity demanded and quantity supplied.

These insights help to explain why U.S. minimum wage laws have historically had only a small impact on employment. Since the minimum wage has typically been set close to the equilibrium wage for low-skill

labour and sometimes even below it, it has not had a large effect in creating an excess supply of labour. However, if the minimum wage increased dramatically—say, if it doubled to match the living wages that some U.S. cities have considered—then its impact on reducing the quantity demanded of employment would be far greater. As of 2017, many U.S. states are set to increase their minimum wage to $15 per hour. We will see what happens. The following Clear It Up feature describes in greater detail some of the arguments for and against changes to minimum wage.

Clear It Up

What's the harm in raising the minimum wage?

Because of the law of demand, a higher required wage will reduce the amount of low-skill employment either in terms of employees or in terms of work hours. Although there is controversy over the numbers, let's say for the sake of the argument that a 10% rise in the minimum wage will reduce the employment of low-skill workers by 2%. Does this outcome mean that raising the minimum wage by 10% is bad public policy? Not necessarily.

If 98% of those receiving the minimum wage have a pay increase of 10%, but 2% of those receiving the minimum wage lose their jobs, are the gains for society as a whole greater than the losses? The answer is not clear, because job losses, even for a small group, may cause more pain than modest income gains for others. For one thing, we need to consider which minimum wage workers are losing their jobs. If the 2% of minimum wage workers who lose their jobs are struggling to support families, that is one thing. If those who lose their job are high school students picking up spending money over summer vacation, that is something else.

Another complexity is that many minimum wage workers do not work full-time for an entire year. Imagine a minimum wage worker who holds different part-time jobs for a few months at a time, with bouts of unemployment in between. The worker in this situation receives the 10% raise in the minimum wage when working, but also ends up working 2% fewer hours during the year because the higher minimum wage reduces how much employers want people to work. Overall, this worker's income would rise because the 10% pay raise would more than offset the 2% fewer hours worked.

Of course, these arguments do not prove that raising the minimum wage is necessarily a good idea either. There may well be other, better public policy options for helping low-wage workers. The lesson from this maze of minimum wage arguments is that complex social problems rarely have simple answers. Even those who agree on how a proposed economic policy affects quantity demanded and quantity supplied may still disagree on whether the policy is a good idea.

Key Concepts and Summary

In the labor market, households are on the supply side of the market and firms are on the demand side. In the market for financial capital, households and firms can be on either side of the market: they are suppliers of financial capital when they save or make financial investments, and demanders of financial capital when they borrow or receive financial investments.

In the demand and supply analysis of labor markets, we can measure the price by the annual salary or hourly wage received. We can measure the quantity of labor various ways, like number of workers or the number of hours worked.

Factors that can shift the demand curve for labor include: a change in the quantity demanded of the product that the labor produces; a change in the production process that uses more or less labor; and a change in government policy that affects the quantity of labor that firms wish to hire at a given wage. Demand can also increase or decrease (shift) in response to: workers' level of education and training, technology, the number of companies, and availability and price of other inputs.

The main factors that can shift the supply curve for labor are: how desirable a job appears to workers relative to the alternatives, government policy that either restricts or encourages the quantity of workers trained for the job, the number of workers in the economy, and required education.

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4.11 - SELF-CHECK, CRITICAL THINKING & REVIEW QUESTIONS

Self-Check Questions

1. From the data in Table 5.5 about demand for smart phones, calculate the price elasticity of demand from: point B to point C, point D to point E, and point G to point H. Classify the elasticity at each point as elastic, inelastic, or unit elastic.

Table 4.11a

Points	P	Q
A	60	3,000
B	70	2,800
C	80	2,600
D	90	2,400
E	100	2,200
F	110	2,000
G	120	1,800
H	130	1,600

2. From the data in Table 5.6 about supply of alarm clocks, calculate the price elasticity of supply from: point J to point K, point L to point M, and point N to point P. Classify the elasticity at each point as elastic, inelastic, or unit elastic.

Table 4.11b

Point	Price	Quantity Supplied
J	$8	50
K	$9	70
L	$10	80
M	$11	88
N	$12	95
P	$13	100

3. Why is the demand curve with constant unitary elasticity concave?
4. Why is the supply curve with constant unitary elasticity a straight line?
5. The federal government decides to require that automobile manufacturers install new anti-pollution equipment that costs $2,000 per car. Under what conditions can carmakers pass almost all of this cost along to car buyers? Under what conditions can carmakers pass very little of this cost along to car buyers?
6. Suppose you are in charge of sales at a pharmaceutical company, and your firm has a new drug that causes bald men to grow hair. Assume that the company wants to earn as much revenue as possible from this drug. If the elasticity of demand for your company's product at the current price is 1.4, would you advise the company to raise the price, lower the price, or to keep the price the same? What if the elasticity were 0.6? What if it were 1? Explain your answer.
7. What would the gasoline price elasticity of supply mean to UPS or FedEx?
8. The average annual income rises from $25,000 to $38,000, and the quantity of bread consumed in a year by the average person falls from 30 loaves to 22 loaves. What is the income elasticity of bread consumption? Is bread a normal or an inferior good?
9. Suppose the cross-price elasticity of apples with respect to the price of oranges is 0.4, and the price of oranges falls by 3%. What will happen to the demand for apples?

Check your answers

1. From point B to point C, price rises from $70 to $80, and Qd decreases from 2,800 to 2,600. So:

$$\begin{aligned}
\text{\% change in quantity} &= \frac{2{,}600–2{,}800}{(2{,}600+2{,}800/2} \times 100 \\
&= \frac{200}{2{,}700} \times 100 \\
&= -7.41 \\
\text{\% change in price} &= \frac{80-70}{(80+70)/2} \times 100 \\
&= \frac{10}{75} \times 100 \\
&= 13.33 \\
\text{Elasticity of Demand} &= \frac{-7.41\%}{13.33\%} \\
&= 0.56
\end{aligned}$$

The demand curve is inelastic in this area; that is, its elasticity value is less than one. Answer from Point D to point E:

$$\begin{aligned}
\text{\% change in quantity} &= \frac{2{,}200-2400}{(2{,}200-2{,}400)/2} \times 100 \\
&= \frac{-200}{2{,}300} \times 100 \\
&= -8.7 \\
\text{\% change in price} &= \frac{100-90}{(100+90)/2} \times 100 \\
&= \frac{10}{95} \times 100 \\
&= 110.53 \\
\text{Elasticity of Demand} &= \frac{-8.7\%}{10.53\%} \\
&= 0.83
\end{aligned}$$

The demand curve is inelastic in this area; that is, its elasticity value is less than one. Answer from Point G to point H:

$$\begin{aligned}
\text{\% change in quantity} &= \frac{1{,}600-1{,}800}{1{,}700} \times 100 \\
&= \frac{-200}{1{,}700} \times 100 \\
&= -11.76 \\
\text{\% change in price} &= \frac{130-120}{125} \times 100 \\
&= \frac{10}{125} \times 100 \\
&= 8.00 \\
\text{Elasticity of Demand} &= \frac{-11.76\%}{8.00\%} \\
&= -1.47
\end{aligned}$$

and curve is elastic in this interval.

2. From point J to point K, price rises from $8 to $9, and quantity rises from 50 to 70. So:

$$\begin{aligned}
\text{\% change in quantity} &= \frac{70-50}{(70+50)\div 2} \times 100 \\
&= \frac{20}{60} \times 100 \\
&= 33.33 \\
\text{\% change in price} &= \frac{\$9-\$8}{(\$9+\$8)\div 2} \times 100 \\
&= \frac{1}{8.5} \times 100 \\
&= 11.76 \\
\text{Elasticity of Supply} &= \frac{33.33\%}{11.76\%} \\
&= 2.83
\end{aligned}$$

The supply curve is elastic in this area; that is, its elasticity value is greater than one. From point L to point M, the price rises from $10 to $11, while the Qs rises from 80 to 88:

$$\begin{aligned}
\text{\% change in quantity} &= \frac{88-80}{(88+80)\div 2} \times 100 \\
&= \frac{8}{84} \times 100 \\
&= 33.33 \\
\text{\% change in price} &= \frac{\$11-\$10}{(\$11+\$10)\div 2} \times 100 \\
&= \frac{1}{10.5} \times 100 \\
&= 9.52 \\
\text{Elasticity of Supply} &= \frac{9.52\%}{9.52\%} \\
&= 1.0
\end{aligned}$$

The supply curve has unitary elasticity in this area. From point N to point P, the price rises from $12 to $13, and Qs rises from 95 to 100:

$$\begin{aligned}
\text{\% change in quantity} &= \frac{100-95}{(100+95)\div 2} \times 100 \\
&= \frac{5}{97.5} \times 100 \\
&= 5.13 \\
\text{\% change in price} &= \frac{\$13-\$12}{(\$13+\$12)\div 2} \times 100 \\
&= \frac{1}{12.5} \times 100 \\
&= 8.0 \\
\text{Elasticity of Supply} &= \frac{5.13\%}{8.0\%} \\
&= 0.64
\end{aligned}$$

The supply curve is inelastic in this region of the supply curve.

3. The demand curve with constant unitary elasticity is concave because the absolute value of declines in price are not identical. The left side of the curve starts with high prices, and then price falls by smaller amounts as it goes down toward the right side. This results in a slope of demand that is steeper on the left but flatter on the right, creating a curved, concave shape.
4. The constant unitary elasticity is a straight line because the curve slopes upward and both price and quantity are increasing proportionally.
5. Carmakers can pass this cost along to consumers if the demand for these cars is inelastic. If the demand for these cars is elastic, then the manufacturer must pay for the equipment.
6. If the elasticity is 1.4 at current prices, you would advise the company to lower its price on the product, since a decrease in price will be offset by the increase in the amount of the drug

sold. If the elasticity were 0.6, then you would advise the company to increase its price. Increases in price will offset the decrease in number of units sold, but increase your total revenue. If elasticity is 1, the total revenue is already maximized, and you would advise that the company maintain its current price level.

7. The percentage change in quantity supplied as a result of a given percentage change in the price of gasoline.
8. In this example, bread is an inferior good because its consumption falls as income rises.

$$\begin{aligned}\text{Percentage change in quantity demanded} &= \frac{(\text{change in quantity})}{(\text{original quantity})} \times 100 \\ &= \frac{22-30}{(22+30)\div 2} \times 100 \\ &= \frac{-8}{26} \times 100 \\ &= -30.77 \\ \text{Percentage change in income} &= \frac{(\text{change in income})}{(\text{original income})} \times 100 \\ &= \frac{38{,}000–25{,}000}{(38{,}000+25{,}000)\div 2} \times 100 \\ &= \frac{13}{31.5} \times 100 \\ &= 41.27\end{aligned}$$

9. The formula for cross-price elasticity is:

$$\text{Cross-price elasticity} = \quad amp; \frac{\%\text{ change in Q}_d\text{for apples}}{\%\text{ change in P of oranges}}.$$

Multiplying both sides by % change in P of oranges yields:

$$\begin{aligned}\%\text{ change in Q}_d\text{for apples} &= \text{cross-price elasticity} \times \%\text{ change in P of oranges} \\ &= 0.4 \times (-3\%) \\ &= -1.2\%\end{aligned}$$

or a 1.2 % decrease in demand for apples.

Critical Thinking Questions

1. Transatlantic air travel in business class has an estimated elasticity of demand of 0.62, while transatlantic air travel in economy class has an estimated price elasticity of 0.12. Why do you think this is the case?
2. What is the relationship between price elasticity and position on the demand curve? For example, as you move up the demand curve to higher prices and lower quantities, what happens to the measured elasticity? How would you explain that?
3. Can you think of an industry (or product) with near infinite elasticity of supply in the short term? That is, what is an industry that could increase Qs almost without limit in response to an increase in the price?
4. Would you expect supply to play a more significant role in determining the price of a basic necessity like food or a luxury like perfume? Explain. *Hint*: Think about how the price elasticity of demand will differ between necessities and luxuries.
5. A city has built a bridge over a river and it decides to charge a toll to everyone who crosses. For one year, the city charges a variety of different tolls and records information on how many drivers cross the bridge. The city thus gathers information about elasticity of demand. If the city wishes to raise as much revenue as possible from the tolls, where will the city decide to charge a toll: in the inelastic portion of the demand curve, the elastic portion of the demand curve, or the unit elastic portion? Explain.
6. In a market where the supply curve is perfectly inelastic, how does an excise tax affect the price paid by consumers and the quantity bought and sold?
7. Economists define normal goods as having a positive income elasticity. We can divide normal goods into two types: Those whose income elasticity is less than one and those whose income elasticity is greater than one. Think about products that would fall into each category. Can you come up with a name for each category?
8. Suppose you could buy shoes one at a time, rather than in pairs. What do you predict the cross-price elasticity for left shoes and right shoes would be?

Review Questions

1. What is the formula for calculating elasticity?
2. What is the price elasticity of demand? Can you explain it in your own words?
3. What is the price elasticity of supply? Can you explain it in your own words?
4. Describe the general appearance of a demand or a supply curve with zero elasticity.
5. Describe the general appearance of a demand or a supply curve with infinite elasticity.
6. If demand is elastic, will shifts in supply have a larger effect on equilibrium quantity or on price?
7. If demand is inelastic, will shifts in supply have a larger effect on equilibrium price or on quantity?
8. If supply is elastic, will shifts in demand have a larger effect on equilibrium quantity or on price?
9. If supply is inelastic, will shifts in demand have a larger effect on equilibrium price or on quantity?
10. Would you usually expect elasticity of demand or supply to be higher in the short run or in the long run? Why?
11. Under which circumstances does the tax burden fall entirely on consumers?
12. What is the formula for the income elasticity of demand?
13. What is the formula for the cross-price elasticity of demand?
14. What is the formula for the wage elasticity of labor supply?
15. What is the formula for elasticity of savings with respect to interest rates?

Problems

1. The equation for a demand curve is P = 48 – 3Q. What is the elasticity in moving from a quantity of 5 to a quantity of 6?
2. The equation for a demand curve is P = 2/Q. What is the elasticity of demand as price falls from 5 to 4? What is the elasticity of demand as the price falls from 9 to 8? Would you expect these answers to be the same?
3. The equation for a supply curve is 4P = Q. What is the elasticity of supply as price rises from 3 to 4? What is the elasticity of supply as the price rises from 7 to 8? Would you expect these answers to be the same?
4. The equation for a supply curve is P = 3Q – 8. What is the elasticity in moving from a price of 4 to a price of 7?
5. The supply of paintings by Leonardo Da Vinci, who painted the *Mona Lisa* and *The Last Supper* and died in 1519, is highly inelastic. Sketch a supply and demand diagram, paying attention to the appropriate elasticities, to illustrate that demand for these paintings will determine the price.
6. Say that a certain stadium for professional football has 70,000 seats. What is the shape of the supply curve for tickets to football games at that stadium? Explain.
7. When someone's kidneys fail, the person needs to have medical treatment with a dialysis machine (unless or until they receive a kidney transplant) or they will die. Sketch a supply and demand diagram, paying attention to the appropriate elasticities, to illustrate that the supply of such dialysis machines will primarily determine the price.
8. Assume that the supply of low-skilled workers is fairly elastic, but the employers' demand for such workers is fairly inelastic. If the policy goal is to expand employment for low-skilled workers, is it better to focus on policy tools to shift the supply of unskilled labor or on tools to shift the demand for unskilled labor? What if the policy goal is to raise wages for this group? Explain your answers with supply and demand diagrams.

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CHAPTER 5: ELASTICITY

5.1 - ELASTICITY IN AREAS OTHER THAN PRICE

Learning Objectives

- Calculate the income elasticity of demand and the cross-price elasticity of demand
- Calculate the elasticity in labour and financial capital markets through an understanding of the elasticity of labour supply and the elasticity of savings
- Apply concepts of price elasticity to real-world situations

The basic idea of elasticity—how a percentage change in one variable causes a percentage change in another variable—does not just apply to the responsiveness quantity supplied and quantity demanded to changes in the price of a product. Recall that quantity demanded (Qd) depends on income, tastes and preferences, the prices of related goods, and so on, as well as price. Similarly, quantity supplied (Qs) depends on factors such as the cost of production, as well as price. We can measure elasticity for any determinant of quantity supplied and quantity demanded, not just the price.

Income Elasticity of Demand

The income elasticity of demand is the percentage change in quantity demanded divided by the percentage change in income.

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

For most products, most of the time, the income elasticity of demand is positive: that is, a rise in income will cause an increase in the quantity demanded. This pattern is common enough that we refer to these goods as normal goods. However, for a few goods, an increase in income means that one might purchase less of the

good. For example, those with a higher income might buy fewer hamburgers, because they are buying more steak instead, or those with a higher income might buy less cheap wine and more imported beer. When the income elasticity of demand is negative, we call the good an inferior good.

We introduced the concepts of normal and inferior goods in Demand and Supply. A higher level of income causes a demand curve to shift to the right for a normal good, which means that the income elasticity of demand is positive. How far the demand shifts depends on the income elasticity of demand. A higher income elasticity means a larger shift. However, for an inferior good, that is, when the income elasticity of demand is negative, a higher level of income would cause the demand curve for that good to shift to the left. Again, how much it shifts depends on how large the (negative) income elasticity is.

Cross-Price Elasticity of Demand

A change in the price of one good can shift the quantity demanded for another good. If the two goods are complements, like bread and peanut butter, then a drop in the price of one good will lead to an increase in the quantity demanded of the other good. However, if the two goods are substitutes, like plane tickets and train tickets, then a drop in the price of one good will cause people to substitute toward that good, and to reduce consumption of the other good. Cheaper plane tickets lead to fewer train tickets, and vice versa.

The cross-price elasticity of demand puts some meat on the bones of these ideas. The term "cross-price" refers to the idea that the price of one good is affecting the quantity demanded of a different good. Specifically, the cross-price elasticity of demand is the percentage change in the quantity of good A that is demanded as a result of a percentage change in the price of good B.

$$\text{Cross-price elasticity of demand} = \frac{\%\text{ change in } Q_d \text{ of good } A}{\%\text{ change in price of good B}}$$

Substitute goods have positive cross-price elasticities of demand: if good A is a substitute for good B, like coffee and tea, then a higher price for B will mean a greater quantity consumed of A. Complement goods have negative cross-price elasticities: if good A is a complement for good B, like coffee and sugar, then a higher price for B will mean a lower quantity consumed of A.

Elasticity in Labour and Financial Capital Markets

The concept of elasticity applies to any market, not just markets for goods and services. In the labour market, for example, the **wage elasticity of labour supply**—that is, the percentage change in hours worked divided by the percentage change in wages—will reflect the shape of the labour supply curve. Specifically:

$$\text{Elasticity of labour supply} = \frac{\text{\% change in quantity of labour supplied}}{\text{\% change in wage}}$$

The wage elasticity of labour supply for teenage workers is generally fairly elastic: that is, a certain percentage change in wages will lead to a larger percentage change in the quantity of hours worked. Conversely, the wage elasticity of labour supply for adult workers in their thirties and forties is fairly inelastic. When wages move up or down by a certain percentage amount, the quantity of hours that adults in their prime earning years are willing to supply changes but by a lesser percentage amount.

In markets for financial capital, the **elasticity of savings**—that is, the percentage change in the quantity of savings divided by the percentage change in interest rates—will describe the shape of the supply curve for financial capital. That is:

$$\text{Elasticity of savings} = \frac{\text{\% change in quantity of financial savings}}{\text{\% change in interest rate}}$$

Sometimes laws are proposed that seek to increase the quantity of savings by offering tax breaks so that the return on savings is higher. Such a policy will have a comparatively large impact on increasing the quantity saved if the supply curve for financial capital is elastic, because then a given percentage increase in the return to savings will cause a higher percentage increase in the quantity of savings. However, if the supply curve for financial capital is highly inelastic, then a percentage increase in the return to savings will cause only a small increase in the quantity of savings. The evidence on the supply curve of financial capital is controversial but, at least in the short run, the elasticity of savings with respect to the interest rate appears fairly inelastic.

Expanding the Concept of Elasticity

The elasticity concept does not even need to relate to a typical supply or demand curve at all. For example, imagine that you are studying whether the Internal Revenue Service should spend more money on auditing tax returns. We can frame the question in terms of the elasticity of tax collections with respect to spending on tax enforcement; that is, what is the percentage change in tax collections derived from a given percentage change in spending on tax enforcement?

With all of the elasticity concepts that we have just described, some are listed below under under Formulas for Calculating Elasticity, the possibility of confusion arises. When you hear the phrases “elasticity of demand” or “elasticity of supply,” they refer to the elasticity with respect to price. Sometimes, either to be extremely clear or because economists are discussing a wide variety of elasticities, we will call the elasticity of demand or the demand elasticity the price elasticity of demand or the “elasticity of demand with respect to price.” Similarly,

economists sometimes use the term elasticity of supply or the supply elasticity, to avoid any possibility of confusion, the **price elasticity of supply** or "the elasticity of supply with respect to price." However, in whatever context, the idea of elasticity always refers to percentage change in one variable, almost always a price or money variable, and how it causes a percentage change in another variable, typically a quantity variable of some kind.

Formulas for Calculating Elasticity:

$$\text{Income elasticity of demand} = \frac{\text{\% change in } Q_d}{\text{\% change in income}}$$

$$\text{Cross-price elasticity of demand} = \frac{\text{\% change in } Q_d \text{ of good A}}{\text{\%change in price of good B}}$$

$$\text{Wage elasticity of labour supply} = \frac{\text{\% change in quantity of labour supplied}}{\text{\% change in wage}}$$

$$\text{Wage elasticity of labour demand} = \frac{\text{\% change in quantity of labour demanded}}{\text{\% change in wage}}$$

$$\text{Interest rate elasticity of savings} = \frac{\text{\% change in quantity of savings}}{\text{\% change in interest rate}}$$

$$\text{Interest rate elasticity of borrowing} = \frac{\text{\% change in quantity of borrowing}}{\text{\% change in interest rate}}$$

Bring It Home

That Will Be How Much?

How did the 60% price increase in 2011 end up for Netflix? It has been a very bumpy ride.

Before the price increase, there were about 24.6 million U.S. subscribers. After the price increase, 810,000 infuriated U.S. consumers canceled their Netflix subscriptions, dropping the total number of subscribers to 23.79 million. Fast forward to June 2013, when there were 36 million streaming Netflix subscribers in the United States. This was an increase of 11.4 million subscribers since the price increase—an average per quarter growth of about 1.6 million. This growth is less than the 2 million per quarter increases Netflix experienced in the fourth quarter of 2010 and the first quarter of 2011.

During the first year after the price increase, the firm's stock price (a measure of future expectations for the firm) fell from about $33.60 per share per share to just under $7.80. By the end of 2016, however, the stock price was at $123 per share. Today, Netflix has more than 86 million subscribers million subscribers in fifty countries.

What happened? Obviously, Netflix company officials understood the law of demand. Company officials reported, when announcing the price increase, this could result in the loss of about 600,000 existing subscribers. Using the elasticity of demand formula, it is easy to see company officials expected an inelastic response:

$$
\begin{aligned}
&= \frac{-600{,}000/[(24\text{ million}+24.6\text{ million})/2]}{\$6/[(\$10+\$16)/2]} \\
&= \frac{-600{,}000/24.3\text{ million}}{\$6/\$13} \\
&= \frac{-0.025}{0.46} \\
&= -0.05
\end{aligned}
$$

In addition, Netflix officials had anticipated the price increase would have little impact on attracting new customers. Netflix anticipated adding up to 1.29 million new subscribers in the third quarter of 2011. It is true this was slower growth than the firm had experienced—about 2 million per quarter.

Why was the estimate of customers leaving so far off? In the more than two decades since Netflix had been founded, there was an increase in the number of close, but not perfect, substitutes. Consumers now had choices ranging from Vudu, Amazon Prime, Hulu, and Redbox, to retail stores. Jaime Weinman reported in *Maclean's* that Redbox kiosks are "a five-minute drive for less from 68 percent of Americans, and it seems that many people still find a five-minute drive more convenient than loading up a movie online." It seems that in 2012, many consumers still preferred a physical DVD disk over streaming video.

What missteps did the Netflix management make? In addition to misjudging the elasticity of demand, by failing to account for close substitutes, it seems they may have also misjudged customers' preferences and tastes. Yet, as the population increases, the preference for streaming video may

overtake physical DVD disks. Netflix, the source of numerous late night talk show laughs and jabs in 2011, may yet have the last laugh.

Key Concepts and Summary

Elasticity is a general term, that reflects responsiveness. It refers to the change of one variable divided by the percentage change of a related variable that we can apply to many economic connections. For instance, the income elasticity of demand is the percentage change in quantity demanded divided by the percentage change in income. The cross-price elasticity of demand is the percentage change in the quantity demanded of a good divided by the percentage change in the price of another good. Elasticity applies in labour markets and financial capital markets just as it does in markets for goods and services. The wage elasticity of labour supply is the percentage change in the quantity of hours supplied divided by the percentage change in the wage. The elasticity of savings with respect to interest rates is the percentage change in the quantity of savings divided by the percentage change in interest rates.

Attribution

Except where otherwise noted, this chapter is adapted from "Elasticity in Areas Other Than Price (https://openstax.org/books/principles-microeconomics-2e/pages/5-4-elasticity-in-areas-other-than-price)" and "Key Concepts and Summary" In *Principles of Microeconomics 2e (https://openstax.org/books/principles-microeconomics-2e/pages/1-introduction)* (OpenStx) by Steven A. Greenlaw & David Shapiro, licensed under CC BY 4.0.\Adaptations include addition of chapter key concepts and summary.

Access for free at https://openstax.org/books/principles-microeconomics-2e/pages/1-introduction

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5.2 - CALCULATING ELASTICITY

Learning Objectives

- Calculate the price elasticity of demand
- Calculate the price elasticity of supply
- Calculate the income elasticity of demand and the cross-price elasticity of demand
- Apply concepts of price elasticity to real-world situations

Figure 5.2a. Netflix DVD, sleeve and mailing envelope (https://www.flickr.com/photos/melomcc/5266923264/) by Mel McC, licensed under CC BY-NC-ND 2.0.

That Will Be How Much?

Imagine going to your favorite coffee shop and having the waiter inform you the pricing has changed. Instead of $3 for a cup of coffee with cream and sweetener, you will now be charged $2 for a black coffee, $1 for creamer, and $1 for your choice of sweetener. If you want to pay your usual $3 for a cup of coffee, you must choose between creamer and sweetener. If you want both, you now face an extra charge of $1. Sound absurd? Well, that is the situation Netflix customers found themselves in 2011 – a 60% price hike to retain the same service.

In early 2011, Netflix consumers paid about $10 a month for a package consisting of streaming video and DVD rentals. In July 2011, the company announced a packaging change. Customers wishing to retain both streaming video and DVD rental would be charged $15.98 per month – a price increase of about 60%. In 2014, Netflix also raised its streaming video subscription price from $7.99 to $8.99 per month for new U.S. customers. The company also changed its policy of 4K streaming content from $9.00 to $12.00 per month that year.

How did customers of the 18-year-old firm react? Did they abandon Netflix? How much will this price change affect the demand for Netflix's products? The answers to those questions will be explored in this chapter with a concept economists call elasticity.

Figure 5.2b Take a look at Undoing the mess [New Tab] (https://www.economist.com/schumpeter/2011/10/10/undoing-the-mess) to read the rest of the Netflix story.

Anyone who has studied economics knows the law of demand: a higher price will lead to a lower quantity demanded. What you may not know is how much lower the quantity demanded will be. Similarly, the law of supply shows that a higher price will lead to a higher quantity supplied. The question is: How much higher? This topic will explain how to answer these questions and why they are critically important in the real world.

To find answers to these questions, we need to understand the concept of **elasticity**. **Elasticity** is an economics concept that measures the responsiveness of one variable to changes in another variable. Suppose

you drop two items from a second-floor balcony. The first item is a tennis ball, and the second item is a brick. Which will bounce higher? Obviously, the tennis ball. We would say that the tennis ball has greater elasticity.

But how is this degree of responsiveness seen in our models? Both the demand and supply curve show the relationship between price and quantity, and elasticity can improve our understanding of this relationship.

The **own price elasticity of demand** is the percentage change in the quantity *demanded* of a good or service divided by the percentage change in the price. This shows the responsiveness of the quantity demanded to a change in price.

The **own price elasticity of supply** is the percentage change in quantity *supplied* divided by the percentage change in price. This shows the responsiveness of quantity supplied to a change in price.

Our formula for elasticity, $\frac{\%\ \Delta \text{Quantity}}{\%\ \Delta \text{Price}}$, can be used for most elasticity problems, we just use different prices and quantities for different situations.

Why percentages are counter-intuitive

Recall that the simplified formula for percentage change is $\frac{\text{New Value} - \text{Old Value}}{\text{Old Value}}$.

Suppose there is an increase in quantity demanded from 4 coffees to 6 coffees. Calculating percentage change ($\frac{(6-4)}{4}$) there has been a 50% increase in quantity demanded. Using the same numbers, consider what happens when quantity demanded decreases from 6 coffees to 4 coffees, ($\frac{(4-6)}{6}$) this change results in a 33% decrease in quantity demanded.

Right away, this should raise a red flag about calculating the elasticity between at two points, if percentage change is dependant on the direction (A to B or B to A) then how can we ensure a consistent elasticity value?

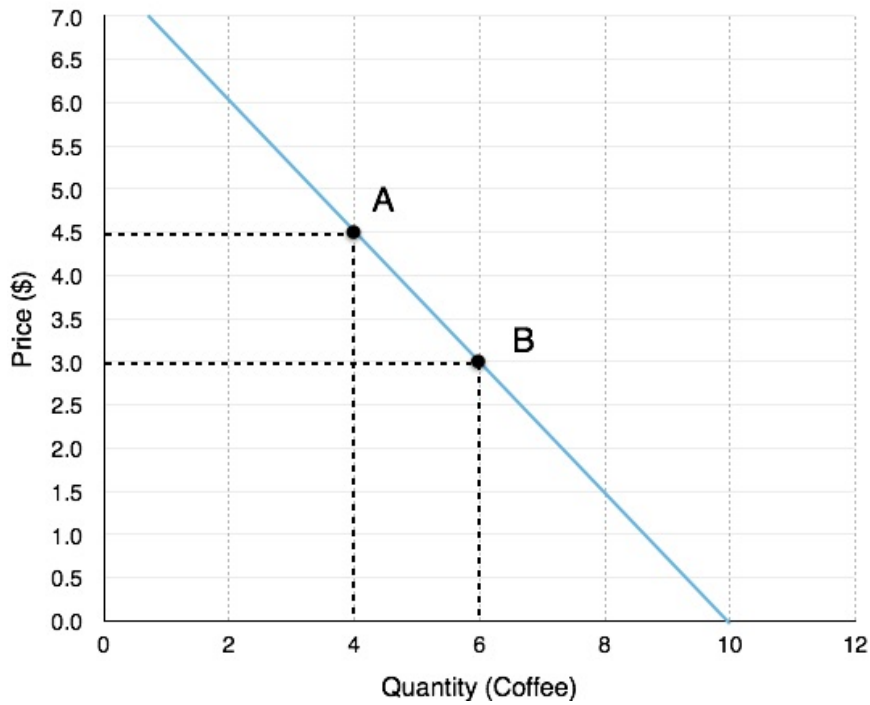

Figure 5.2c. Figure by University of Victoria, licensed under CC BY 4.0.

Let's calculate elasticity from both perspectives:

Moving from A to B:

%ΔPrice: The coffee price falls from $4.50 to $3.00, meaning the percentage change is $\frac{(3.00 - 4.50)}{4.50} = -33\%$. Price has fallen by 33%.

%ΔQuantity: The quantity of coffee sold increases from 4 to 6, meaning the percentage change is $\frac{(6 - 4)}{4} = 50\%$. Quantity has risen by 50%

$$\text{Elasticity:} \quad \frac{\%\Delta \text{ Quantity}}{\%\Delta \text{ Price}} = -\frac{50\%}{33\%} = 1.5^{*}$$

*Note that elasticity is an absolute value, meaning it is not affected by positive of negative values.

Moving from B to A:

%ΔPrice: The coffee price rises from $3.00 to $4.50, meaning the percentage change is $\frac{(4.50 - 3.00)}{3.00} = 50\%$. Price has risen by 50%.

%ΔQuantity: The quantity of coffee sold falls from 6 to 4, meaning the percentage change is $\frac{(4-6)}{6} = -33\%$. Quantity has fallen by 33%

$$\text{Elasticity:} \quad \frac{\%\Delta \text{ Quantity}}{\%\Delta \text{ Price}} = -\frac{33\%}{50\%} = 0.67$$

These two calculations give us different numbers. This type of analysis would make elasticity subject to direction which adds unnecessary complication. To avoid this, we will instead rely on averages.

Mid-point Method

To calculate elasticity, instead of using simple percentage changes in quantity and price, economists use the average percent change. This is called the mid-point method for elasticity, and is represented in the following equations:

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

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

The advantage of the **mid-point method** is that one obtains the same elasticity between two price points whether there is a price increase or decrease. This is because the denominator is an average rather than the old value.

Using the mid-point method to calculate the elasticity between Point A and Point B:

$$\begin{aligned}
\%\ change\ in\ quantity &= \frac{6-4}{(6+4)/2} \times 100 \\
&= \frac{2}{5} \times 100 \\
&= 40\% \\
\%\ change\ in\ price &= \frac{3.00-4.50}{(3.00+4.50)/2} \times 100 \\
&= \frac{-1.50}{3.75} \times 100 \\
&= -40\% \\
Price\ Elasticity\ of\ Demand &= \frac{40\%}{40\%} \\
&= 1
\end{aligned}$$

This method gives us a sort of average elasticity of demand over two points on our curve. Notice that our elasticity of 1 falls in-between the elasticities of 0.67 and 1.52 that we calculated in the previous example.

Point-Slope Formula

Point Slope Method is a method of calculating elasticity between two points. Involves calculating the percentage change of price and quantity with respect to an average of the two points.

In Figure 4.1a we were given two points and looked at elasticity as movements along a curve. As we will see in Topic 4.3, it is often useful to view elasticity at a single point. To calculate this, we have to derive a new equation.

$$\frac{\%\ \Delta \text{Quantity}}{\%\ \Delta \text{Price}} = \text{Elasticity}$$

Since we know that a percentage change in price can be rewritten as

$$\frac{\Delta\ \text{Price}}{\text{Price}}$$

and a percentage change in quantity to

$$\frac{\Delta \text{ Quantity}}{\text{Quantity}}$$

we can rearrange the original equation as

$$\frac{\frac{\Delta \text{ Quantity}}{\text{Quantity}}}{\frac{\Delta \text{ Price}}{\text{Price}}}$$

which is the same as saying

$$\frac{\Delta \text{ Quantity } \cdot \text{ Price}}{\Delta \text{ Price } \cdot \text{ Quanity}} = \frac{\Delta \text{ Q}}{\Delta \text{ P}} \cdot \frac{\text{P}}{\text{Q}}$$

This gives us our **point-slope formula**. How do we use it to calculate the elasticity at Point A? The P/Q portion of our equation corresponds to the values at the point, which are $4.5 and 4. The ΔQ/ ΔP corresponds to the **inverse slope of the curve.** Recall slope is calculated as rise/run.

In Figure 4.1, the slope is $\frac{3-4.5}{6-4} = 0.75$, which means the inverse is 1/0.75 = 1.33. Plugging this information into our equation, we get:

$$\frac{\Delta \text{ Q}}{\Delta \text{ P}} \cdot \frac{\text{P}}{\text{Q}}$$

$$1.33 \cdot \frac{4.5}{4}$$

$$= 1.5$$

This analysis gives us elasticity as a single point. Notice that this gives us the same number as calculating elasticity from Point A to B. This is not a coincidence. When we are calculating from Point A to Point B, we are actually just calculating the elasticity at Point A, since we are using the values on Point A as the denominator for our percentage change. Likewise from Point B to Point A, we are calculating the elasticity at Point B. When we use the mid-point method, we are just taking an average of the two points. This solidifies the fact that there is a different elasticity at every point on our line, a concept that will be important when we discuss revenue.

Not Really So Different

Even though mid-point and Point-Slope appear to be fairly different formulas, mid-point can be rewritten to show how similar the two really are.

$$\frac{\frac{\Delta \text{ Quantity}}{(\text{Q1} + \text{Q2})/2}}{\frac{\Delta \text{ Price}}{(\text{P1} + P2)/2}} = \frac{\frac{\Delta \text{ Q}}{\text{Q1} + \text{Q}}}{\frac{\Delta \text{ P}}{\text{P1} + P}}$$

Remember that when a fraction is divided by a fraction, you can rearrange it to a fraction multiplied by the inverse of the denominator fraction.

$$= \frac{\Delta \text{ Q}}{\Delta \text{ P}} \cdot \frac{(\text{P1} + \text{P2})}{(\text{Q1} + \text{Q2})}$$

Notice that compared to point-slope: $\frac{\Delta \text{ Q}}{\Delta \text{ P}} \cdot \frac{\text{P}}{\text{Q}}$, the only difference is that point-slope is the inverse of the slope multiplied by a single point, whereas mid-point is the inverse of the slope multiplied by multiple points. This reinforces the conclusion that mid-point represents an average.

Other Elasticities

Remember, elasticity is the responsiveness of one variable to changes in another variable. This means it can be applied to more that just the price-quantity relationship of our market model. In Topic 3 we discussed how goods can be inferior/normal or substitutes/complements. We will examine this even further when we introduce consumer theory, but for now we can develop our understanding by applying what we know about elasticities.

Own-price elasticity of supply (e_P^S)

Our analysis of elasticity has been centred around demand, but the same principles apply to the supply curve. Whereas elasticity of demand measures responsiveness of quantity demanded to a price change, **own-price elasticity of supply** measures the responsiveness of quantity supplied. The more elastic a firm, the more it can increase production when prices are rising, and decrease its production when prices are falling. Our equation is as follows:

$$\frac{\% \ \Delta \text{Q Supplied}}{\% \ \Delta \text{P}}$$

Own-price elasticity of supply can be calculated using mid-point and point-slope formula in the same way as for e_P^D.

Cross-price elasticity of demand (e_{XP}^{D})

Whereas the **own-price elasticity of demand** measures the responsiveness of quantity to a goods own price, **cross-price elasticity of demand** shows us how quantity demand responds to changes in the price of *related* goods. Whereas before we could ignore positives and negatives with elasticities, with cross-price, this matters. Our equation is as follows:

$$\frac{\%\ \Delta Q\ \text{Good A}}{\%\ \Delta P\ \text{Good A}}$$

Consider our discussion of complements and substitutes in Topic 3.3. We defined complements as goods that individuals prefer to consume with another good, and substitutes as goods individuals prefer to consume instead of another good. If the price of a complement rises our demand will fall, if the price of a substitute rises our demand will rise. For cross-price elasticity this means:

A complement will have a **negative cross-price elasticity**, since if the % change in price is positive, the % change in quantity will be negative and vice-versa.

A substitute will have a **positive cross-price elasticity**, since if the % change in price is positive, the % change in quantity will be positive and vice-versa.

This adds another dimension to our discussion of complements/substitutes. Now we can comment on the strength of the relationship between two goods. For example, a cross-price elasticity of -4 suggests an individual strongly prefers to consume two goods together, compared to a cross-price elasticity of -0.5. This could represent the cross-price elasticity of a consumer for a hot dog, with respect to ketchup and relish. The consumer might strongly prefer to consume hot dogs with ketchup, and loosely prefers relish.

Income elasticity of demand (e_{N}^{D})

In Topic 3 we also explained how goods can be normal or inferior depending on how a consumer responds to a change in income. This responsiveness can also be measured with elasticity by the **income elasticity of demand.** Our equation is as follows:

$$\frac{\%\ \Delta Q}{\%\ \Delta \text{Income}}$$

As with cross-price elasticity, whether our elasticity is positive or negative provides valuable information about how the consumer views the good:

A normal good will have a **positive income elasticity**, since if the % change in income is positive, the % change in quantity will be positive and vice-versa.

A inferior good will have a **negative income elasticity**, since if the % change in income is positive, the % change in quantity will be negative and vice-versa.

The value of our elasticity will indicate how responsive a good is to a change in income. A good with an income elasticity of 0.05, while technically a normal good (since demand increases after an increase in income) is not nearly as responsive as one with an income elasticity of demand of 5.

Summary

Elasticity is a measure of responsiveness, calculated by the percentage change in one variable divided by the percentage change in another.

Both mid-point and point-slope formulas are important for calculating elasticity in different situations. Mid-point gives an average of elasticities between two points, whereas point-slope gives the elasticity at a certain point. These can be calculated with the following formulas:

Formulas to Calculate Points to Determine Elasticity

$$\text{Base Formula} = \frac{\%\ \Delta\text{Quantity}}{\%\ \Delta\text{Price}}$$

$$\text{Mid-Point Formula} = \frac{\Delta\ \text{Q}}{\Delta\ \text{P}} \cdot \frac{(\text{P1}\ +\ \text{P2})}{(\text{Q1}\ +\ \text{Q2})}$$

$$\text{Point-Slope Formula} = \frac{\Delta\ \text{Q}}{\Delta\ \text{P}} \cdot \frac{\text{P}}{\text{Q}}$$

Since elasticity measures responsiveness, it can also be used to measure the own-price elasticity of supply, the cross-price elasticity of demand, and the income elasticity of demand. These can be calculated with the following formulas:

Formulas to Calculate Elasticity

$$\text{Own-Price Elasticity of Supply} = \frac{\%\ \Delta\text{Q Supplied}}{\%\ \Delta\text{P}}$$

$$\text{Cross-Price Elasticity of Demand} = \frac{\%\ \Delta \text{Q Good A}}{\%\ \Delta \text{P Good A}}$$

$$\text{Income Elasticity of Demand} = \frac{\%\ \Delta \text{Q}}{\%\ \Delta \text{Income}}$$

Exercises 4.1

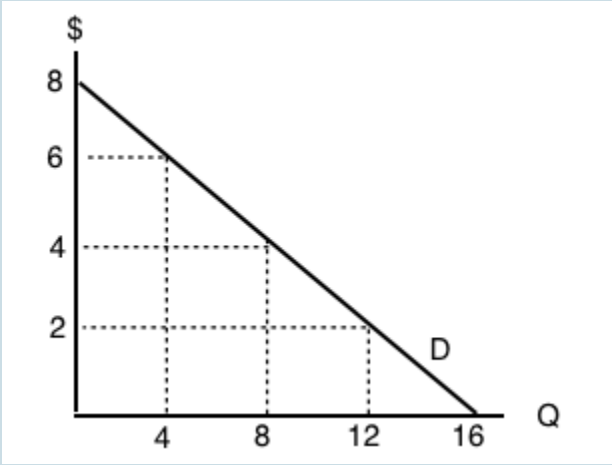

Figure 5.2d Demand curve diagram Figure by University of Victoria, licensed under CC BY 4.0.

Figure 5.2d Demand curve diagram (Text Version)

The graph has the vertical axis price ($) increasing in increments of 2 and the horizontal axis is quantity (Q) increasing in increments of 4. The demand curve (D) is straight downward sloping from left to right. Table for Exercises 4.1 contains data for the figure above.

Table for Exercises 5.2a

Points	Location on graph (Quantity, Price)
1	(0 quantity , $8)
2	(4 quantity , $6)
3	(8 quantity , $4)
4	(12 quantity , $2)
5	(16 quantity , $0)

1. Use the demand curve diagram above to answer the following question. What is the own-price elasticity of demand as price increases from $2 per unit to $4 per unit? Use the mid-point formula in your calculation.

    a. 1/3
    b. 6/10
    c. 2/3
    d. None of the above

2. Suppose that a 2% increase in price results in a 6% decrease in quantity demanded. Own-price elasticity of demand is equal to:

    a. 1/3
    b. 6
    c. 2
    d. 3

3. **3.** If own-price elasticity of demand equals 0.3 in absolute value, then what percentage change in price will result in a 6% decrease in quantity demanded?

    a. 3%
    b. 6%
    c. 20%.
    d. 50%

4. Suppose you are told that the own-price elasticity of supply equal 0.5. Which of the following is the correct interpretation of this number?

    a. A 1% increase in price will result in a 50% increase in quantity supplied.
    b. A 1% increase in price will result in a 5% increase in quantity supplied.

c. A 1% increase in price will result in a 2% increase in quantity supplied.
d. A 1% increase in price will result in a 0.5% increase in quantity supplied.

5. Suppose that a 10 increase in price results in a 50 percent decrease in quantity demanded. What does (the absolute value of) own price elasticity of demand equal?

   a. 0.5
   b. 0.2
   c. 5
   d. 10

6. If goods X and Y are *substitutes*, then which of the following could be the value of the cross price elasticity of demand for good Y?

   a. -1
   b. -2
   c. Neither a) nor b)
   d. Both a) and b)

7. If pizza is a normal good, then which of the following could be the value of income elasticity of demand?

   a. 0.2.
   b. 0.8.
   c. 1.4
   d. All of the above.

8. If goods X and Y are *complements*, the which of the following could be the value of cross price elasticity of demand?

   a. 0
   b. 1
   c. -1
   d. All of the above could be the value of cross price elasticity of demand.

Attribution

Except where otherwise noted, this chapter is adapted from "Calculating Elasticity (https://pressbooks.bccampus.ca/uvicecon103/chapter/4-2-elasticity/)" In *Principles of Microeconomics*

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5.3 - PRICE ELASTICITY OF DEMAND AND PRICE ELASTICITY OF SUPPLY

Learning Objectives

- Calculate the price elasticity of demand
- Calculate the price elasticity of supply

Both the demand and supply curve show the relationship between price and the number of units demanded or supplied. **Price elasticity** is the ratio between the percentage change in the quantity demanded (Qd) or supplied (Qs) and the corresponding percent change in price. The price elasticity of demand is the percentage change in the quantity *demanded* of a good or service divided by the percentage change in the price. The price elasticity of supply is the percentage change in quantity *supplied* divided by the percentage change in price.

We can usefully divide elasticities into three broad categories: elastic, inelastic, and unitary. Because price and quantity demanded move in opposite directions, price elasticity of demand is always a negative number. Therefore, price elasticity of demand is usually reported as its absolute value, without a negative sign. The summary in Table 5.3a is assuming absolute values for price elasticity of demand. An elastic demand or elastic supply is one in which the elasticity is greater than one, indicating a high responsiveness to changes in price. Elasticities that are less than one indicate low responsiveness to price changes and correspond to inelastic demand or inelastic supply. Unitary elasticities indicate proportional responsiveness of either demand or supply, as Table 5.3a summarizes.

Table 5.3a Elastic, Inelastic, and Unitary: Three Cases of Elasticity

If . . .	**Then . . .**	**And It Is Called . . .**
$\%\text{change in quantity} > \%\text{change in price}$	$\dfrac{\%\text{change in quantity}}{\%\text{change in price}} > 1$	Elastic
$\%\text{change in quantity} = \%\text{change in price}$	$\dfrac{\%\text{change in quantity}}{\%\text{change in price}} = 1$	Unitary
$\%\text{change in quantity} < \%\text{change in price}$	$\dfrac{\%\text{change in quantity}}{\%\text{change in price}} < 1$	Inelastic

Link It Up

Before we delve into the details of elasticity, enjoy the article Super Bowl XLVIII Pricing: A Lesson In Demand Elasticity[New Tab] (https://www.forbes.com/sites/prishe/2013/09/19/super-bowl-xlviii-pricing-a-lesson-in-demand-elasticity/?sh=7e73438c796f) to learn about elasticity and ticket prices at the Super Bowl.

To calculate elasticity along a demand or supply curve economists use the average percent change in both quantity and price. This is called the Midpoint Method for Elasticity, and is represented in the following equations:

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

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

The advantage of the Midpoint Method is that one obtains the same elasticity between two price points whether there is a price increase or decrease. This is because the formula uses the same base (average quantity and average price) for both cases.

Calculating Price Elasticity of Demand

Let's calculate the elasticity between points A and B and between points G and H as Figure 5.3a shows.

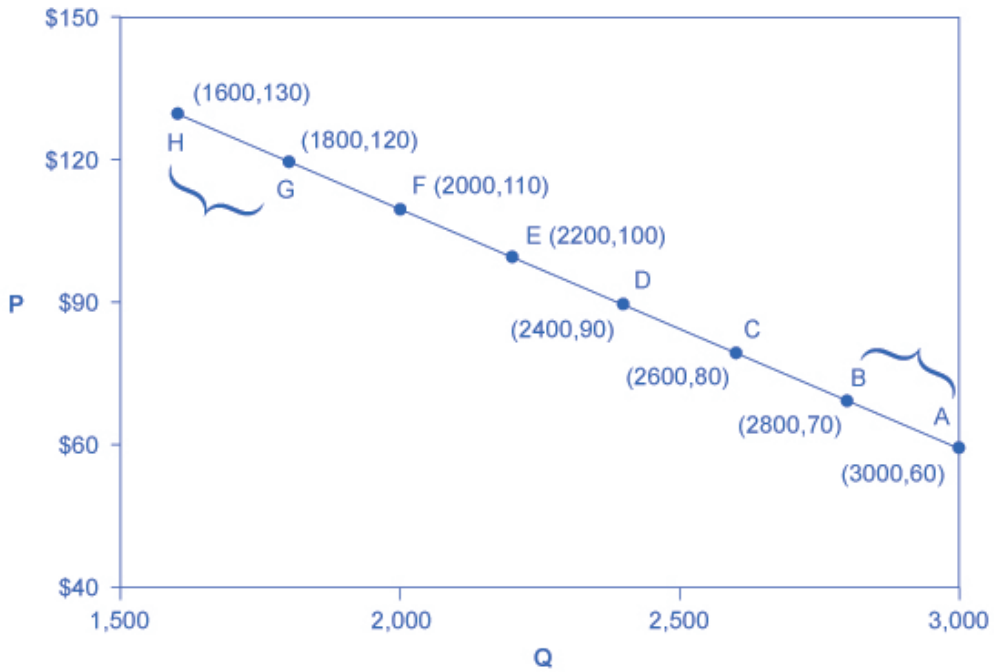

Figure 5.3a Calculating the Price Elasticity of Demand. Figure by Steven A. Greenlaw & David Shapiro (OpenStax), licensed under CC BY 4.0.

Figure 5.3a Calculating the Price Elasticity of Demand (Text Version)

The graph shows a downward sloping line that represents the price elasticity of demand. The vertical axis is Price ($) and the horizontal axis is Quantity (Q). Data for Figure 5.3a is detailed in the table Table 5.3b Calculating the Price Elasticity of Demand.

Table 5.3b Calculating the Price Elasticity of Demand

Points	Location on the graph (Quantity, Price)
A	(3000, 60)
B	(2800, 70)
C	(2600, 80)
D	(2400, 90)
E	(2200, 100)
F	(2000, 110)
G	(1800, 120)
H	(1600, 130)

Figure 5.3a Calculating the Price Elasticity of Demand We calculate the price elasticity of demand as the

percentage change in quantity divided by the percentage change in price.

First, apply the formula to calculate the elasticity as price decreases from $70 at point B to $60 at point A:

$$\begin{aligned} \%\ change\ in\ quantity &= \frac{3{,}000–2{,}800}{(3{,}000+2{,}800)/2} \times 100 \\ &= \frac{200}{2{,}900} \times 100 \\ &= 6.9 \\ \%\ change\ in\ price &= \frac{60-70}{(60+70)/2} \times 100 \\ &= \frac{-10}{65} \times 100 \\ &= -15.4 \\ Price\ Elasticity\ of\ Demand &= \frac{6.9\%}{-15.4\%} \\ &= 0.45 \end{aligned}$$

Therefore, the elasticity of demand between these two points is 6.9%–15.4% 6.9%–15.4% which is 0.45, an amount smaller than one, showing that the demand is inelastic in this interval. Price elasticities of demand are *always* negative since price and quantity demanded always move in opposite directions (on the demand curve). By convention, we always talk about elasticities as positive numbers. Mathematically, we take the absolute value of the result. We will ignore this detail from now on, while remembering to interpret elasticities as positive numbers.

This means that, along the demand curve between point B and A, if the price changes by 1%, the quantity demanded will change by 0.45%. A change in the price will result in a smaller percentage change in the quantity demanded. For example, a 10% *increase* in the price will result in only a 4.5% *decrease* in quantity demanded. A 10% *decrease* in the price will result in only a 4.5% *increase* in the quantity demanded. Price elasticities of demand are negative numbers indicating that the demand curve is downward sloping, but we read them as absolute values. The following Work It Out feature will walk you through calculating the price elasticity of demand.

Work It Out

Finding the Price Elasticity of Demand

Calculate the price elasticity of demand using the data in Figure 5.3a for an increase in price from G to H. Has the elasticity increased or decreased?

Step 1. We know that:

$$\text{Price Elasticity of Demand} = \frac{\text{\% change in quantity}}{\text{\% change in price}}$$

Step 2. From the Midpoint Formula we know that:

$$\begin{aligned} \%\ change\ in\ quantity &= \frac{Q_2 - Q_1}{(Q_2 + Q_1)/2} \times 100 \\ \%\ change\ in\ price & \frac{P_2 - P_1}{(P_2 + P_1)/2} \times 100 \end{aligned}$$

Step 3. So we can use the values provided in the figure in each equation:

$$\begin{aligned} \text{\% change in quantity} &= \frac{1{,}600 - 1{,}800}{(1{,}600 + 1{,}800)/2} \times 100 \\ &= -2001,700 \times 100 \\ &= 11.76 \\ \text{\% change in price} &= \frac{130 - 120}{(130 + 120)/2} \times 100 \\ &= \frac{10}{125} \times 100 \\ &= 8.0 \end{aligned}$$

Step 4. Then, we can use those values to determine the price elasticity of demand:

$$\begin{aligned} \text{Price Elasticity of Demand} &= \frac{\text{\% change in quantity}}{\text{\% change in price}} \\ &= \frac{-11.76}{8} \\ &= 1.47 \end{aligned}$$

Therefore, the elasticity of demand from G to is H 1.47. The magnitude of the elasticity has increased (in absolute value) as we moved up along the demand curve from points A to B. Recall that the elasticity between these two points was 0.45. Demand was inelastic between points A and B and elastic between points G and H. This shows us that price elasticity of demand changes at different points along a straight-line demand curve.

Calculating the Price Elasticity of Supply

Assume that an apartment rents for $650 per month and at that price the landlord rents 10,000 units are rented as Figure 5.3b shows. When the price increases to $700 per month, the landlord supplies 13,000 units into the market. By what percentage does apartment supply increase? What is the price sensitivity?

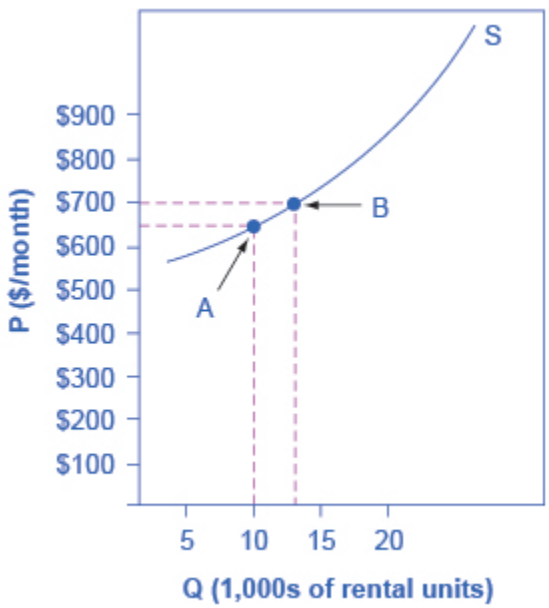

Figure 5.3b Price Elasticity of Supply. Figure by Steven A. Greenlaw & David Shapiro (OpenStax), licensed under CC BY 4.0.

Figure 5.3b Price Elasticity of Supply (Text Version)

The graph shows an upward sloping line that represents the supply of apartment rentals. The vertical axis is Price ($/month) and the horizontal axis is Quantity (1,000s of rental units). The supply curve (S) has a concave upward slope running from left to right. Point A (10, 000 rental units, $650) and Point B (11, 500 rental units, $700) occur along the line.

Using **Figure 5.3b** Price Elasticity of Supply we calculate the price elasticity of supply as the percentage

change in quantity divided by the percentage change in price.
Using the midpoint method:

$$\begin{aligned} \%\ change\ in\ quantity &= \frac{13{,}000-10{,}00}{(13{,}000-10{,}00)/2} \times 100 \\ &= \frac{3{,}000}{11{,}500} \times 100 \\ &= 26.1 \\ \%\ change\ in\ price &= \frac{700-650}{(700+650)/2} \times 100 \\ &= \frac{50}{675} \times 100 \\ &= 7.4 \\ Price\ Elasticity\ of\ Demand &= \frac{26.1\%}{7.4\%} \\ &= 3.53 \end{aligned}$$

Again, as with the elasticity of demand, the elasticity of supply is not followed by any units. Elasticity is a ratio of one percentage change to another percentage change—nothing more—and we read it as an absolute value. In this case, a 1% rise in price causes an increase in quantity supplied of 3.5%. The greater than one elasticity of supply means that the percentage change in quantity supplied will be greater than a one percent price change. If you're starting to wonder if the concept of slope fits into this calculation, read the following Clear It Up box.

Clear It Up

Is the elasticity the slope?

It is a common mistake to confuse the slope of either the supply or demand curve with its elasticity. The slope is the rate of change in units along the curve, or the rise/run (change in y over the change in x). For example, in Figure 5.3a, at each point shown on the demand curve, price drops by $10 and the number of units demanded increases by 200 compared to the point to its left. The slope is –10/200 along the entire demand curve and does not change. The price elasticity, however, changes along the

curve. Elasticity between points A and B was 0.45 and increased to 1.47 between points G and H. Elasticity is the *percentage* change, which is a different calculation from the slope and has a different meaning.

When we are at the upper end of a demand curve, where price is high and the quantity demanded is low, a small change in the quantity demanded, even in, say, one unit, is pretty big in percentage terms. A change in price of, say, a dollar, is going to be much less important in percentage terms than it would have been at the bottom of the demand curve. Likewise, at the bottom of the demand curve, that one unit change when the quantity demanded is high will be small as a percentage.

Thus, at one end of the demand curve, where we have a large percentage change in quantity demanded over a small percentage change in price, the elasticity value would be high, or demand would be relatively elastic. Even with the same change in the price and the same change in the quantity demanded, at the other end of the demand curve the quantity is much higher, and the price is much lower, so the percentage change in quantity demanded is smaller and the percentage change in price is much higher. That means at the bottom of the curve we'd have a small numerator over a large denominator, so the elasticity measure would be much lower, or inelastic.

As we move along the demand curve, the values for quantity and price go up or down, depending on which way we are moving, so the percentages for, say, a $1 difference in price or a one unit difference in quantity, will change as well, which means the ratios of those percentages and hence the elasticity will change.

Key Concepts and Summary

Price elasticity measures the responsiveness of the quantity demanded or supplied of a good to a change in its price. We compute it as the percentage change in quantity demanded (or supplied) divided by the percentage change in price. We can describe elasticity as elastic (or very responsive), unit elastic, or inelastic (not very responsive). Elastic demand or supply curves indicate that quantity demanded or supplied respond to price changes in a greater than proportional manner. An inelastic demand or supply curve is one where a given percentage change in price will cause a smaller percentage change in quantity demanded or supplied. A unitary elasticity means that a

given percentage change in price leads to an equal percentage change in quantity demanded or supplied.

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5.4 - POLAR CASES OF ELASTICITY AND CONSTANT ELASTICITY

Learning Objectives

- Differentiate between infinite and zero elasticity
- Analyze graphs in order to classify elasticity as constant unitary, infinite, or zero

There are two extreme cases of elasticity: when elasticity equals zero and when it is infinite. A third case is that of **constant unitary elasticity**. We will describe each case.

Infinite elasticity or **perfect elasticity** refers to the extreme case where either the quantity demanded (Qd) or supplied (Qs) changes by an infinite amount in response to any change in price at all. In both cases, the supply and the demand curve are horizontal as Figure 5.4a shows. While perfectly **elastic supply** curves are for the most part unrealistic, goods with readily available inputs and whose production can easily expand will feature highly elastic supply curves. Examples include pizza, bread, books, and pencils. Similarly, perfectly **elastic demand** is an extreme example. However, luxury goods, items that take a large share of individuals' income, and goods with many substitutes are likely to have highly elastic demand curves. Examples of such goods are Caribbean cruises and sports vehicles.

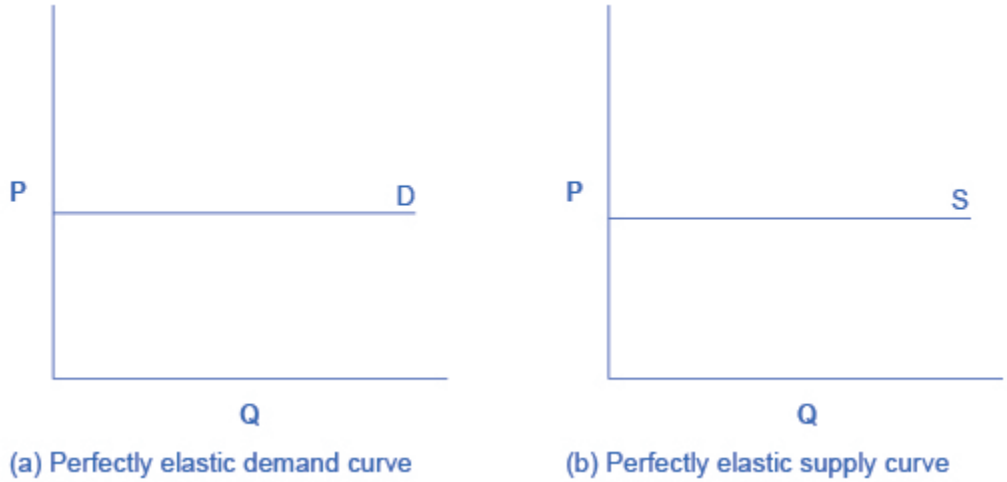

Figure 5.4a Infinite Elasticity. Figure by Steven A. Greenlaw & David Shapiro (OpenStax), licensed under CC BY 4.0.

In Figure 5.4a Infinite Elasticity the horizontal lines show that an infinite quantity will be demanded or supplied at a specific price. This illustrates the cases of a perfectly (or infinitely) elastic demand curve and supply curve. The quantity supplied or demanded is extremely responsive to price changes, moving from zero for prices close to P to infinite when prices reach P.

Zero elasticity or **perfect inelasticity**, as Figure 5.4b depicts, refers to the extreme case in which a percentage change in price, no matter how large, results in zero change in quantity. While a perfectly **inelastic supply** is an extreme example, goods with limited supply of inputs are likely to feature highly inelastic supply curves. Examples include diamond rings or housing in prime locations such as apartments facing Central Park in New York City. Similarly, while perfectly **inelastic demand** is an extreme case, necessities with no close substitutes are likely to have highly inelastic demand curves. This is the case of life-saving drugs and gasoline.

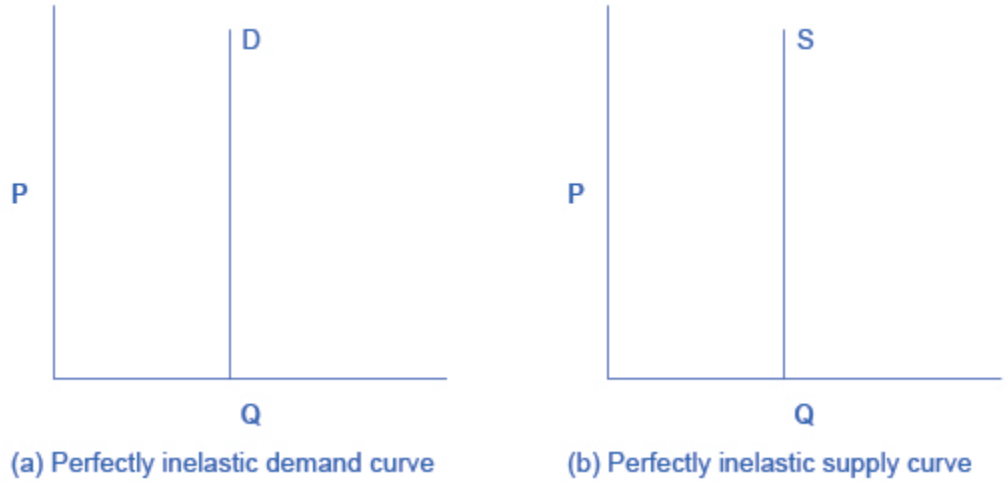

Figure 5.4b Zero Elasticity. Figure by Steven A. Greenlaw & David Shapiro (OpenStax), licensed under CC BY 4.0.

In Figure 5.4b Zero Elasticity the vertical supply curve and vertical demand curve show that there will be zero percentage change in quantity (a) demanded or (b) supplied, regardless of the price.

Constant unitary elasticity, in either a supply or demand curve, occurs when a price change of one percent results in a quantity change of one percent. Figure 5.4c shows a demand curve with constant unit elasticity. Using the midpoint method, you can calculate that between points A and B on the demand curve, the price changes by 66.7% and quantity demanded also changes by 66.7%. Hence, the elasticity equals 1. Between points B and C, price again changes by 66.7% as does quantity, while between points C and D the corresponding percentage changes are again 66.7% for both price and quantity. In each case, then, the percentage change in price equals the percentage change in quantity, and consequently elasticity equals 1. Notice that in absolute value, the declines in price, as you step down the demand curve, are not identical. Instead, the price falls by $8.00 from A to B, by a smaller amount of $4.00 from B to C, and by a still smaller amount of $2.00 from C to D. As a result, a demand curve with constant unitary elasticity moves from a steeper slope on the left and a flatter slope on the right—and a curved shape overall.

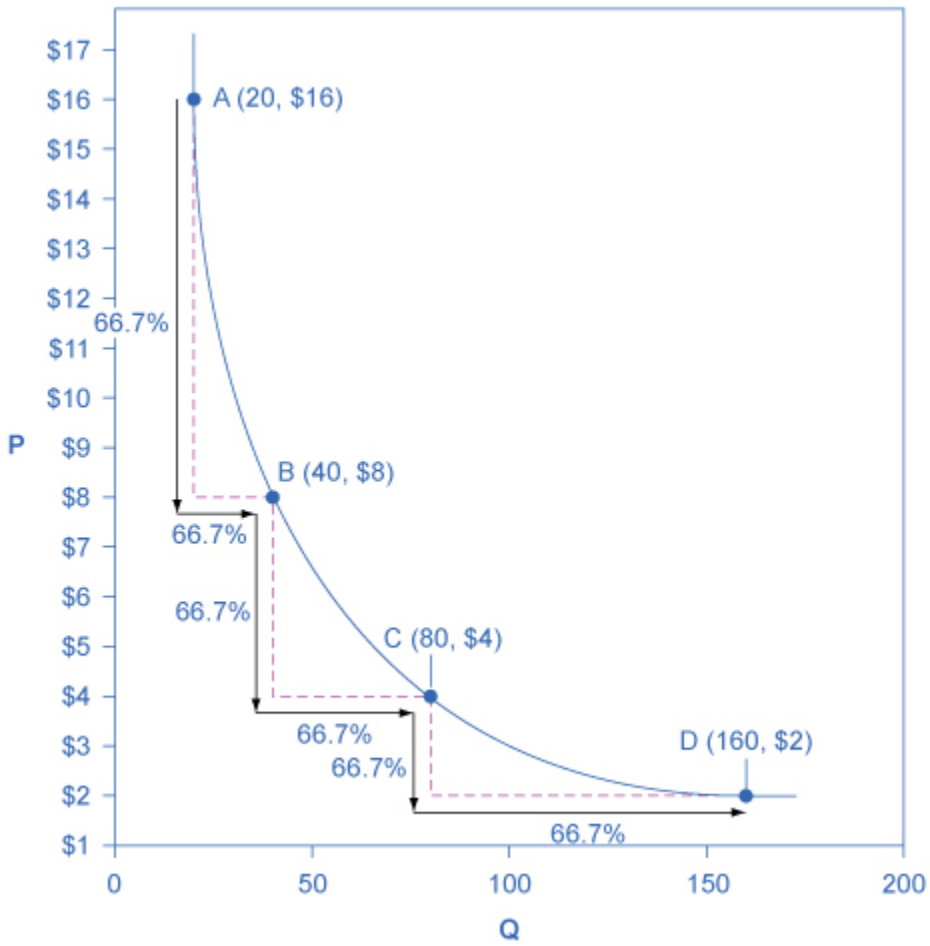

Figure 5.4c. A Constant Unitary Elasticity Demand Curve. Figure by Steven A. Greenlaw & David Shapiro (OpenStax), licensed under CC BY 4.0.

Figure 5.4c. A Constant Unitary Elasticity Demand Curve (Text Version)

The vertical axis is Price (P) in dollars and the horizontal axis Quantity (Q). The demand curve sloped concave curve downward from left to right and Points A, B, C and D occur along it. The price and quantity demanded change by an identical percentage amount (66.7%) between each pair of points on the demand curve.

Table 5.4a. A Constant Unitary Elasticity Demand Curve

Point	**Point location (Quantity, Price)**
A	20 quantity, 16 dollars
B	40 quantity, 8 dollars
C	80 quantity, 4 dollars
D	160 quantity, 2 dollars

Figure 5.4c A Constant Unitary Elasticity Demand Curve. A demand curve with constant unitary elasticity will be a curved line. Notice how price and quantity demanded change by an identical percentage amount between each pair of points on the demand curve.

Unlike the demand curve with **unitary elasticity**, the supply curve with unitary elasticity is represented by a straight line, and that line goes through the origin. In each pair of points on the supply curve there is an equal difference in quantity of 30. However, in percentage value, using the midpoint method, the steps are decreasing as one moves from left to right, from 28.6% to 22.2% to 18.2%, because the quantity points in each percentage calculation are getting increasingly larger, which expands the denominator in the elasticity calculation of the percentage change in quantity.

Consider the price changes moving up the supply curve in Figure 5.4d. From points D to E to F and to G on the supply curve, each step of $1.50 is the same in absolute value. However, if we measure the price changes in percentage change terms, using the midpoint method, they are also decreasing, from 28.6% to 22.2% to 18.2%, because the original price points in each percentage calculation are getting increasingly larger in value, increasing the denominator in the calculation of the percentage change in price. Along the constant unitary elasticity supply curve, the percentage quantity increases on the horizontal axis exactly match the percentage price increases on the vertical axis—so this supply curve has a constant unitary elasticity at all points.

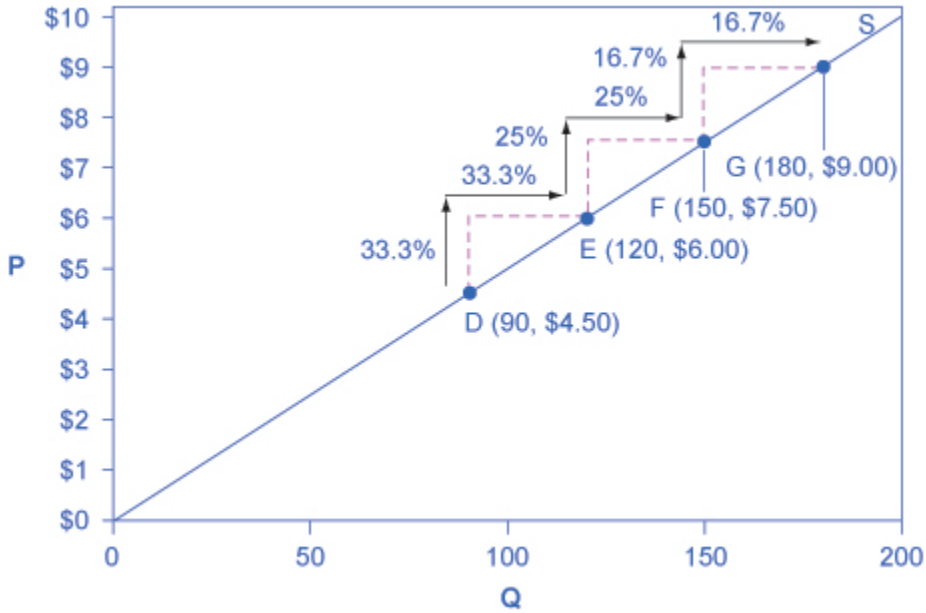

Figure 5.4d A Constant Unitary Elasticity Supply Curve. Figure by Steven A. Greenlaw & David Shapiro (OpenStax), licensed under CC BY 4.0.

Figure 5.4d. A Constant Unitary Elasticity Supply Curve (Text Version)

A constant unitary elasticity supply curve is a straight line reaching up from the origin. Between each pair of points, the percentage increase in quantity supplied is the same as the percentage increase in price. The vertical axis is Price (P) and the horizontal axis is Quantity (Q). The supply curve (S) slopes upward from left to right. Points D, E, F, and G occur along the supply line is detailed in the table below.

Table 5.4b. A Constant Unitary Elasticity Supply Curve

Point	Point location (Quantity, Price)
D	90 quantity, 4.50 dollars
E	120 quantity, 6 dollars
F	150 quantity, 7.50 dollars
G	180 quantity, 9 dollars

The percentage value increases in steps between points:

1. Point D to E increases by 33.3%
2. Point E to F increases 25%
3. Point F to G increases 16.7%

Key Concepts and Summary

Infinite or perfect elasticity refers to the extreme case where either the quantity demanded or supplied changes by an infinite amount in response to any change in price at all. Zero elasticity refers to the extreme case in which a percentage change in price, no matter how large, results in zero change in quantity. Constant unitary elasticity in either a supply or demand curve refers to a situation where a price change of one percent results in a quantity change of one percent.

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5.5 - ELASTICITY AND PRICING

Learning Objectives

- Analyze how price elasticities impact revenue
- Evaluate how elasticity can cause shifts in demand and supply
- Predict how the long-run and short-run impacts of elasticity affect equilibrium
- Explain how the elasticity of demand and supply determine the incidence of a tax on buyers and sellers

Studying elasticities is useful for a number of reasons, pricing being most important. Let's explore how elasticity relates to revenue and pricing, both in the long and short run. First, let's look at the elasticities of some common goods and services.

Table 5.5a shows a selection of demand elasticities for different goods and services drawn from a variety of different studies by economists, listed in order of increasing elasticity.

Table 5.5a Some Selected Elasticities of Demand

Goods and Services	Elasticity of Price
Housing	0.12
Transatlantic air travel (economy class)	0.12
Rail transit (rush hour)	0.15
Electricity	0.20
Taxi cabs	0.22
Gasoline	0.35
Transatlantic air travel (first class)	0.40
Wine	0.55
Beef	0.59
Transatlantic air travel (business class)	0.62
Kitchen and household appliances	0.63
Cable TV (basic rural)	0.69
Chicken	0.64
Soft drinks	0.70
Beer	0.80
New vehicle	0.87
Rail transit (off-peak)	1.00
Computer	1.44
Cable TV (basic urban)	1.51
Cable TV (premium)	1.77
Restaurant meals	2.27

Note that demand for necessities such as housing and electricity is inelastic, while items that are not necessities such as restaurant meals are more price-sensitive. If the price of a restaurant meal increases by 10%, the quantity demanded will decrease by 22.7%. A 10% increase in the price of housing will cause only a slight decrease of 1.2% in the quantity of housing demanded.

Link It Up

Read the article Movie Ticket Prices Hit All-Time High in 2012 [New Tab] (https://business.time.com/2013/02/19/movie-ticket-prices-hit-all-time-high-in-2012-why-thats-probably-good-for-moviegoers/) for an example of price elasticity that may have affected you.

Does Raising Price Bring in More Revenue?

Imagine that a band on tour is playing in an indoor arena with 15,000 seats. To keep this example simple, assume that the band keeps all the money from ticket sales. Assume further that the band pays the costs for its appearance, but that these costs, like travel, and setting up the stage, are the same regardless of how many people are in the audience. Finally, assume that all the tickets have the same price. (The same insights apply if ticket prices are more expensive for some seats than for others, but the calculations become more complicated.) The band knows that it faces a downward-sloping demand curve; that is, if the band raises the ticket price and, it will sell fewer seats. How should the band set the ticket price to generate the most total revenue, which in this example, because costs are fixed, will also mean the highest profits for the band? Should the band sell more tickets at a lower price or fewer tickets at a higher price?

The key concept in thinking about collecting the most revenue is the price elasticity of demand. Total revenue is price times the quantity of tickets sold. Imagine that the band starts off thinking about a certain price, which will result in the sale of a certain quantity of tickets. The three possibilities are in Table 5.5b. If demand is elastic at that price level, then the band should cut the price, because the percentage drop in price will result in an even larger percentage increase in the quantity sold—thus raising total revenue. However, if demand is inelastic at that original quantity level, then the band should raise the ticket price, because a certain percentage increase in price will result in a smaller percentage decrease in the quantity sold—and total revenue will rise. If demand has a unitary elasticity at that quantity, then an equal percentage change in quantity will offset a moderate percentage change in the price—so the band will earn the same revenue whether it (moderately) increases or decreases the ticket price.

Table 5.5b Will the Band Earn More Revenue by Changing Ticket Prices?

If Demand Is . . .	Then . . .	Therefore . . .
Elastic	$\%$ change in $Q_d > \%$ change in P	A given % rise in P will be more than offset by a larger % fall in Q so that total revenue($P \times Q$) falls.
Unitary	$\%$ change in $Q_d = \%$ change in P	A given % rise in P will be exactly offset by an equal % fall in Q so that total revenue ($P \times Q$) is unchanged.
Inelastic	$\%$ change in $Q_d < \%$ change in P	A given % rise in P will cause a smaller % fall in Q so that total revenue ($P \times Q$) rises.

What if the band keeps cutting price, because demand is elastic, until it reaches a level where it sells all 15,000 seats in the available arena? If demand remains elastic at that quantity, the band might try to move to a bigger arena, so that it could slash ticket prices further and see a larger percentage increase in the quantity of tickets sold. However, if the 15,000-seat arena is all that is available or if a larger arena would add substantially to costs, then this option may not work.

Conversely, a few bands are so famous, or have such fanatical followings, that demand for tickets may be inelastic right up to the point where the arena is full. These bands can, if they wish, keep raising the ticket price. Ironically, some of the most popular bands could make more revenue by setting prices so high that the arena is not full—but those who buy the tickets would have to pay very high prices. However, bands sometimes choose to sell tickets for less than the absolute maximum they might be able to charge, often in the hope that fans will feel happier and spend more on recordings, T-shirts, and other paraphernalia.

Can Businesses Pass Costs on to Consumers?

Most businesses face a day-to-day struggle to figure out ways to produce at a lower cost, as one pathway to their goal of earning higher profits. However, in some cases, the price of a key input over which the firm has no control may rise. For example, many chemical companies use petroleum as a key input, but they have no control over the world market price for crude oil. Coffee shops use coffee as a key input, but they have no control over the world market price of coffee. If the cost of a key input rises, can the firm pass those higher costs along to consumers in the form of higher prices? Conversely, if new and less expensive ways of producing are invented, can the firm keep the benefits in the form of higher profits, or will the market pressure them to pass the gains along to consumers in the form of lower prices? The price elasticity of demand plays a key role in answering these questions.

Imagine that as a consumer of legal pharmaceutical products, you read a newspaper story that a technological

breakthrough in the production of aspirin has occurred, so that every aspirin factory can now produce aspirin more cheaply. What does this discovery mean to you? Figure 5.5a illustrates two possibilities. In Figure 5.5a (a), the demand curve is highly inelastic. In this case, a technological breakthrough that shifts supply to the right, from S_0 to S_1, so that the equilibrium shifts from E_0 to E_1, creates a substantially lower price for the product with relatively little impact on the quantity sold. In Figure 5.5a (b), the demand curve is highly elastic. In this case, the technological breakthrough leads to a much greater quantity sold in the market at very close to the original price. Consumers benefit more, in general, when the demand curve is more inelastic because the shift in the supply results in a much lower price for consumers.

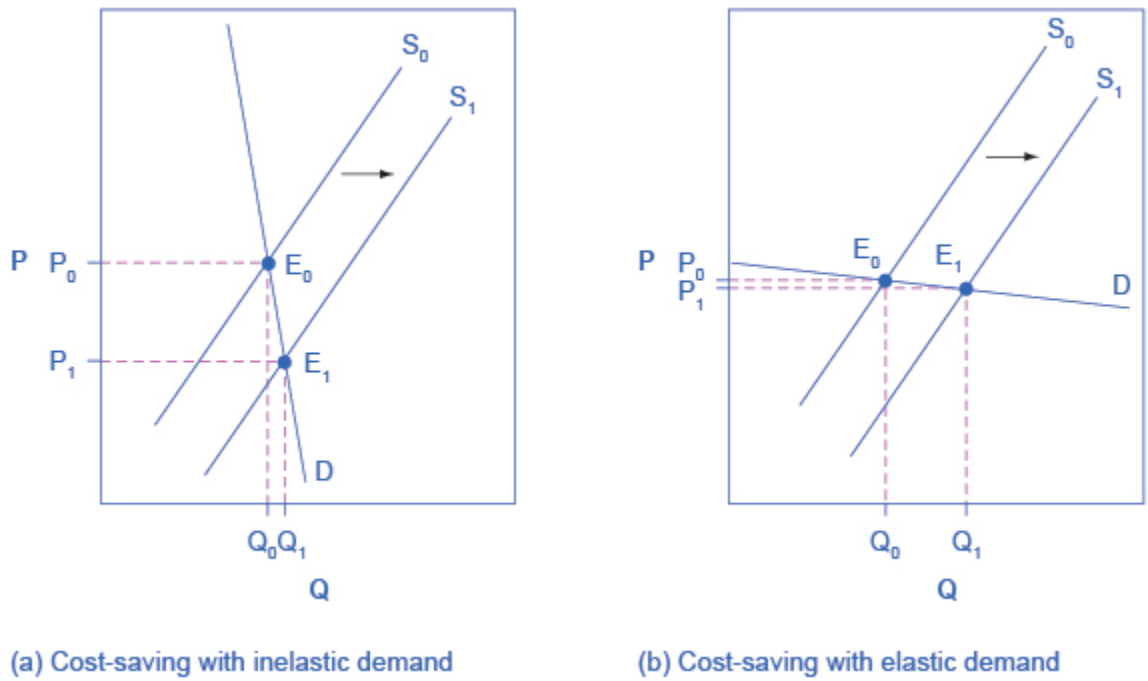

Figure 5.5a Passing along Cost Savings to Consumers. Cost-saving gains cause supply to shift out to the right from S0 to S1; that is, at any given price, firms will be willing to supply a greater quantity. If demand is inelastic, as in (a), the result of this cost-saving technological improvement will be substantially lower prices. If demand is elastic, as in (b), the result will be only slightly lower prices. Consumers benefit in either case, from a greater quantity at a lower price, but the benefit is greater when demand is inelastic, as in (a). Figure by Steven A. Greenlaw & David Shapiro (OpenStax), licensed under CC BY 4.0.

Figure 5.5a Passing along Cost Savings to Consumers (Text Version)

Depicts two graphs and both have the vertical axis Price (P) and the horizontal axis Quantity (Q).

Graph A – Cost-Saving with inelastic demand: The demand curve (D) is highly inelastic, sloping sharply downward from left to right. The original supply curve (S_0) intersects the demand curve (D) at the equilibrium E_0 at point P_0 and Q_0. S_0 shifts to the right to the new supply curve S_1. S_1 now intersects D at the

new equilibrium E_1 at point P_1 and Q_1. P_1 is noticeably lower then P0 and Q_1 is only slightly to further the right then Q_0.

Graph B – Cost-Saving with elastic demand: The demand curve (D) is highly elastic, sloping downward from left to right. The original supply curve (S_0) intersects the demand curve (D) at the equilibrium E_0 at point Pv and Q_0. S_0 shifts to the right to S_1. S_1 now intersects D at the new equilibrium E_1 at point P_1 Q_1. Q_1 is noticeably further to the right and P1 is only slightly down then P_0.

Aspirin producers may find themselves in a nasty bind here. The situation in Figure 5.5a, with extremely inelastic demand, means that a new invention may cause the price to drop dramatically while quantity changes little. As a result, the new production technology can lead to a drop in the revenue that firms earn from aspirin sales. However, if strong competition exists between aspirin producers, each producer may have little choice but to search for and implement any breakthrough that allows it to reduce production costs. After all, if one firm decides not to implement such a cost-saving technology, other firms that do can drive them out of business.

Since demand for food is generally inelastic, farmers may often face the situation in Figure 5.5a (a). That is, a surge in production leads to a severe drop in price that can actually decrease the total revenue that farmers receive. Conversely, poor weather or other conditions that cause a terrible year for farm production can sharply raise prices so that the total revenue that the farmer receives increases. The Clear It Up box discusses how these issues relate to coffee.

Clear It Up

How do coffee prices fluctuate?

Coffee is an international crop. The top five coffee-exporting nations are Brazil, Vietnam, Colombia, Indonesia, and Ethiopia. In these nations and others, 20 million families depend on selling coffee beans as their main source of income. These families are exposed to enormous risk, because the world price of coffee bounces up and down. For example, in 1993, the world price of coffee was about 50 cents per pound. In 1995 it was four times as high, at $2 per pound. By 1997 it had fallen by half to $1.00 per pound. In 1998 it leaped back up to $2 per pound. By 2001 it had fallen back to 46 cents a pound. By early 2011 it rose to about $2.31 per pound. By the end of 2012, the price had fallen back to about $1.31 per pound.

The reason for these price fluctuations lies in a combination of inelastic demand and shifts in supply. The elasticity of coffee demand is only about 0.3; that is, a 10% rise in the price of coffee leads to a decline of about 3% in the quantity of coffee consumed. When a major frost hit the Brazilian coffee

crop in 1994, coffee supply shifted to the left with an inelastic demand curve, leading to much higher prices. Conversely, when Vietnam entered the world coffee market as a major producer in the late 1990s, the supply curve shifted out to the right. With a highly inelastic demand curve, coffee prices fell dramatically. Figure 5.5a (a) illustrates this situation.

Elasticity also reveals whether firms can pass higher costs that they incur on to consumers. Addictive substances, for which demand is inelastic, are products for which producers can pass higher costs on to consumers. For example, the demand for cigarettes is relatively inelastic among regular smokers who are somewhat addicted. Economic research suggests that increasing cigarette prices by 10% leads to about a 3% reduction in the quantity of cigarettes that adults smoke, so the elasticity of demand for cigarettes is 0.3. If society increases taxes on companies that produce cigarettes, the result will be, as in Figure 5.5b (a), that the supply curve shifts from S_0 to S_1. However, as the equilibrium moves from E_0 to E_1, governments mainly pass along these taxes to consumers in the form of higher prices. These higher taxes on cigarettes will raise tax revenue for the government, but they will not much affect the quantity of smoking.

If the goal is to reduce the quantity of cigarettes demanded, we must achieve it by shifting this inelastic demand back to the left, perhaps with public programs to discourage cigarette use or to help people to quit. For example, anti-smoking advertising campaigns have shown some ability to reduce smoking. However, if cigarette demand were more elastic, as in Figure 5.5b (b), then an increase in taxes that shifts supply from S_0 to S_1 and equilibrium from E_0 to E_1 would reduce the quantity of cigarettes smoked substantially. Youth smoking seems to be more elastic than adult smoking—that is, the quantity of youth smoking will fall by a greater percentage than the quantity of adult smoking in response to a given percentage increase in price.

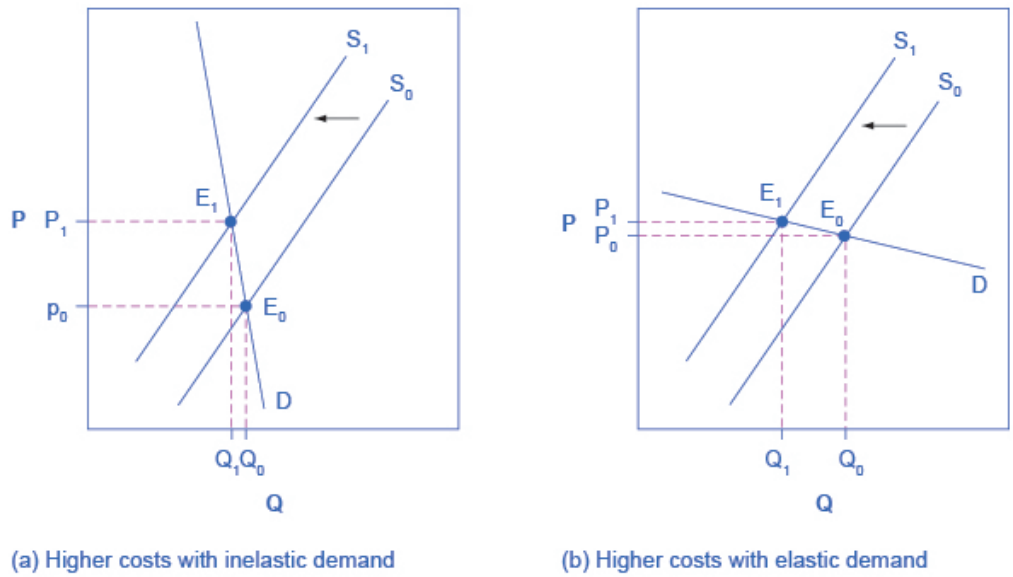

Figure 5.5b Passing along Higher Costs to Consumers. Higher costs, like a higher tax on cigarette companies for the example we gave in the text, lead supply to shift to the left. This shift is identical in (a) and (b). However, in (a), where demand is inelastic, companies largely can pass the cost increase along to consumers in the form of higher prices, without much of a decline in equilibrium quantity. In (b), demand is elastic, so the shift in supply results primarily in a lower equilibrium quantity. Consumers suffer in either case, but in (a), they suffer from paying a higher price for the same quantity, while in (b), they suffer from buying a lower quantity (and presumably needing to shift their consumption elsewhere). Figure by Steven A. Greenlaw & David Shapiro (OpenStax), licensed under CC BY 4.0.

Figure 5.5b Passing along Higher Costs to Consumers

Depicts two graphs. Both graphs have the vertical axis Price (P) and the horizontal axis Quantity (Q).
Graph A – higher costs with inelastic demand: The demand curve (D) is highly inelastic, sloping sharply downward from left to right. The original supply curve (S0) intersects the demand curve (D) at the equilibrium E_0 at point P0 and Q0. S0 shifts to the left to the new supply curve S_1. $S1_1$now intersects D at the new equilibrium E_1 at point P_1 and Q_1. P_1 has noticeably higher then P_0 and Q_0 shifts only slightly to the left to Q_1.

Graph B – higher costs with elastic demand: The demand curve (D) is highly elastic, sloping downward from left to right. The original supply curve (S_0) intersects the demand curve (D) at the equilibrium E_0 at point P_0 and Q_0. S0 shifts to the left to S_1. S_1 now intersects D at the new equilibrium E1 at point P_1 and Q_1. Q_1 is noticeably further to the left and P_0 has only slightly increased to Q_1.

Elasticity and Tax Incidence

The example of cigarette taxes demonstrated that because demand is inelastic, taxes are not effective at

reducing the equilibrium quantity of smoking, and they mainly pass along to consumers in the form of higher prices. The analysis, or manner, of how a tax burden is divided between consumers and producers is called tax incidence. Typically, the tax incidence, or burden, falls both on the consumers and producers of the taxed good. However, if one wants to predict which group will bear most of the burden, all one needs to do is examine the elasticity of demand and supply. In the tobacco example, the tax burden falls on the most inelastic side of the market.

If demand is more inelastic than supply, consumers bear most of the tax burden, and if supply is more inelastic than demand, sellers bear most of the tax burden.

The intuition for this is simple. When the demand is inelastic, consumers are not very responsive to price changes, and the quantity demanded reduces only modestly when the tax is introduced. In the case of smoking, the demand is inelastic because consumers are addicted to the product. The government can then pass the tax burden along to consumers in the form of higher prices, without much of a decline in the equilibrium quantity.

Similarly, when a government introduces a tax in a market with an inelastic supply, such as, for example, beachfront hotels, and sellers have no alternative than to accept lower prices for their business, taxes do not greatly affect the equilibrium quantity. The tax burden now passes on to the sellers. If the supply was elastic and sellers had the possibility of reorganizing their businesses to avoid supplying the taxed good, the tax burden on the sellers would be much smaller. The tax would result in a much lower quantity sold instead of lower prices received. Figure 5.5c illustrates this relationship between the tax incidence and elasticity of demand and supply.

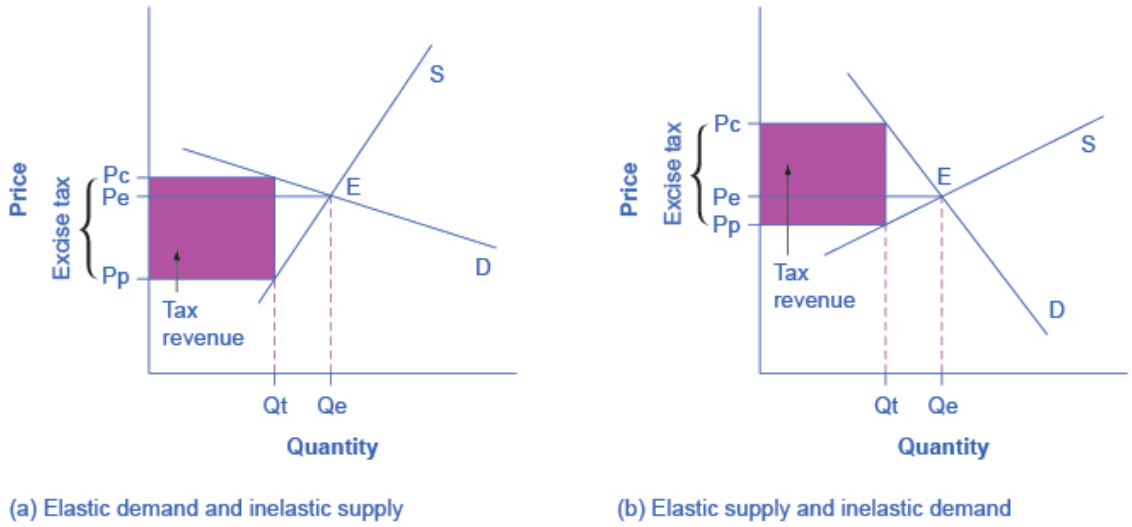

Figure 5.5c Elasticity and Tax Incidence. An excise tax introduces a wedge between the price paid by consumers (Pc) and the price received by producers (Pp). The vertical distance between Pc and Pp is the amount of the tax per unit. Pe is the equilibrium price prior to introduction of the tax. (a) When the demand is more elastic than supply, the tax incidence on consumers Pc – Pe is lower than the tax incidence on producers Pe – Pp. (b) When the supply is more elastic than demand, the tax incidence on consumers Pc – Pe is larger than the tax incidence on producers Pe – Pp. The more elastic the demand and supply curves, the lower the tax revenue. Figure by Steven A. Greenlaw & David Shapiro (OpenStax), licensed under CC BY 4.0.

Figure 5.5c Elasticity and Tax Incidence (Text Version)

Depicts two graphs with a vertical axis of Price (P) and the horizontal axis Quantity (Q). An excise tax introduces a wedge between the price paid by consumers (Pc) and the price received by producers (Pp). The vertical distance between Pc and Pp is the amount of the tax per unit.

Graph A- Elastic demand and inelastic supply: The supply curve (S) slopes sharply upward from left to right and the demand curve (D) slopes downward from left to right. Pe is the equilibrium price prior to introduction of the tax, occurring where S and D interact, Point E at Qe and Pe.

In the lower lefthand corner in the space between where the supply curve and demand curve intersect is the exercise tax.

Pc (price paid by consumers) is the highest point, slightly above Pe, and runs to Qt where it intersects with the demand curve (D) at point Qt.

Pp (price received by producers) is the lowest point, significantly below Pe, and runs to Qt where it intersects with the supply curve (S) at point Qt.

When the demand is more elastic than supply, the tax incidence on consumers Pc – Pe is lower than the tax incidence on producers Pe – Pp.

Graph B- Elastic supply and inelastic demand: The supply curve (S) slopes upward from left to right and the demand curve (D) slopes sharply downward from left to right. Pe is the equilibrium price prior to introduction of the tax, occurring where S and D interact, Point E at Qe and Pe.

In the upper lefthand corner in the space between where the supply curve and demand curve intersect is the exercise tax.

Pc (price paid by consumers) is the highest point, significantly above Pe, and runs to Qt where it intersects with the demand curve (D) at point Qt.

Pp (price received by producers) is the lowest point, slightly below Pe, and runs to Qt where it intersects with the supply curve (S) at point Qt.

When the demand is more elastic than supply, the tax incidence on consumers Pc – Pe is lower than the tax incidence on producers Pe – Pp. The more elastic the demand and supply curves, the lower the tax revenue.

In Figure 5.5c (a), the supply is inelastic and the demand is elastic, such as in the example of beachfront hotels. While consumers may have other vacation choices, sellers can't easily move their businesses. By introducing a tax, the government essentially creates a wedge between the price paid by consumers Pc and the price received by producers Pp. In other words, of the total price paid by consumers, part is retained by the sellers and part is paid to the government in the form of a tax. The distance between Pc and Pp is the tax rate. The new market price is Pc, but sellers receive only Pp per unit sold, as they pay Pc-Pp to the government. Since we can view a tax as raising the costs of production, this could also be represented by a leftward shift of the supply curve, where the new supply curve would intercept the demand at the new quantity Qt. For simplicity, Figure 5.5c omits the shift in the supply curve.

The tax revenue is given by the shaded area, which we obtain by multiplying the tax per unit by the total quantity sold Qt. The tax incidence on the consumers is given by the difference between the price paid Pc and the initial equilibrium price Pe. The tax incidence on the sellers is given by the difference between the initial equilibrium price Pe and the price they receive after the tax is introduced Pp. In Figure 5.5c (a), the tax burden falls disproportionately on the sellers, and a larger proportion of the tax revenue (the shaded area) is due to the resulting lower price received by the sellers than by the resulting higher prices paid by the buyers. Figure 5.5c (b) describes the example of the tobacco excise tax where the supply is more elastic than demand. The tax incidence now falls disproportionately on consumers, as shown by the large difference between the price they pay, Pc, and the initial equilibrium price, Pe. Sellers receive a lower price than before the tax, but this difference is much smaller than the change in consumers' price. From this analysis one can also predict

whether a tax is likely to create a large revenue or not. The more elastic the demand curve, the more likely that consumers will reduce quantity instead of paying higher prices. The more elastic the supply curve, the more likely that sellers will reduce the quantity sold, instead of taking lower prices. In a market where both the demand and supply are very elastic, the imposition of an excise tax generates low revenue.

Some believe that excise taxes hurt mainly the specific industries they target. For example, the medical device excise tax, in effect since 2013, has been controversial for it can delay industry profitability and therefore hamper start-ups and medical innovation. However, whether the tax burden falls mostly on the medical device industry or on the patients depends simply on the elasticity of demand and supply.

Long-Run vs. Short-Run Impact

Elasticities are often lower in the short run than in the long run. On the demand side of the market, it can sometimes be difficult to change Qd in the short run, but easier in the long run. Consumption of energy is a clear example. In the short run, it is not easy for a person to make substantial changes in energy consumption. Maybe you can carpool to work sometimes or adjust your home thermostat by a few degrees if the cost of energy rises, but that is about all. However, in the long run you can purchase a car that gets more miles to the gallon, choose a job that is closer to where you live, buy more energy-efficient home appliances, or install more insulation in your home. As a result, the elasticity of demand for energy is somewhat inelastic in the short run, but much more elastic in the long run.

Figure 5.5d is an example, based roughly on historical experience, for the responsiveness of Qd to price changes. In 1973, the price of crude oil was $12 per barrel and total consumption in the U.S. economy was 17 million barrels per day. That year, the nations who were members of the Organization of Petroleum Exporting Countries (OPEC) cut off oil exports to the United States for six months because the Arab members of OPEC disagreed with the U.S. support for Israel. OPEC did not bring exports back to their earlier levels until 1975—a policy that we can interpret as a shift of the supply curve to the left in the U.S. petroleum market. Figure 5.5d (a) and Figure 5.5d (b) show the same original equilibrium point and the same identical shift of a supply curve to the left from S_0 to S_1.

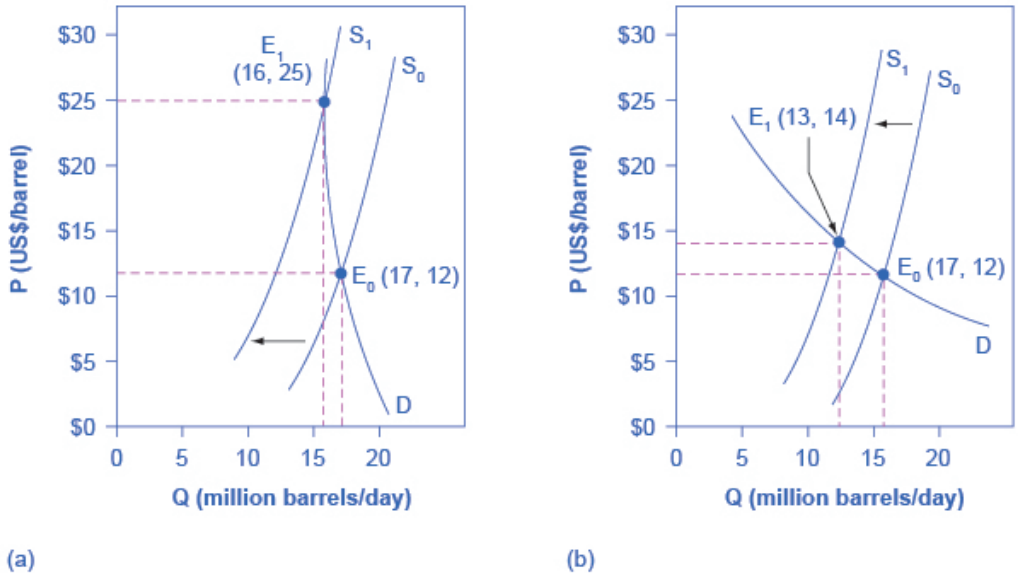

Figure 5.5d How a Shift in Supply Can Affect Price or Quantity. The intersection (E_0) between demand curve D and supply curve S_0 is the same in both (a) and (b). The shift of supply to the left from S_0 to S_1 is identical in both (a) and (b). The new equilibrium (E_1) has a higher price and a lower quantity than the original equilibrium (E_0) in both (a) and (b). However, the shape of the demand curve D is different in (a) and (b), being more elastic in (b) than in (a). As a result, the shift in supply can result either in a new equilibrium with a much higher price and an only slightly smaller quantity, as in (a), with more inelastic demand, or in a new equilibrium with only a small increase in price and a relatively larger reduction in quantity, as in (b), with more elastic demand. Figure by Steven A. Greenlaw & David Shapiro (OpenStax), licensed under CC BY 4.0.

Figure 5.5d How a Shift in Supply Can Affect Price or Quantity (text Version)

Depicts two graphs with the same vertical axis Price (US$ per barrel) and the horizontal axis Quantity (million barrels per day).

The original supply curve (S_0) slopes upward from left to right for both graphs.

In image (a), the shape of the demand curve (D) slopes steeply downward from left to right, whereas in image (b) the demand curve (D) slope is more gradual. The demand curve (D) is more elastic in (b) than in (a).

The original intersection (E_0), occurring between demand curve D and supply curve S_0, is the same in both graphs (a) and (b), occurring at $17 per barrel and 12 million barrels per day.

The shift of supply to the left from S_0 to S_1 is identical in both (a) and (b). The new equilibrium (E_1), occurring at the intersection between D_0 and S_1, has a higher price and a lower quantity than the original equilibrium (E_0) in both image (a) and (b).

The new equilibrium (E1) for image (a) is $16 per barrel and 25 million barrels per day. The new equilibrium (E1) for image (b) is $163 per barrel and 14 million barrels per day.

Figure 5.5d (a) shows inelastic demand for oil in the short run similar to that which existed for the United States in 1973. In Figure 5.5d (a), the new equilibrium (E_1) occurs at a price of $25 per barrel, roughly double the price before the OPEC shock, and an equilibrium quantity of 16 million barrels per day. Figure 5.5d (b) shows what the outcome would have been if the U.S. demand for oil had been more elastic, a result more likely over the long term. This alternative equilibrium (E_1) would have resulted in a smaller price increase to $14 per barrel and larger reduction in equilibrium quantity to 13 million barrels per day. In 1983, for example, U.S. petroleum consumption was 15.3 million barrels a day, which was lower than in 1973 or 1975. U.S. petroleum consumption was down even though the U.S. economy was about one-fourth larger in 1983 than it had been in 1973. The primary reason for the lower quantity was that higher energy prices spurred conservation efforts, and after a decade of home insulation, more fuel-efficient cars, more efficient appliances and machinery, and other fuel-conserving choices, the demand curve for energy had become more elastic.

On the supply side of markets, producers of goods and services typically find it easier to expand production in the long term of several years rather than in the short run of a few months. After all, in the short run it can be costly or difficult to build a new factory, hire many new workers, or open new stores. However, over a few years, all of these are possible.

In most markets for goods and services, prices bounce up and down more than quantities in the short run, but quantities often move more than prices in the long run. The underlying reason for this pattern is that supply and demand are often inelastic in the short run, so that shifts in either demand or supply can cause a relatively greater change in prices. However, since supply and demand are more elastic in the long run, the long-run movements in prices are more muted, while quantity adjusts more easily in the long run.

Key Concepts and Summary

In the market for goods and services, quantity supplied and quantity demanded are often relatively slow to react to changes in price in the short run, but react more substantially in the long run. As a result, demand and supply often (but not always) tend to be relatively inelastic in the short run and relatively elastic in the long run. A tax incidence depends on the relative price elasticity of supply

and demand. When supply is more elastic than demand, buyers bear most of the tax burden, and when demand is more elastic than supply, producers bear most of the cost of the tax. Tax revenue is larger the more inelastic the demand and supply are.

Attribution

Except where otherwise noted, this chapter is adapted from "Elasticity and Pricing (https://openstax.org/books/principles-microeconomics-2e/pages/5-3-elasticity-and-pricing)" and "Key Concepts and Summary" In *Principles of Microeconomics 2e (https://openstax.org/books/principles-microeconomics-2e/pages/1-introduction)* (OpenStx) by Steven A. Greenlaw & David Shapiro, licensed under CC BY 4.0./Adaptations include addition of chapter key concepts and summary.
Access for free at https://openstax.org/books/principles-microeconomics-2e/pages/1-introduction

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CHAPTER 6: TRENDS IN THE LABOUR MARKET

6.1 - ARE BITCOIN AND OTHER DIGITAL CURRENCIES THE FUTURE OF MONEY?

The rising price of Bitcoin during the pandemic has renewed interest in private digital money. While it is unlikely that Bitcoin will replace existing currencies, the emergence of 'cryptocurrencies' and 'stablecoins' has prompted exploration of central bank digital currencies.

Bitcoin is a decentralised virtual currency or 'cryptocurrency': in the words of its anonymous founder, 'a purely peer-to-peer version of electronic cash [that allows] online payments to be sent directly from one party to another without going through a financial institution.' When you own Bitcoin, you own the 'key' (or password) to an 'address' (or account) that contains the virtual currency. Bitcoin can be sent from one address to another by generating a transaction, which is then recorded on an immutable public 'block'. These blocks are then chained together, creating a 'blockchain' – apublicly available record of all historical Bitcoin transactions.

These 'blocks' are generated around once every ten minutes by a user of the network, who receives a reward in the form of newly issued Bitcoin. Which user generates this block, and therefore receives the reward, is determined by 'proof of work': using computing power to guess repeatedly a very large random number, with the new Bitcoin awarded to the user who guesses closest to this number. This process is known as 'mining' Bitcoin. The size of the reward tends towards zero over time, ensuring an absolute limit of 21 million on the quantity of Bitcoin in existence.

What are the advantages of Bitcoin over existing currencies?

According to its supporters, Bitcoin has two advantages over existing currencies. The first is that its supply is limited, making it impossible for a central authority to issue it in quantities that would devalue it. This means it is much less vulnerable to hyperinflation crises, such as those seen in Weimar Germany, Zimbabwe or Venezuela. But a limited supply can also be a weakness, as it makes it impossible to control deflation – a phenomenon that can also lead to very severe economic consequences (Bordo & Filardo, 2005).

The second claimed advantage of Bitcoin is that all transactions are permanent and immutable. When money is held in a bank account, that bank could theoretically expropriate the money from its user and claim that it never existed. With Bitcoin, this is impossible, because the database on which transactions are recorded

cannot be edited by any central authority. Bitcoin is thus often described as 'trustless', because it does not require its holder to trust a financial institution not to expropriate it.

These advantages are very much theoretical. Hyperinflation is not currently a major problem in advanced economies, and while financial institutions have been known to engage in fraudulent practices, they are typically more subtle than simply to seize their customers' funds and deny that they had ever existed.

In practical terms, the main advantage for users of Bitcoin is its anonymity, which allows it to be used to break the law with a lower risk of prosecution. One 2019 study found that 46% of all Bitcoin transactions involved illegal activity, accounting for around $76 billion per year (Foley et al, 2019). The most common forms of illegal activity using Bitcoin are the purchase of illegal drugs and money laundering. It is also frequently used to solicit anonymous payments during blackmail and extortion schemes.

Banks dealing with cryptocurrency platforms have historically struggled to comply with 'know-your-customer' regulation and several governments – most recently the French Minister of the Economy and Finance – have sought to crack down on the anonymity afforded by Bitcoin.

What are the disadvantages of Bitcoin compared with existing currencies?

In economic theory, money is said to have three primary functions: a medium of exchange; a store of value; and a unit of account. How well does Bitcoin fulfil these roles?

As discussed, Bitcoin is an excellent medium of exchange for transactions that require anonymity. But using it for other transactions is often prohibitively expensive. The average Bitcoin transaction fee during 2020 has ranged from 28 cents on 2 January to $13.41 on 31 October.

Furthermore, transferring Bitcoin without going through a third party, such as a crypto exchange, can be logistically challenging for those without a background in computer science. Most traders therefore use an exchange or a virtual wallet handled by a third party. But this means that the currency is no longer trustless, and Bitcoin holders have historically lost large sums of money to careless or fraudulent third parties. The most famous such episode was the theft of $460 million worth of Bitcoin held in the Mt. Gox Bitcoin exchange in 2013.

The usefulness of Bitcoin as a store of value is limited by its volatility. In the year to 9 December 2020, the US dollar value of Bitcoin – and therefore the quantity of goods that can be bought with Bitcoin – changed by an average of 2.22% per day. The price of Bitcoin has risen considerably in that time and advocates often argue that the cryptocurrency is a good store of value because its price will continue to rise over time.

The future price is inherently unpredictable, but even if optimists are correct that its price will rise, this is only an argument that Bitcoin is a good speculative investment – not that it is a useful form of money (Baur et al, 2018). Countries typically aim to have a stable currency rather than an appreciating but highly volatile currency, because the former is much more conducive to a healthy economy. This volatility also limits the effectiveness of Bitcoin as a unit of account: denoting the value of an asset in Bitcoin makes little sense when the real value of Bitcoin changes by an average of 2.22% per day.

See graphical representation of bitcoin prices at coindesk.com [New Tab] (https://www.coindesk.com/price/bitcoin).

These problems are significant, but may be surmountable in the long term. Perhaps a much more profound barrier to the widespread adoption of Bitcoin is the scalability of the blockchain. Each block is currently equipped to handle 1MB of data, meaning that it can only process between 3.3 and 7 transactions per second (Croman et al, 2016). During a period of intense speculative trading in 2017, the blockchain was overwhelmed by the quantity of requested transactions, causing the average Bitcoin transaction cost to rise to over $55.

This limit is several orders of magnitude too low for Bitcoin to function as a country's main currency. For comparison, Visa alone handles around 1,736 transactions per second, and the company claims that its network can handle over 24,000 transactions per second. Despite several proposals to alleviate this scalability problem, it is not clear that a solution exists, or that any solution could gain the confidence of enough Bitcoin stakeholders to be implemented successfully.

These problems with Bitcoin resulted in several attempts to create new digital currencies that solve these volatility and scalability problems – some of which have come to be known as 'stablecoins'.

What are stablecoins?

A stablecoin is a cryptocurrency that has its market value pegged to another asset or basket of assets. If traditional cryptocurrencies could be said to have a floating exchange rate, in that their price is allowed to fluctuate, stablecoins have a fixed exchange rate, in that their price is held constant by the guarantee of a central authority.

The most widely used stablecoin is Tether, which is purportedly pegged to the US dollar at a 1:1 ratio by the Tether Corporation. While the corporation's original 'white paper' stated that Tethers would be fully backed by US dollars, this is no longer the case. But Tether still trades at very close to $1 on secondary markets.

Why do people use Tether rather than the US dollar? Buying or selling cryptocurrency with traditional money, especially in large quantities, can incur considerable compliance costs. By holding Tethers rather than

US dollars, frequent crypto traders do not have to incur these costs as often. Major financial institutions have often been reluctant to deal with the Tether Corporation because of the potential for Tether to facilitate money laundering, and the corporation is currently under investigation by the state of New York.

Another well-known stablecoin is Facebook's Libra, which has recently been rebranded as Diem. This is a proposal for a virtual currency, run by a conglomerate of firms led by Facebook, which would be pegged to a basket of major currencies. As of December 2020, this stablecoin has not yet been launched, and the response from regulators has been so hostile that it may never be launched. Steven Mnuchin, US Secretary of the Treasury, responded to the initial white paper with the comment 'I hate everything about this [New Tab] (https://fortune.com/longform/facebook-libra-stablecoin-digital-currency-crypto/)', and Libra was later criticized in a tweet by President Trump.

Partly in response to the perceived threat posed by private currencies, central banks around the world have begun to research ways in which these technologies could be used to create state-controlled digital currencies.

What are central bank digital currencies?

A central bank digital currency (or CBDC) is a form of electronic money issued by a central bank. Existing national currencies can be traded electronically, so what is the benefit of a CBDC? This varies from one proposal to the next: it might be to allow the public to access central bank lending or to facilitate a move to a smoother payments system. A more sinister possibility is that a CBDC could allow an authoritarian government to record all transactions on a blockchain for the purposes of law enforcement.

To date, only a small number of CBDC schemes have been attempted. Finland's 'Avant' digital currency was rendered obsolete by improvements to the debit card system in the early 2000s. Uruguay has issued 'e-Pesos [New Tab]' (https://www.suerf.org/studies/7025/do-we-need-central-bank-digital-currency-economics-technology-and-institutions) in a successful trial of the concept of a CBDC, and is currently considering whether to continue the project on a larger scale. The largest project in development is the People's Bank of China's 'digital cash/electronic payments' project, which is intended partly to replace physical cash and has been piloted in several regions.

While a successful CBDC would lead to economic gains from a more efficient payments system, a botched implementation could pose risks to financial stability (Kumhof & Noone, 2018). For this reason, central banks globally are proceeding with caution. As of January 2019, only a small number of central banks in countries with atypical monetary circumstances had plans to implement a CBDC in the short to medium term (Barontini & Holden, 2019).

What else do we need to know?

A common mistake in media coverage of Bitcoin is to assume that a change in its price is indicative of a change in the long-term probability of its adoption. But Bitcoin market movements are rarely related to economic fundamentals, for two reasons:

- First, prices are highly sensitive to the issuance of additional unbacked Tethers (Griffin & Shams, 2020).
- Second, the ownership of Bitcoin is highly concentrated: by one estimate, 2% of accounts control 95% of Bitcoin. As a result, many significant price changes are simply the result of large trades by a single investor (Shen et al, 2020).

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6.2 - LABOUR MARKETS

Bring It Home

Baby Boomers Come of Age

The Census Bureau reports that as of 2013, 20% of the U.S. population was over 60 years old, which means that almost 63 million people are reaching an age when they will need increased medical care.

The baby boomer population, the group born between 1946 and 1964, is comprised of approximately 74 million people who have just reached retirement age. As this population grows older, they will be faced with common healthcare issues such as heart conditions, arthritis, and Alzheimer's that may require hospitalization, long-term, or at-home nursing care. Aging baby boomers and advances in life-saving and life-extending technologies will increase the demand for healthcare and nursing. Additionally, the Affordable Care Act, which expands access to healthcare for millions of Americans, has further increase the demand, although with the election of Donald J. Trump, this increase may not be sustained.

According to the Bureau of Labor Statistics, registered nursing jobs are expected to increase by 16% between 2014 and 2024. The median annual wage of $67,490 (in 2015) is also expected to increase. The BLS forecasts that 439,000 new nurses will be in demand by 2022.

These data tell us, as economists, that the market for healthcare professionals, and nurses in particular, will face several challenges. Our study of supply and demand will help us to analyze what might happen in the labour market for nursing and other healthcare professionals, as we will discuss in the second half of this case at the end of the chapter.

The theories of supply and demand do not apply just to markets for goods. They apply to any market, even markets for things we may not think of as goods and services like labour and financial services. Labour markets are markets for employees or jobs. Financial services markets are markets for saving or borrowing.

When we think about demand and supply curves in goods and services markets, it is easy to picture the demanders and suppliers: businesses produce the products and households buy them. Who are the demanders and suppliers in labour and financial service markets? In labour markets job seekers (individuals) are the suppliers of labour, while firms and other employers who hire labour are the

demanders for labour. In financial markets, any individual or firm who saves contributes to the supply of money, and any who borrows (person, firm, or government) contributes to the demand for money.

As a college student, you most likely participate in both labour and financial markets. Employment is a fact of life for most college students: According to the National Center for Educational Statistics, in 2013 40% of full-time college students and 76% of part-time college students were employed. Most college students are also heavily involved in financial markets, primarily as borrowers. Among full-time students, about half take out a loan to help finance their education each year, and those loans average about $6,000 per year. Many students also borrow for other expenses, like purchasing a car. As this chapter will illustrate, we can analyze labour markets and financial markets with the same tools we use to analyze demand and supply in the goods markets.

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6.3 - THE CHANGING WORKFORCE

Learning Objectives

- Understand some of the key social factors that influence the evolution of the workforce.
- Understand the distinct, common and integrated Canadian Federal and Provincial legal systems with respect to employment legislation.
- Understand the distinction between direct and indirect discrimination.
- Understand the concepts of job relatedness, Bona Fide Occupational requirements, duty to accommodate and undue hardship.
- Understand the steps needed to ensure employment equity in organizations.

The focus of human resource management is people. People bring with them feelings, emotions, perceptions, values, prejudices and are often unpredictable. Data, on the other hand is generally neat, quantifiable and often predictable. Thus, HR processes have to adapt and be particularly sensitive to how people and society change and evolve over time. Workers, like the society in which they live, are subject to constant change. Some of these changes have been slow and steady while others are very sudden (COVID-19). We discuss these changes, and their implications for HRM in this section.

Social Factors: The Constantly Evolving Workers

Diversity

The makeup of the Canadian workforce has changed dramatically over the past 50 years. In the 1950s, more than 70 percent of the workforce was composed of males.[19] Today's workforce reflects the broad range of differences in the population—differences in gender, race, ethnicity, age, physical ability, religion, education, and lifestyle. Most companies strive for diverse workforces and HR managers work hard to recruit, hire, develop, and retain employees from different backgrounds. As we will see later in this chapter, these efforts are

motivated in part by legal concerns: mismanagement in recruiting, hiring, advancement, disciplining and firing has legal consequences under applicable law. However, reasons for building a diverse workforce go well beyond mere compliance with legal standards. It even goes beyond commitment to ethical standards. Diversity is simply good business! In a competitive market, an organization cannot afford to limit their talent pools arbitrarily. Imagine a hockey team that would only hire players who love Death Metal music (let's assume that 20% of the population falls into that category). This means that this team would exclude 80% of all available players from the draft. The likelihood of that team ever winning the Stanley Cup with such a restricted pool of players is very, very slim! The point is that organizations cannot afford to exclude workers based on frivolous characteristics. When they do exclude workers, as it is their prerogative, it should be based on characteristics that are proven to be related to performance. In the case of a hockey team: skating, puck handling, vision, etc.

A study by Cedric Herring called *Does Diversity Pay? (Herring, 2006)* reveals that diversity does in fact pay. The study found that the businesses with greater racial diversity reported higher sales revenues, more customers, larger market shares, and greater relative profits than those with more homogeneous workforces. Other research on the topic by Scott Page, the author of *The Difference: How the Power of Diversity Creates Better Groups, Firms, Schools, and Societies (Page, 2007)* ended up with similar results. Page found that people from varied backgrounds are more effective at working together than those who are from similar backgrounds, because they offer different approaches and perspectives in the development of solutions.

Eric Foss, chairperson and CEO of Pepsi Beverages Company opined, "It's not a fad. It's not an idea of the month. It's central and it's linked very directly to business strategy" (Holstein, 2009). A study by the late Roy Adler of Pepperdine University shows similar results. His 19-year study of 215 *Fortune* 500 companies shows a strong correlation between female executives and high profitability (Adler). Another study, conducted by Project Equality, found that companies that rated low on equal opportunity earned 7.9 percent profit, while those who rated highest with more equal opportunities resulted in 18.3 percent profit (Lauber, 2011). These numbers show that diversity and multiculturalism are certainly not a fad, but a way of doing business that better serves customers and results in higher profits.

Figure 6.3a Class of 58 (https://concordia.accesstomemory.org/class-of-58) [P0050-02-01] by Concordia University Records Management and Archives

Link It Up

Read Canadian workforce facing demographic shift, StatsCan predicts [New Tab] (https://www.investmentexecutive.com/news/research-and-markets/canadian-workforce-facing-demographic-shift-statscan-predicts/) for information about shifting workforce demographics.

Employees' Expectations

Another trend that HRM needs to account for is how employees' values and attitudes are evolving. It is important for HRM to meet employees' expectations when it comes to work. We outline three broad areas for which expectations have evolved drastically over the past 20 years.

Rights and ethics

Employees are more demanding than ever when it comes to their rights and the behaviour of their employers. Regarding their rights, employees are more informed than ever. With the rise of social media, a new phenomenon is also taking place in organizations: employee militancy. People are willing to commit their time and energy to an organization, but if that organization fails to meet their expectations in terms of values or ethics, they will no longer remain silent. Employee militancy has moved from advocating for workers right (e.g., better pay, gender equity) to pushing for a better society. A good example of this is how Facebook employees staged a virtual protest [New Tab] (https://www.wired.com/story/facebook-employees-rare-step-call-out-mark-zuckerberg/), pressing Facebook executives to take a tougher stand on Donald Trump's inflammatory posts. Some of the issues that have become very important for employees are listed below, with a relevant example demonstrating it:

Sustainability: At Amazon, employees organized an 'online walk out' to protest the company's stance on climate change. Since late last year, a group of workers within Amazon have been organizing to push the company to radically reduce its carbon emissions. On 2020-09-20, Amazon workers around the world will walk out of their offices to join the Global Climate Strike. Read Hey, Jeff Bezos: I work for Amazon – and I'm protesting against your firm's climate inaction [New Tab] (https://www.theguardian.com/technology/2019/sep/10/jeff-bezos-amazon-climate-strike-aecj) to learn more.

Privacy: Humanyze [New Tab] (https://www.humanyze.com/organizational-health-score/), a Boston-based start-up makes wearable badges equipped with sensors, an accelerometer, microphones and Bluetooth. The devices — just slightly thicker than a standard corporate ID badge — can gather audio data such as tone of

voice and volume, an accelerometer to determine whether an employee is sitting or standing, and Bluetooth and infrared sensors to track where employees are and whether they are having face-to-face interactions (see video below). The privacy of workers is increasingly threatened by such technological advances and many employees are taking their opposition to this technology to court.

Watch It!

Watch High-Tech ID Badge Tracks Workers' Entire Day On The Job (https://www.youtube.com/watch?v=nzch8_u77T4)(2 mins)

One or more interactive elements has been excluded from this version of the text. You can view them online here: https://ecampusontario.pressbooks.pub/laboureconomics/?p=607#oembed-1

Video Source: CBS Boston. (2017, May 17). *High-tech ID badge tracks workers' entire day on the job* [Video]. YouTube. https://www.youtube.com/watch?v=nzch8_u77T4

Work life balance

Work-life balance is an important aspect of a healthy work environment, and more and more, employees are insisting on it. Maintaining work-life balance helps reduce stress and helps prevent burnouts in the workplace. To satisfy the assumed desires of employees, many employers overcompensate by adding game rooms and beanbags to spice up the work environment. An entire industry has popped up surrounding making workspaces more "millennial-friendly." WeWork [New Tab] (https://www.wework.com/), one of the most well-known of this new breed of property managers, is known for designing such work environments. However, these environments tend to blur the boundaries between work and life, and many employees report that they do not care for these types of perks. One of the answers for employers is to create a flexible work environment, one that satisfies the work-life balance needs of most employees.

Attribution

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6.4 - IMMIGRATION

Learning Objectives

- Discuss the economic implications of immigration

Most Americans would be outraged if a law prevented them from moving to another city or another state. However, when the conversation turns to crossing national borders and are about other people arriving in the United States, laws preventing such movement often seem more reasonable. Some of the tensions over immigration stem from worries over how it might affect a country's culture, including differences in language, and patterns of family, authority, or gender relationships. Economics does not have much to say about such cultural issues. Some of the worries about immigration do, however, have to do with its effects on wages and income levels, and how it affects government taxes and spending. On those topics, economists have insights and research to offer.

Historical Patterns of Immigration

Supporters and opponents of immigration look at the same data and see different patterns. Those who express concern about immigration levels to the United States point to graphics like Figure 1 which shows total inflows of immigrants decade by decade through the twentieth century. Clearly, the level of immigration has been high and rising in recent years, reaching and exceeding the towering levels of the early twentieth century. However, those who are less worried about immigration point out that the high immigration levels of the early twentieth century happened when total population was much lower. Since the U.S. population roughly tripled during the twentieth century, the seemingly high levels in immigration in the 1990s and 2000s look relatively smaller when they are divided by the population.

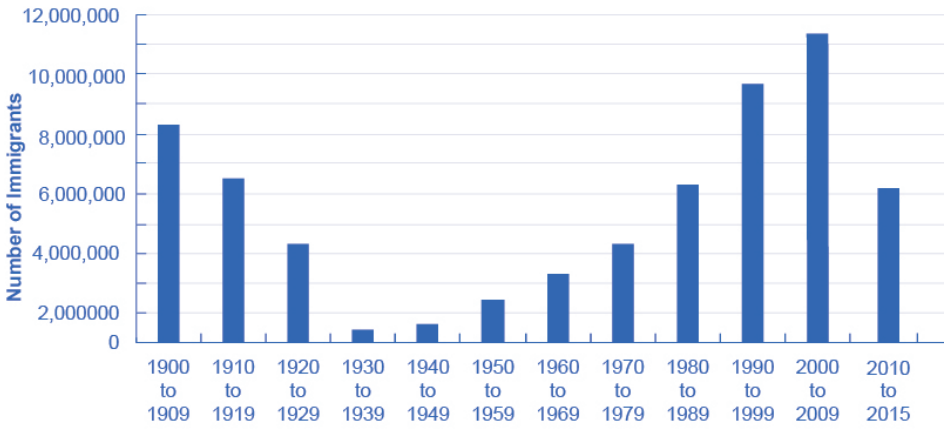

Figure 6.4a Immigration Since 1900. he number of immigrants in each decade declined between 1900 and the 1940s, rose sharply through 2009 and started to decline from 2010 to the present. (Image Source: U.S. Department of Homeland Security, Yearbook of Immigration Statistics: 2011, Table 1). Figure by Steven A. Greenlaw & David Shapiro (OpenStax), licensed under CC BY 4.0.

From where have the immigrants come? Immigrants from Europe were more than 90% of the total in the first decade of the twentieth century, but less than 20% of the total by the end of the century. By the 2000s, about half of U.S. immigration came from the rest of the Americas, especially Mexico, and about a quarter came from various countries in Asia.

Economic Effects of Immigration

A surge of immigration can affect the economy in a number of different ways. In this section, we will consider how immigrants might benefit the rest of the economy, how they might affect wage levels, and how they might affect government spending at the federal and local level.

To understand the economic consequences of immigration, consider the following scenario. Imagine that the immigrants entering the United States matched the existing U.S. population in age range, education, skill levels, family size, and occupations. How would immigration of this type affect the rest of the U.S. economy?

Immigrants themselves would be much better off, because their standard of living would be higher in the United States. Immigrants would contribute to both increased production and increased consumption. Given enough time for adjustment, the range of jobs performed, income earned, taxes paid, and public services needed would not be much affected by this kind of immigration. It would be as if the population simply increased a little.

Now, consider the reality of recent immigration to the United States. Immigrants are not identical to the rest of the U.S. population. About one-third of immigrants over the age of 25 lack a high school diploma. As a result, many of the recent immigrants end up in jobs like restaurant and hotel work, lawn care, and janitorial work. This kind of immigration represents a shift to the right in the supply of unskilled labour for a number of jobs, which will lead to lower wages for these jobs. The middle- and upper-income households that purchase the services of these unskilled workers will benefit from these lower wages. However, low-skilled U.S. workers who must compete with low-skilled immigrants for jobs will tend to suffer from immigration.

The difficult policy questions about immigration are not so much about the overall gains to the rest of the economy, which seem to be real but small in the context of the U.S. economy, as they are about the disruptive effects of immigration in specific labour markets. One disruptive effect, as we noted, is that immigration weighted toward low-skill workers tends to reduce wages for domestic low-skill workers. A study by Michael S. Clune found that for each 10% rise in the number of employed immigrants with no more than a high school diploma in the labour market, high school students reduced their annual number of hours worked by 3%. The effects on wages of low-skill workers are not large—perhaps in the range of decline of about 1%. These effects are likely kept low, in part, because of the legal floor of federal and state minimum wage laws. In addition, immigrants are also thought to contribute to increased demand for local goods and services which can stimulate the local low skilled labour market. It is also possible that employers, in the face of abundant low-skill workers may choose production processes which are more labour intensive than otherwise would have been. These various factors would explain the small negative wage effect that the native low-skill workers observed as a result of immigration.

Another potential disruptive effect is the impact on state and local government budgets. Many of the costs imposed by immigrants are costs that arise in state-run programs, like the cost of public schooling and of welfare benefits. However, many of the taxes that immigrants pay are federal taxes like income taxes and Social Security taxes. Many immigrants do not own property (such as homes and cars), so they do not pay property taxes, which are one of the main sources of state and local tax revenue. However, they do pay sales taxes, which are state and local, and the landlords of property they rent pay property taxes. According to the nonprofit Rand Corporation, the effects of immigration on taxes are generally positive at the federal level, but they are negative at the state and local levels in places where there are many low-skilled immigrants.

Proposals for Immigration Reform

The Congressional Jordan Commission of the 1990s proposed reducing overall levels of immigration and refocusing U.S. immigration policy to give priority to immigrants with higher skill levels. In the labour market, focusing on high-skilled immigrants would help prevent any negative effects on low-skilled workers' wages. For government budgets, higher-skilled workers find jobs more quickly, earn higher wages, and pay more in taxes. Several other immigration-friendly countries, notably Canada and Australia, have immigration systems where those with high levels of education or job skills have a much better chance of obtaining permission to immigrate. For the United States, high tech companies regularly ask for a more lenient immigration policy to admit a greater quantity of highly skilled workers under the H1B visa program.

The Obama Administration proposed the so-called "DREAM Act" legislation, which would have offered a path to citizenship for illegal immigrants brought to the United States before the age of 16. Despite bipartisan support, the legislation failed to pass at the federal level. However, some state legislatures, such as California, have passed their own Dream Acts.

Between its plans for a border wall, increased deportation of undocumented immigrants, and even reductions in the number of highly skilled legal H1B immigrants, the Trump Administration has a much less positive approach to immigration. Most economists, whether conservative or liberal, believe that while immigration harms some domestic workers, the benefits to the nation exceed the costs. However, given the Trump Administration's opposition, any significant immigration reform is likely on hold.

Watch It!

Watch The Economics of Immigration: Crash Course Economics #33 (https://www.youtube.com/watch?v=4XQXiCLzyAw)(11 mins) for a comprehensive overview on the economics of immigration.

One or more interactive elements has been excluded from this version of the text. You can view them online here: https://ecampusontario.pressbooks.pub/laboureconomics/?p=624#oembed-1

Video Source: CrashCourse. (2016, May 18). *The economics of immigration: Crash course econ #33* [Video]. YouTube. https://www.youtube.com/watch?v=4XQXiCLzyAw

Try It

An interactive H5P element has been excluded from this version of the text. You can view it online here: https://ecampusontario.pressbooks.pub/laboureconomics/?p=624#h5p-5

Try It – Text version

1. Which of the following economic implications of immigration is not correct?
    a. Typically, when immigration increases, households pay less for projects involving unskilled labor and low-skilled U.S workers end up competing with low-skilled immigrants for these jobs.
    b. Immigration can benefit the local economy.
    c. An increase in immigration tends to impact on state and local government budgets by decreasing the use of resources and entitlement programs.

Check your Answer: [1]

Activity source: "Immigration (https://courses.lumenlearning.com/wm-microeconomics/chapter/immigration/)" In *Micoreconomics* (https://courses.lumenlearning.com/wm-microeconomics/) by LumenLearning, licensed under CC BY 4.0. / Converted to H5P and text.

Attribution

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1. 1. c) Correct. A potential disruptive effect to increased immigration is the impact on state and local government budgets. Many of the costs imposed by immigrants are costs that arise in state-run programs, like the cost of public schooling and of welfare benefits.

14-6-immigration)" In Principles of Economics 2e. (https://openstax.org/books/principles-economics-2e/pages/1-introduction) by Steven A. Greenlaw and David Shapiro (OpenStax), licensed under CC BY 4.0.

Access for free at https://openstax.org/books/principles-economics-2e/pages/1-introduction

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U.S. Department of Homeland Security. (2012, September). Table 1. Persons obtaining legal permanent resident status: fiscal years 1820 to 2011 [2011 Yearbook of Immigration Statistics]. https://www.dhs.gov/sites/default/files/publications/ois_yb_2011.pdf
U.S. Department of Homeland Security. (2012, September). Table 1. Persons obtaining legal permanent resident status: fiscal years 1820 to 2011 [2011 Yearbook of Immigration Statistics]. https://www.dhs.gov/sites/default/files/publications/ois_yb_2011.pdf

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6.5 - READING LIST

1. David Foot/Footwork Consulting Inc. [New Tab] (http://www.footwork.com/index.asp)
2. The millennial generation's views on their world of work [New Tab] (https://www.youtube.com/watch?v=uc8kW2iDA3A)
3. Retiring baby boomers are going to have a huge impact on the economy [New Tab] (https://www.weforum.org/agenda/2017/09/retiring-baby-boomers-are-going-to-have-a-huge-impact-on-the-economy)
4. Artificial Intelligence has changed our world [New Tab] (https://www.meer.com/en/64215-artificial-intelligence-has-changed-our-world)
5. Everything you need to know about the Fourth Industrial Revolution [New Tab] (https://www.cnbc.com/2019/01/16/fourth-industrial-revolution-explained-davos-2019.html)

Reading List compiled by Norm Smith.

CHAPTER 7 -EMPLOYMENT

7.1 - WORK IN CANADA

Learning Objectives

Introduction to Work and the Economy

- Understand what economy refers to.

Work in Canada

- Describe the current Canadian workforce and the trend of polarization.
- Explain how women and immigrants have impacted the modern Canadian workforce.
- Understand the basic elements of poverty in Canada today.

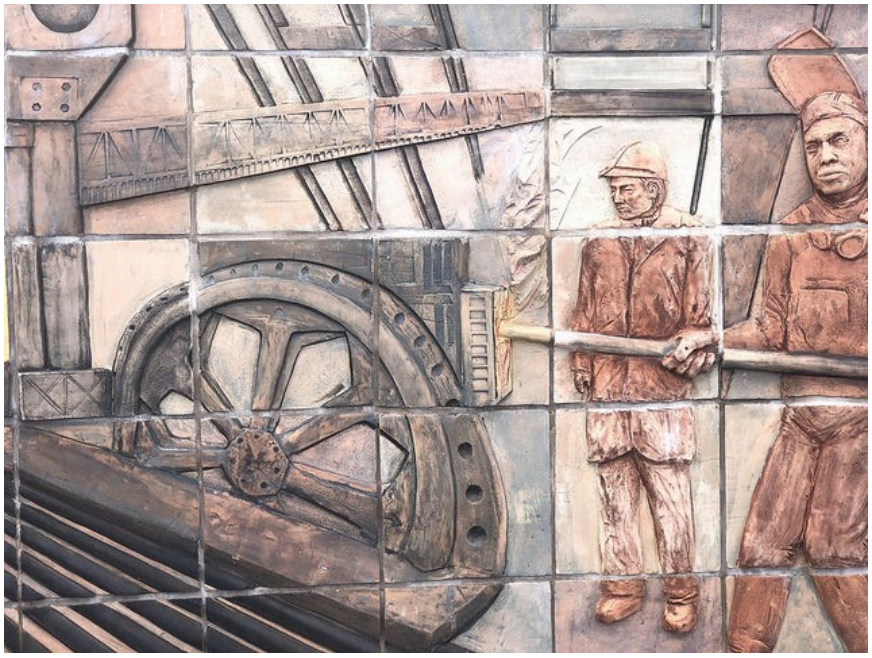

Figure 7.1a Detail from mural at Open Hearth Park In Sydney, NS. Heavy industry like steel production was once a cornerstone of the Canadian economy. mural OH worker2 (https://www.flickr.com/photos/164103414@N04/41910429462/) by connie mcpherson licensed under CC BY-NC-ND.

Introduction to Work and the Economy

Ever since the first people traded one item for another, there has been some form of **economy** in the world. The economy is how people meet their wants and needs though producing and exchanging **goods** and services. In sociology, e**conomy** refers to the social institutions through which a society's resources (goods and services) are managed.

Goods are the physical objects we find, grow, or make in order to meet human needs. Goods can meet essential needs, such as shelter, clothing, and food, or they can be luxuries — those things we do not *need* to live but *want* anyway. Goods produced for sale on the market are called **commodities**. In contrast to these *objects*, **services** are *activities* that benefit people. Examples of services include food preparation and delivery, health care, education, and entertainment. These services provide resources to maintain and improve a society. The food industry helps ensure that all of a society's members have access to nutrition. Health care and education systems care for those in need, help foster longevity, and equip people to become productive members of society.

Economy is one of human society's earliest social structures. Our earliest forms of writing (such as Sumerian clay tablets) were developed to record transactions, payments, and debts between merchants. As societies

grow and change, so do their economies. The economy of a small farming community is very different from the economy of a large nation with advanced technology.

Work in Canada

Common wisdom states that if you study hard, develop good work habits, and graduate from high school or college, then you'll get a good job. And although the reality has always been more complex than the myth, worldwide **recessions** and other economic changes make it harder to win the employment game.

The data are grim: for example, in the United States, from December 2007 through March 2010, 8.2 million workers lost their jobs, and the unemployment rate grew to almost 10% nationally, with some states showing much higher rates (Autor, 2010). Times are very challenging for those in the workforce in Canada too. For those finishing their schooling, often with enormous student-debt burdens, finding employment is not just challenging — it can be terrifying.

So where did all the jobs go? Will any of them be coming back? If not, what new ones will there be? How do you find and keep a good job now? These are the kinds of questions people are currently asking about the job market in Canada.

Polarization in the Workforce

The mix of jobs available in Canada has always varied. Geography, race, gender, and other factors have always played a role in finding employment. More recently, increased **outsourcing** (or contracting work to an outside source) of manufacturing jobs to developing nations has greatly diminished the number of high-paying, often unionized, blue-collar positions available. A similar problem exists in the white-collar sector, with many clerical and support positions also being outsourced. Think of the number of international technical-support call centres in Mumbai, India! The number of supervisory and managerial positions has been reduced as companies streamline their command structures. Industries continue to consolidate through mergers. Even highly educated skilled workers such as computer programmers have seen their jobs vanish overseas.

Automation (replacing workers with technology) of the workplace is another cause of the changes in the job market. Computers can be programmed to do many routine tasks faster and less expensively than people who used to do such tasks. Jobs like bookkeeping, clerical work, and repetitive tasks on production assembly lines all lend themselves to automation. Think about the newer automated toll passes we can install in our cars. Toll collectors are just one of the many endangered jobs that will soon cease to exist.

Despite all this, the job market is growing in some areas, but in a very polarized fashion. **Polarization** means

that a gap has developed in the job market, with most employment opportunities at the lowest and highest levels and few jobs for those with mid- level skills and education. At one end, there is strong demand for low-skilled, low-paying jobs in industries like food service and retail. On the other end, some research shows that in certain fields there has been a steadily increasing demand for highly skilled and educated professionals, technologists, and managers. These high-skilled positions also tend to be highly paid (Autor, 2010).

The fact that some positions are highly paid while others are not is an example of the **dual labour market structure**, a division of the economy into sectors with different levels of pay. The primary labour market consists of high-paying jobs in the public sector, manufacturing, telecommunications, biotechnology, and other similar sectors that require high levels of capital investment (or other restrictions) that limit the number of businesses able to enter the sector. The costs of labour are considered marginal in comparison to the total capital investment required. Jobs in the sector usually offer good benefits, security, prospects for advancement, and comparatively higher levels of unionization.

The secondary labour market consists of jobs in more competitive sectors of the economy like service industries, restaurants, and commercial enterprises, where the cost of entry for businesses is relatively low. Jobs in the secondary labour market are usually poorly paid, offer few if any benefits, and have little job security, poor prospects for advancement, and minimal unionization. Wages paid to employees make up a significant portion of the cost of products or **services** offered to consumers, and because of the high level of competition, businesses are obliged to keep the cost of labour to a minimum to remain competitive.

Hard work does not guarantee success in the dual labour market economy, because **social capital**—the accumulation of a network of social relationships and knowledge that will provide a platform from which to achieve financial success—in the form of connections or higher education are often required to access the high-paying jobs. Increasingly, we are realizing intelligence and hard work are not enough. If you lack knowledge of how to leverage the right names, connections, and players, you are unlikely to experience upward mobility. Particularly in the knowledge economy, which generates a new dual labour market between jobs that require high levels of education (scientists, programmers, designers, etc.) and support jobs (secretarial, data entry, technicians, etc.), social capital in the form of formal education is a condition for accessing quality jobs.

The division between those who are able to access, create, use, and disseminate knowledge and those who cannot is often referred to as the **knowledge divide**. With so many jobs being outsourced or eliminated by automation, what kinds of jobs are available in Canada?

While manufacturing jobs are in decline and fishing and agriculture are static, several job markets are expanding. These include resource extraction, computer and information services, professional business services, health care and social assistance, and accommodation and food services. Figure 7.1b, from Employment and Social Development Canada, illustrates areas of projected growth.

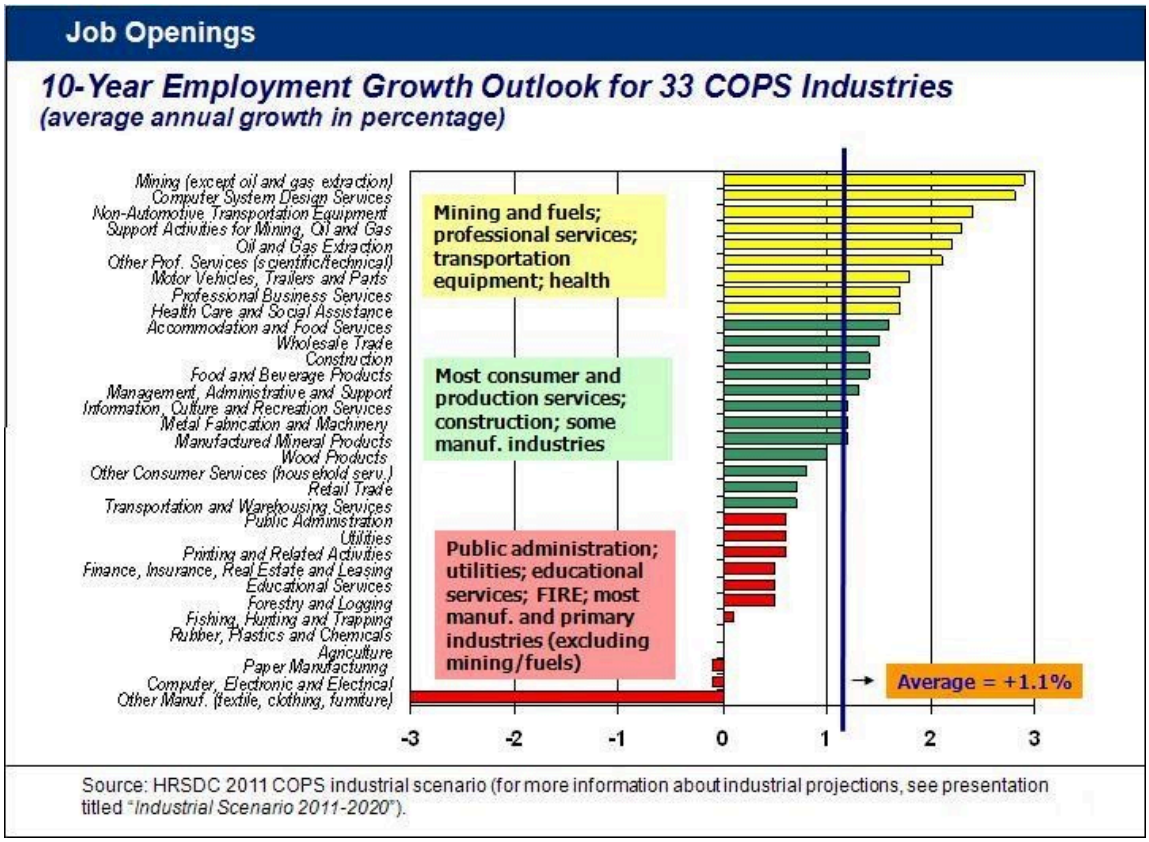

Figure 7.1b. This chart shows the projected growth of several occupational groups. (Graph courtesy of the Employment and Social Development Canada (Labour Market Research and Forecasting Policy Research Directorate 2011a) available from http://www23.hrsdc.gc.ca/l.3bd.2t.1ilshtml@-eng.jsp?lid=17&fid=1&lang=en. The Canadian Government allows this graph to be used in whole or part for non-commercial purposes in any format (http://www.esdc.gc.ca/eng/terms/index.shtml).

Figure 7.1b (Text Version)

Job Openings : 10-Year Employment Growth Outlook for 33 COPS Industries (average annual growth in percentage)
Highest is in "Mining and fuels; professional services; transportation equiptment; health": all well above the average +1.1%.
The next highest is in "Most consumer and production services; construction; some manufacturing industries": some are above the average +1.1%.
The lowest is the "Public administration; utilities; educational services; FIRE; most manufacturing and primary industries (excluding mining/fuels)" : all well below the average +1.1%.

Professional and related jobs, which include any number of positions, typically require significant education and training and tend to be lucrative career choices. Service jobs, according to Employment and Social Development Canada, can include everything from consumer service jobs such as scooping ice cream, to

producer service jobs that contract out administrative or technical support, to government service jobs including teachers and bureaucrats (Labour Market Research and Forecasting Policy Research Directorate, 2011b).

There is a wide variety of training needed, and therefore an equally large wage discrepancy. One of the largest areas of growth by industry, rather than by occupational group (as seen above), is in the health field (Labour Market Research and Forecasting Policy Research Directorate, 2011a). This growth is across occupations, from practical nurses and assistants to management-level staff. Baby boomers are living longer than any generation before, and the growth of this population segment requires an increase in our country's elder care system, from home health care nursing to geriatric nutrition.

Notably, jobs in manufacturing are in decline. This is an area where those with less education traditionally could find steady, if low-wage, work. With these jobs disappearing, more and more workers will find themselves untrained for available employment. Another projected trend in employment relates to the level of education and training required to gain and keep a job.

As **Figure 7.1c** shows, growth rates are higher for those with more education. It is estimated that between 2011 and 2020, there will be 6.5 million new job openings due to economic growth or retirement, two-thirds of which will be in occupations that require post-secondary education ("PSE" in the chart) or in management positions (Labour Market Research and Forecasting Policy Research Directorate, 2011a). 70% of new jobs created through economic growth are projected to be in management or occupations that require post-secondary education. Those with a university degree may expect job growth of 21.3%, and those with a college degree or apprenticeship 34.3%.

At the other end of the spectrum, jobs that require a high school diploma or equivalent are projected to grow at only 24.9%, while jobs that require less than a high school diploma will grow at 8.6%. Quite simply, without a degree, it will be more difficult to find a job. These projections are based on overall growth across all occupation categories, so obviously there will be variations within different occupational areas. Seven out of the ten occupations with the highest proportion of job openings are in management and the health sector. However, once again, those who are the least educated will be the ones least able to fulfill the Canadian dream.

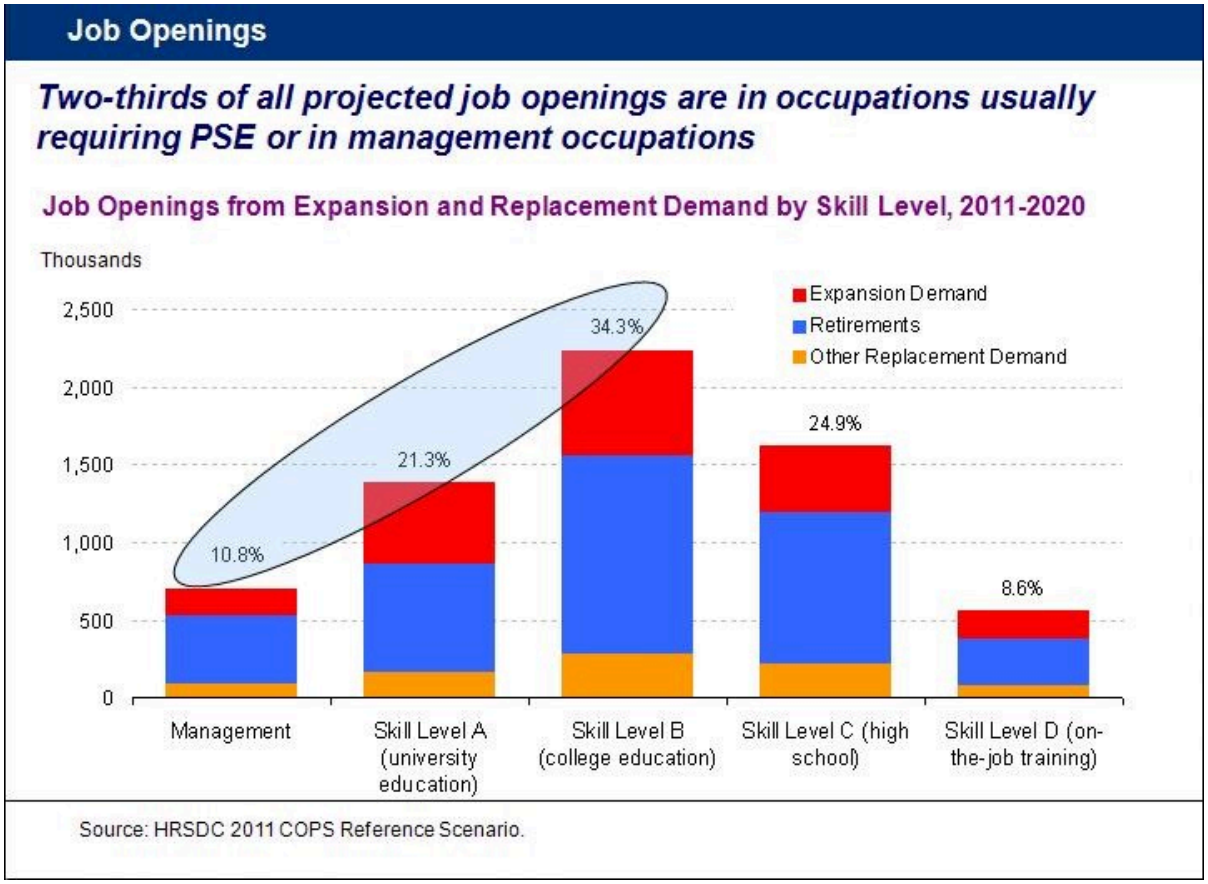

Figure 7.1c. More education generally means more jobs. (Graph courtesy of the Social Development Canada (Labour Market Research and Forecasting Policy Research Directorate, 2011a)) available from http://www23.hrsdc.gc.ca/l.3bd.2t.1ilshtml@-eng.jsp?lid=17&fid=1&lang=en. The Canadian Government allows this graph to be used in whole or part for non-commercial purposes in any format (http://www.esdc.gc.ca/eng/terms/index.shtml).

Figure 7.1c (Text Version)

Job Openings: Two-thirds of all projected job openings are in occupations usually requiring PSE or in management occupations.

Job Openings from Expansion and Replacement Demand by Skill Level, 2011 -2020:

Bar graph describing the skill level demanded (2011-2020) detailing the expansion demand, retirements and other replacement demand for each level:

Management: 10.8%

Skill Level A (university education): 21.3%

Skill Level B (college education): 34.3%.

Skill Level C (high school):24.9%

Skill Level D (on-the-job training): 8.6%

Women in the Workforce

In the past, rising education levels in Canada were able to keep pace with the rise in the number of education-dependent jobs. Since the late 1970s, men have been enrolling in university at a lower rate than women, and graduating at a rate of almost 10% less (Wang and Parker, 2011). In 2008, 62% of undergraduate degrees and 54% of graduate degrees were granted to women (Drolet, 2011). The lack of male candidates reaching the education levels needed for skilled positions has opened opportunities for women and immigrants. Women have been entering the workforce in ever-increasing numbers for several decades. Their increasingly higher levels of education attainment than men has resulted in many women being better positioned to obtain high-paying, high-skill jobs. Between 1991 and 2011, the percentage of employed women between the ages of 25 and 34 with a university degree increased from 19% to 40%, whereas among employed men aged 25 to 34 the percentage increased from 17% to 27%.

It is interesting to note however that at least 20% of all women with a university degree were still employed in the same three occupations as they were in 1991: registered nurses, elementary school and kindergarten teachers, and secondary school teachers. The top three occupations for university-educated men (11% of this group) were computer programmers and interactive media developers, financial auditors and accountants, and secondary school teachers (Uppal and LaRochelle-Côté, 2014). While women are getting more and better jobs and their wages are rising more quickly than men's wages are, Statistics Canada data show that they are still earning only 76% of what men are for the same positions. However when the wages of young women aged 25 to 29 are compared to young men in the same age cohort, the women now earn 90% of young men's hourly wage (Statistics Canada, 2011).

Immigration and the Workforce

Simply put, people will move from where there are few or no jobs to places where there are jobs, unless something prevents them from doing so. The process of moving to a country is called immigration. Canada has long been a destination for workers of all skill levels. While the rate decreased somewhat during the economic slowdown of 2008, immigrants, both legal and illegal, continue to be a major part of the Canadian workforce. In 2006, before the recession arrived, immigrants made up 19.9% of the workforce, up from 19 percent in 1996 (Kustec, 2012). The economic downturn affected them disproportionately. In 2008, employment rates were at the peak for both native-born Canadians (84.1%) and immigrants (77.4%). In 2009, these figures dropped to 82.2% and 74.9% respectively, meaning that the gap in employment rates increased to 7.3 percentage points from 6.7. The gap was greater between native-born and very recent immigrants (18.6 percentage points in 2009, compared with a gap of 17.5 points in 2008) (Yssaad, 2012). Interestingly, in the United States, this trend was reversed. The unemployment rate decreased for immigrant workers and increased for native workers (Kochhar, 2010). This no doubt did not help to reduce tensions in that country about levels of immigration, particularly illegal immigration.

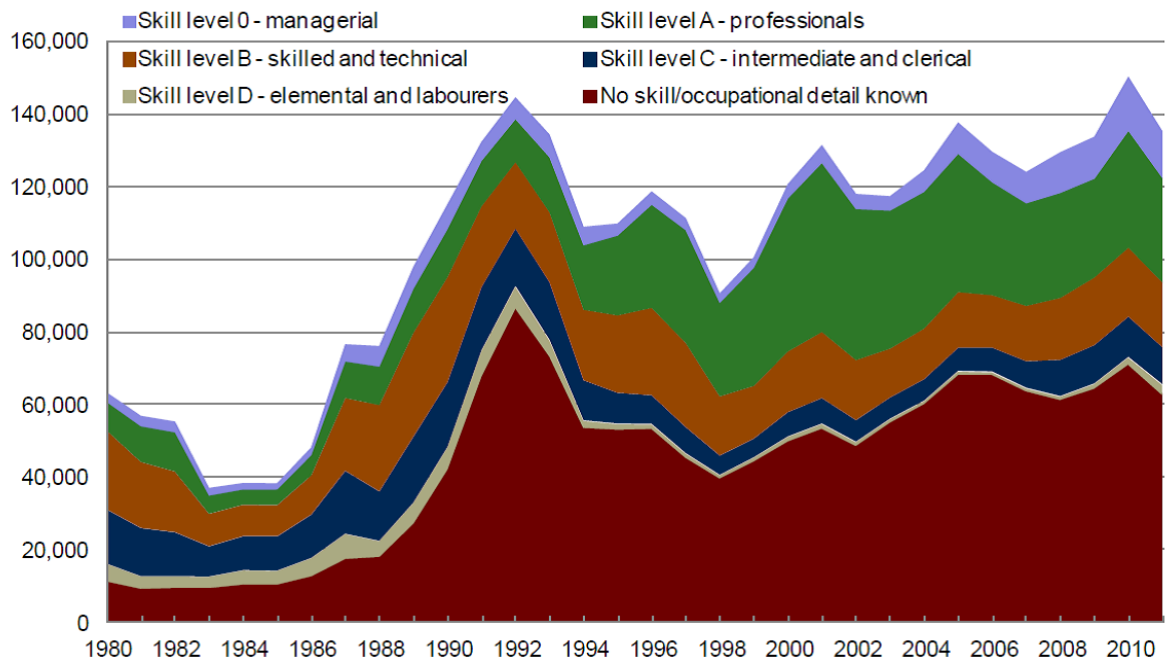

Figure 7.1d. Landings of permanent residents intending to work by skill level, 1980-2011 (Graph courtesy of Citizenship & Immigration Canada (Kustec, 2012)). This graph is a reproduction of an official work that is published by the Government of Canada and that has not been produced in affiliation with, or with the endorsement of the Government of Canada. This graph may be used in part or whole for non-commercial purposes without further permissions.

Recent political debate about the Temporary Foreign Worker Program has been fueled by conversations about low-skilled service industry jobs being taken by low-earning foreign workers (Mas, 2014). It should be emphasized that a substantial portion of working-age *immigrants* (i.e., not temporary workers) landing in Canada are highly educated and highly skilled (Figure 7.1d). They play a significant role in filling skilled positions that open up through both job creation and retirement. About half of the landed immigrants identify an occupational skill, 80 to 90% of which fall within the higher skill level classifications. Of the other 50% of landed immigrants who intend to work but do not indicate a specific occupational skill, most have recently completed school and are new to the labour market, or have landed under the family class or as refugees — classes which are not coded by occupation (Kustec, 2012).

Poverty in Canada

When people lose their jobs during a recession or in a changing job market, it takes longer to find a new one, if they can find one at all. If they do, it is often at a much lower wage or not full time. This can force people into poverty. In Canada, we tend to have what is called relative poverty, defined as being unable to live the lifestyle of the average person in your country. This must be contrasted with the absolute poverty that can be found in underdeveloped countries, defined as being barely able, or unable, to afford basic necessities such as food

(Byrns, 2011). We cannot even rely on unemployment statistics to provide a clear picture of total unemployment in Canada. First, unemployment statistics do not take into account **underemployment**, a state in which people accept lower-paying, lower-status jobs than their education and experience qualifies them to perform. Second, unemployment statistics only count those:

1. who are actively looking for work
2. who have not earned income from a job in the past four weeks
3. who are ready, willing, and able to work

The unemployment statistics provided by Statistics Canada are rarely accurate, because many of the unemployed become discouraged and stop looking for work. Not only that, but these statistics undercount the youngest and oldest workers, the chronically unemployed (e.g., homeless), and seasonal and migrant workers.

A certain amount of unemployment is a direct result of the relative inflexibility of the labour market, considered **structural unemployment**, which describes when there is a societal level of disjuncture between people seeking jobs and the available jobs. This mismatch can be geographic (they are hiring in Alberta, but the highest rates of unemployment are in Newfoundland and Labrador), technological (skilled workers are replaced by machines, as in the auto industry), or can result from any sudden change in the types of jobs people are seeking versus the types of companies that are hiring. Because of the high standard of living in Canada, many people are working at full-time jobs but are still poor by the standards of relative poverty. They are the **working poor**. Canada has a higher percentage of working poor than many other developed countries (Brady, Fullerton, and Cross, 2010). In terms of employment, Statistics Canada defines the working poor as those who worked for pay at least for at least 910 hours during the year, and yet remain below the poverty line according to the Market Basket Measure (i.e., they lack the disposable income to purchase a specified "basket" of basic goods and services). Many of the facts about the working poor are as expected: those who work only part time are more likely to be classified as working poor than those with full-time employment; higher levels of education lead to less likelihood of being among the working poor; and those with children under 18 are four times more likely than those without children to fall into this category. In 2011, 6.4% of Canadians of all ages lived in households classified as working poor (Employment and Social Development Canada, 2011).

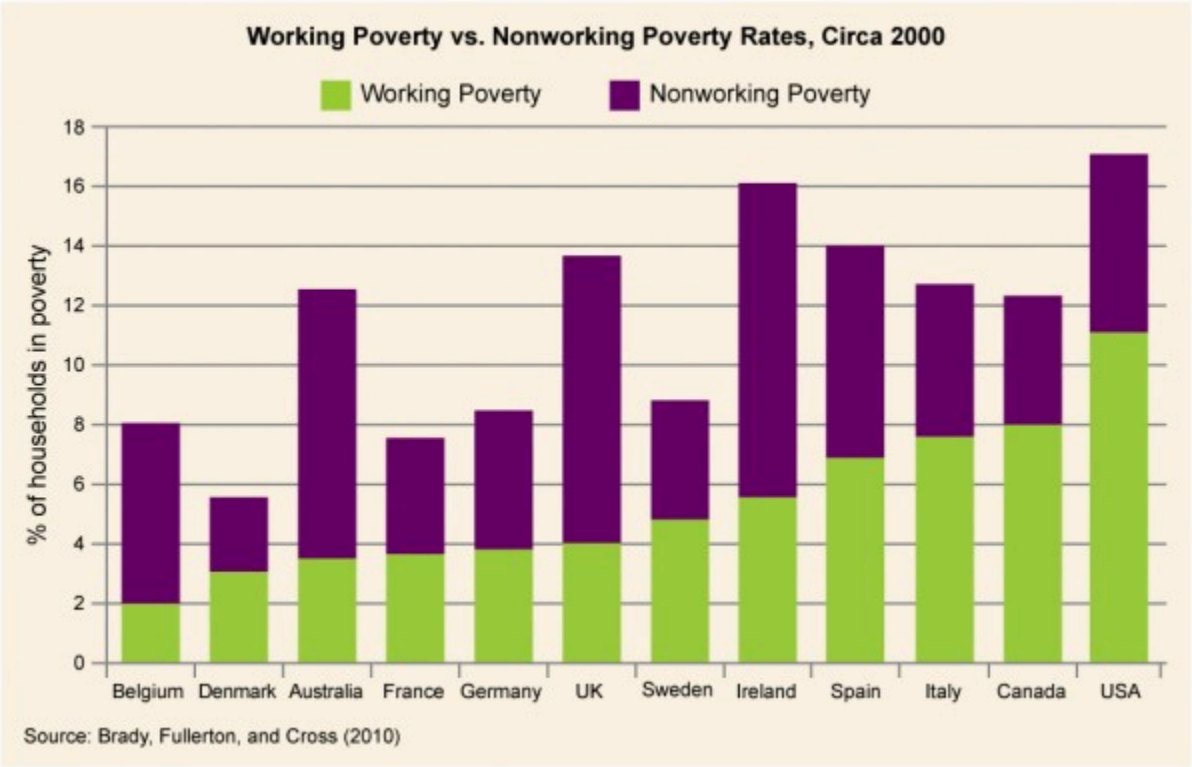

Figure 7.1e. A higher percentage of the people living in poverty in Canada and the United States have jobs compared to other developed nations. Figure by William Little, under CC BY 4.0.

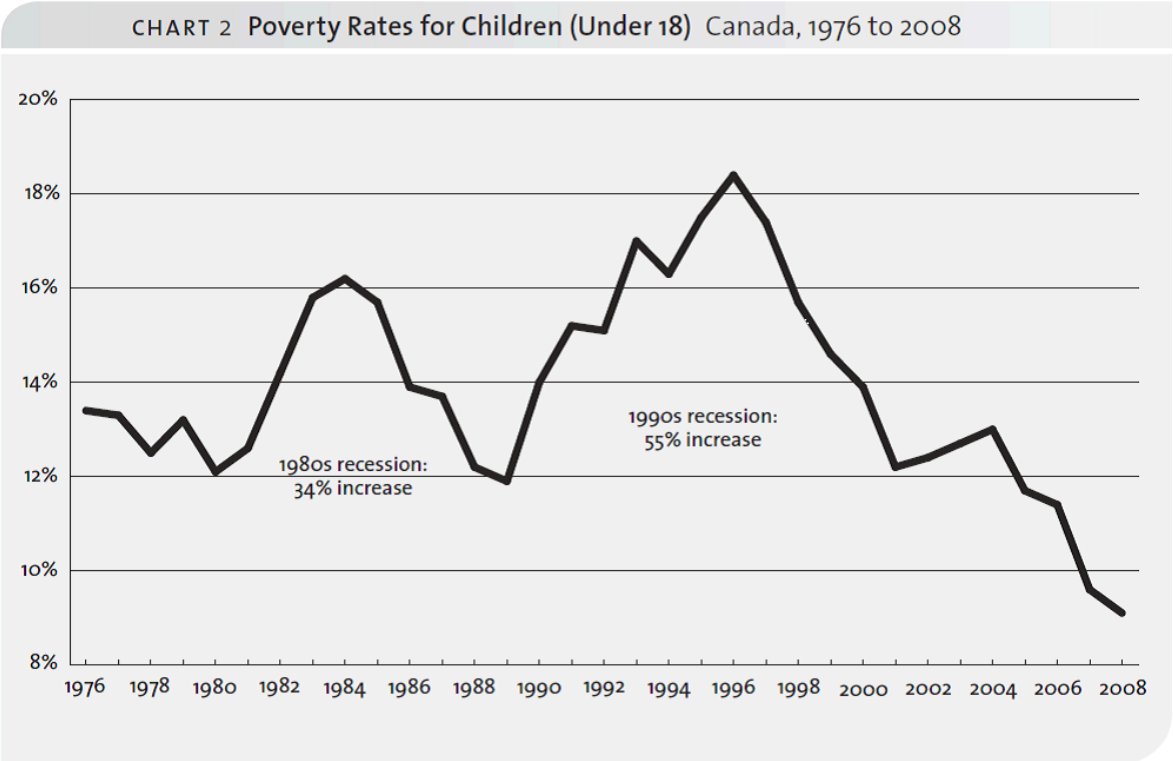

Figure 7.1f. Poverty rates for children: 1976 to 2008. [Long Description at the end of the chapter] (Graph courtesy of the Canadian Centre for Policy Alternatives (Yalnizyan, 2010)) used with a CC-BY-NC-ND 3.0 Unported license (https://creativecommons.org/licenses/by-nc-nd/3.0/)

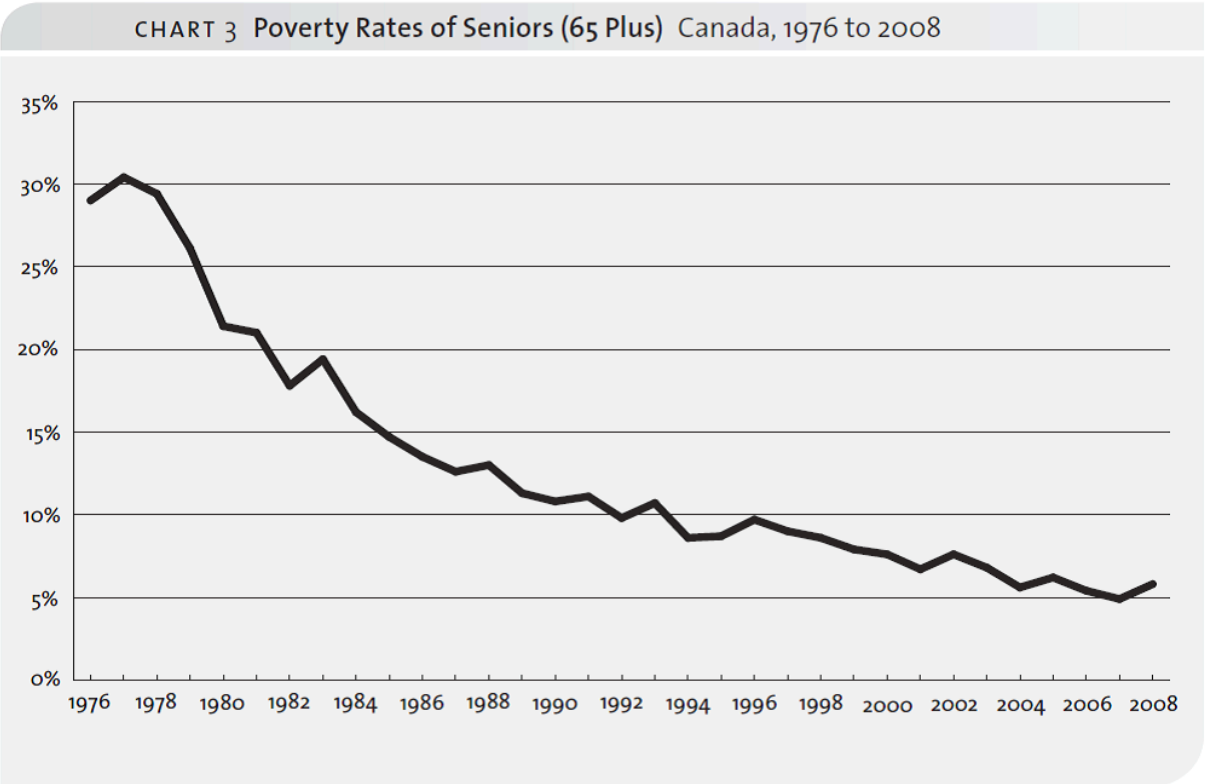

Figure 7.1g. Poverty rates for seniors: 1976 to 2008. Poverty Rates of Seniors (65 Plus) – Canada, 1976 to 2008 by Armine Yalnizyan & Canadian Centre for Policy Alternatives, licensed under CC By-NC-ND 3.0.

Most developed countries such as Canada protect their citizens from absolute poverty by providing different levels of social services such as employment insurance, welfare, health care, and so on. They may also provide job training and retraining so that people can re-enter the job market. In the past, the elderly were particularly vulnerable to falling into poverty after they stopped working; however, the Canada and Quebec Pension Plans, the Old Age Security program, and the Guaranteed Income Supplement are credited with successfully reducing old age poverty. A major concern in Canada is the number of young people growing up in poverty, although these numbers have been declining as well. About 606,000 children younger than 18 lived in low-income families in 2008. The proportion of children in low-income families was 9% in 2008, half the 1996 peak of 18% (Statistics Canada, 2011). Growing up poor can cut off access to the education and services people need to move out of poverty and into stable employment. As we saw, more education was often a key to stability, and those raised in poverty are the ones least able to find well-paying work, perpetuating a cycle.

With the shift to neoliberal economic policies, there has been greater debate about how much support local, provincial, and federal governments should give to help the unemployed and underemployed. Often the issue is presented as one in which the interests of "taxpayers" are opposed to the "welfare state." It is interesting to note that in social democratic countries like Norway, Finland, and Sweden, there is much greater acceptance

of higher tax rates when these are used to provide universal health care, education, child care, and other forms of social support than there is in Canada. Nevertheless, the decisions made on these issues have a profound effect on working in Canada.

Chapter Summary

Introduction to Work and the Economy

Economy refers to the social institution through which a society's resources (goods and services) are managed. The Agricultural Revolution led to development of the first economies that were based on trading goods. Mechanization of the manufacturing process led to the Industrial Revolution and gave rise to two major competing economic systems. Under capitalism, private owners invest their capital and that of others to produce goods and services they can sell in an open market. Prices and wages are set by supply and demand and competition. Under socialism, the means of production is commonly owned, and the economy is controlled centrally by government. Several countries' economies exhibit a mix of both systems. Convergence theory seeks to explain the correlation between a country's level of development and changes in its economic structure.

Work in Canada

The job market in Canada is meant to be a meritocracy that creates social stratifications based on individual achievement. Economic forces, such as outsourcing and automation, are polarizing the workforce, with most job opportunities being either low-level, low-paying manual jobs or high-level, high-paying jobs based on abstract skills. Women's role in the workforce has increased, although they have not yet achieved full equality. Immigrants play an important role in the Canadian labour market. The changing economy has forced more people into poverty even if they are working. Welfare, old age pensions, and other social programs exist to protect people from the worst effects of poverty.

Chapter Quiz

Introduction to Work and the Economy

1. Which of these is an example of a commodity?
    1. Cooking
    2. Corn
    3. Teaching
    4. Writing
2. When did the first economies begin to develop?
    1. When all of the hunter-gatherers died
    2. When money was invented
    3. When people began to grow crops and domesticate animals
    4. When the first cities were built
3. What is the most important commodity in a postindustrial society?
    1. Electricity
    2. Money
    3. Information
    4. Computers
4. In which sector of an economy would someone working as a software developer be?
    1. Primary
    2. Secondary
    3. Tertiary
    4. Quaternary
5. Which is an economic policy based on national policies of accumulating silver and gold by controlling markets with colonies and other countries through taxes and customs charges?
    1. Capitalism

2. Communism
3. Mercantilism
4. Mutualism

6. Who was the leading theorist on the development of socialism?

    1. Karl Marx
    2. Alex Inkeles
    3. Émile Durkheim
    4. Adam Smith

7. The type of socialism now carried on by Cuba is a form of _____ socialism.

    1. centrally planned
    2. market
    3. utopian
    4. zero-sum

8. Which country serves as an example of convergence?

    1. Singapore
    2. North Korea
    3. England
    4. Canada

Work in Canada

9. Which is evidence that the Canadian workforce is largely a meritocracy?

    1. Job opportunities are increasing for highly skilled jobs.
    2. Job opportunities are decreasing for mid-level jobs.
    3. Highly skilled jobs pay better than low-skill jobs.
    4. Women tend to make less than men do for the same job.

10. If someone does not earn enough money to pay for the essentials of life he or she is said to be _____ poor.

    1. absolutely
    2. essentially
    3. really

4. working

11. About what percentage of the workforce in Canada are legal immigrants?

    1. Less than 1%
    2. 1%
    3. 20%
    4. 66%

Check your answers[1]

Short Answer

Introduction to Work and the Economy

1. Explain the difference between state socialism with central planning and market socialism.
2. In what ways can capitalistic and socialistic economies converge?
3. Describe the impact a rapidly growing economy can have on families.
4. How do you think the Canadian economy will change as we move closer to a technology-driven service economy?

Work in Canada

1. As polarization occurs in the Canadian job market, this will affect other social institutions. For example, if mid-level education does not lead to employment, we could see polarization in educational levels as well. Use the sociological imagination to consider what social institutions may be impacted, and how.

1. 1) b 2) c 3) c 4) d 5) c 6) a 7) b 8) a 9) c 10) a 11) c

2. Do you believe we have a true meritocracy in Canada? Why or why not?

Further Research

The role of women in the workplace [New Tab] (http://www.statcan.gc.ca/pub/89-503-x/2010001/article/11387-eng.htm) is constantly changing

The Employment Projections Program of Employment and Social Development Canada looks at a ten-year projection for jobs and employment. See some employment trends for the next decade [New Tab] (http://occupations.esdc.gc.ca/sppc-cops/w.2lc.4m.2@-eng.jsp)

Global poverty is tracked by the globalissues.org website. See recent analyses and statistics about poverty [New Tab] (http://www.globalissues.org/article/26/poverty-facts-and-stats)

Attribution

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Long Descriptions

Figure 7.1h long description: Poverty Rates for Children (Under 18) Canada, 1976 to 2008

Year	**1976**	**1978**	**1980**	**1982**	**1984**	**1986**	**1988**	**1990**	**1992**
Percentage	13.5	12.5	12	14	16.1	14	12.1	14	15.1
Year	**1994**	**1996**	**1998**	**2000**	**2002**	**2004**	**2006**	**2008**	
Percentage	16.1	18.2	15.8	14	12.3	13.1	11.5	9.1	

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7.2 - INTRODUCTION TO URBAN, INDUSTRIAL, AND DIVIDED: SOCIO-ECONOMIC CHANGE, 1867-1920

Learning Objectives

- Develop an understanding of the causes and contours of the Second Industrial Revolution.
- Explain the rise of a working class and describe its main features.
- Assess the main features and goals of the National Policy and its individual components.
- Discuss the ways in which age and gender shaped the historic experience of industrialization.
- Connect the phenomena of industrialization with urbanization in the pre-1914 period.
- Describe the strategies explored by working people to improve their conditions.
- Account for the rise of the first-wave of feminism.

Figure 7.2a Coal sorters at work at the Atlas Mine in Alberta, n.d. Coal Mining, Alberta (https://recherche-collection-search.bac-lac.gc.ca/eng/home/record?app=FonAndCol&IdNumber=3351151&q=3351151) [MIKAN no. 3351151] archived by Library and Archives Canada , licensed under CC0.

The Industrial Revolution was well underway in Britain and the northeastern United States by 1867. The systematized production of manufactured goods — woollen or cotton garments or iron tools — was made possible by a reorganization of labour, from independent and cottage-based production to one where the work was produced collectively, and increasingly with the use of machinery. The creation of low-valued manufactured products required the development of new systems of transportation. The early (or "first") Industrial Revolution generated a parallel revolution in infrastructure that included canals, railways, and shipping.

Canada's Industrial Revolution piggybacked on that of its neighbour and Britain. However, the most rapid transition of the Canadian economy came after 1850, and accelerated through the last half of the 19th century. Confederation — and the resulting creation of a common financial system that included a shared currency and mint — was, in fact, an enabling step in industrializing British North America. It created an open colonial marketplace without tariff barriers, facilitated the movement of investment capital, and superimposed a modern freight-handling capacity that realigned trade from north-south to east-west. Victorian Canada was, in every sense, industrializing Canada.

Figure 7.2b Industrialism didn't put an end to homespun, particularly in poorer, rural communities. But it severely reduced the economic viability of the handloom weaver and other artisans. Weaving Loom (Habitant Series) (https://recherche-collection-search.bac-lac.gc.ca/eng/home/record?app=FonAndCol&IdNumber=3349488&q=3349488) [MIKAN no. 3349488] archived by Library and Archives Canada, licensed under CC0.

Industrial British North America

Watch It!

Watch Dr. Craig Heron Question 2 – Origins of the Industrial Revolution in Canada (https://www.youtube.com/watch?v=oXOSDwVX0Dw)(5 mins)

One or more interactive elements has been excluded from this version of the text. You can view them online here: https://ecampusontario.pressbooks.pub/laboureconomics/?p=569#oembed-1

Video Source: TRU, Open Learning. (2015, November 15). *Dr. Craig Heron Question 2 – Origins of*

the Industrial Revolution in Canada [Video]. YouTube. https://www.youtube.com/watch?v=oXOSDwVX0Dw . Licensed under CC BY 3.0.

In the 1860s, industry was breaking out all over. New Brunswick — dominated by forest industries and shipbuilding — was, on a per capita basis up until 1871, only a little less industrialized than Ontario and Quebec. Nova Scotia's industry was distinctively divided between the metal and coal industries of Cape Breton, and the textile mills and sugar refineries in the western part of the province.[1] Vancouver Island, with its coal mines at and around Nanaimo and the vertically-integrated heavy industries that included Royal Navy shipyards in Esquimalt and chain-making in Victoria, was another outpost of industrialization.

These parallel developments were not happenstance. By keeping local land prices high, the colonial and then provincial governments of British Columbia demonstrated a desire for wage-earning workers rather than farm settlers — a striking signal that industry, not agriculture, was central to their vision. The engagement of the state in the building of an industrial order is itself part of the suite of ideas associated with **modernity** — a concept pursued throughout this text. Industrialism, the term used to describe the new economic order emerging in the late 19th century, was thus more than a pattern of like practices and institutions; it was something to which governments, investors, and workers were all striving.

1. Margaret R. Conrad and James K. Hiller, *Atlantic Canada: A Concise History* (Don Mills: Oxford University Press, 2006), 131-2.

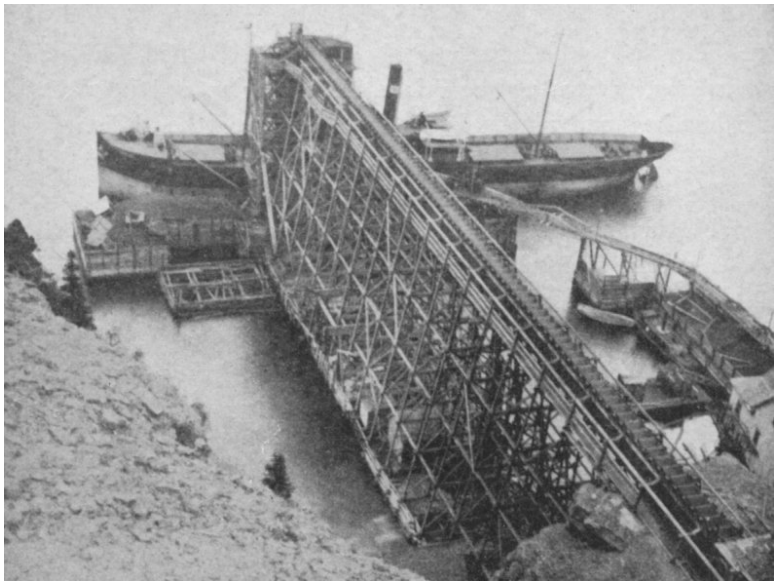

Figure 7.2c Iron ore from Bell Island is loaded onto a metal-hulled ship, ca. 1903. The loading pier at Bell Island, Conception Bay, Newfounland (https://commons.wikimedia.org/wiki/File:BellIslandPierCa1900.jpg) by C.W. Vernon, licensed under CC0.

The economics of industrialization are staggering insofar as they require the movement of capital, raw materials, personnel, and products across huge distances. Industry requires, too, the mobilization, training, housing, and discipline of a workforce with little to no prior exposure to industrial systems. The pre-Conquest iron forges at Saint-Maurice, near Trois-Rivières, depended on fuel and ore — and labour — that could be obtained locally. By 1890, industries in Central and Maritime Canada were using iron ore from Labrador and Newfoundland's Bell Island; coking coal from Cape Breton was finding its way to Ontario; and workers in Canadian industry were migrating from one province to another, from coast to coast. Workers were being recruited from industrializing Lancashire and Yorkshire, Wales, Lowland Scotland, and Germany. Industrial workers were also coming to Canada from rural and non-industrialized corners of Italy, Ireland, Hungary, and China. The intensification of mechanized, and then automated, work ensured that peasant populations whose home countries were still mostly feudal would be thrust directly onto the cutting edge of industrialization. It also meant that untrained Canadian labour — specifically children — would find themselves very literally at the coalface.

In addition to personnel, industry requires energy. In 1867, the dominant sources of energy grew in forests or walked on four legs. Waterpower had made some inroads, particularly in rural areas where waterwheels could take advantage of local rapids. At Lachine, Quebec, the canals provided power as well, driving the Montreal area's earliest industries. Bringing energy sources into city centres, however, where other resources could be assembled, posed a challenge; a challenge that was overcome by following Britain's lead and adapting the new

steam-power technologies.Within a very short time period, there was a shift in industrial and urban Canada from organic and water-based power sources to **fossil fuels**.

Figure 7.2d Horse power moved goods and people, was fuelled by oats and hay, and was adapted to work in Canadian conditions. Montreal, ca. 1877. Horse-drawn winter tram in Montreal (https://commons.wikimedia.org/wiki/File:Horse-drawn_winter_tram,_about_1877.jpg) by Montreal Street Railway Company, licensed under CC0.

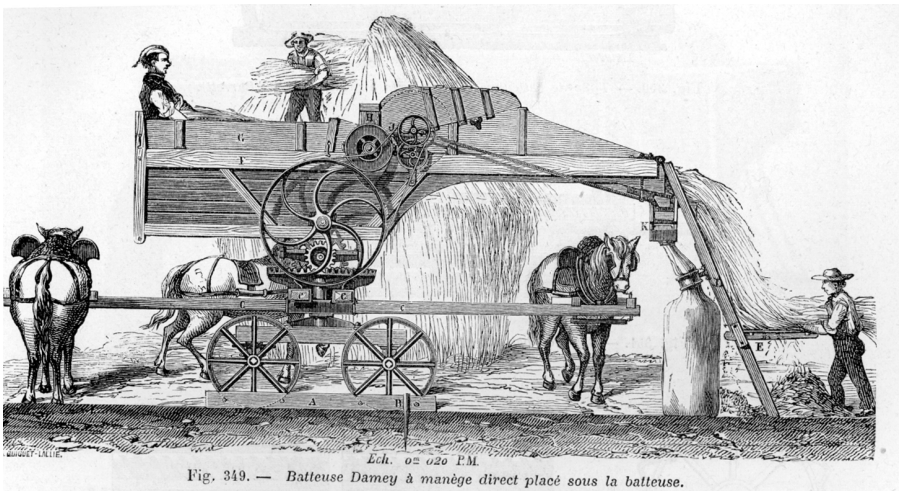

Figure 7.2e Before steam power augmented machines, horses were regularly employed. Batteuse, 1881 (https://commons.wikimedia.org/wiki/File:Batteuse_1881.jpg) by Unknown Author, licensed under CC0.

This change in the energy economy had the important advantage in Canada of diminishing the impact of seasonality. Waterwheels were powerful innovations and their application to the increased use of machinery in production, was literally revolutionary. Nevertheless, watercourses freeze up in Canada, which meant an interruption in power supply and in the transportation of necessary supplies along rivers. The transition from organic to inorganic energy sources changed all that. Factories could work year-round and steam-powered engines could be used to move larger and larger quantities of raw materials from source to market in shorter time. Applied to land-based transportation along rails, steam and coal could free much of Canadian manufacturing from the dictatorship of winter.

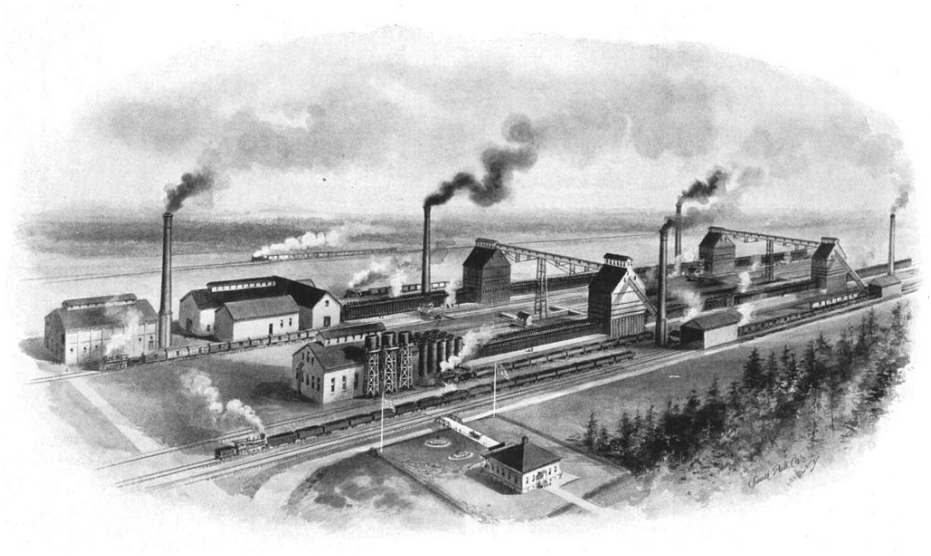

Figure 7.2f Heavy industry comes to Nova Scotia and, with it, plenty of steam and smoke. An artist's rendering of the Cape Breton coking ovens applauds the regimentation of smoky industry at the start of the 20th century. Cape Breton at the Beginning of the Twentieth Century (https://commons.wikimedia.org/wiki/File:SydneyCokeOvenGeneralViewCa1900.jpg) by C.W. Vernon, licensed under CC0.

Once factories began operating throughout the four seasons, the possibility arose for workers to take on wage-labour full time. The increasing use of cash in the Canadian economy was one attraction to doing so. Many agricultural workers went into industrial labour as a temporary measure, a step toward saving enough money to purchase a farm of their own. This was also true of immigrant industrial workers who imagined their future in Canada as independent landowners.[2] That transitional stage never fully ended, as rural populations in the 21st century continue to augment farm income with wage-labour. In the 19th century, however, limits on transportation made such moves increasingly permanent. By the 1870s wage-labour in many regions matched agriculture as a practical strategy for survival. The population of ready workers increased and expanded across Canada. From 1861-71 the labour force grew by about 15% and then, from 1871-81 by 26%. Its growth slowed thereafter to a still-respectable 21% and then 11% in each of the two decades that followed.[3] Labour inputs, however, are only part of the equation.

The introduction of machinery, and especially steam-powered machinery, was transformative. Output could be increased dramatically, quality could aim for (and sometimes achieve) reliable standards, and the skill sets

2. British coal miners who moved to Vancouver Island in the late 19th century repeatedly indicated that they saw West Coast mine work as a stepping stone to independence on their own land. See John Douglas Belshaw, *Colonization and Community: The Vancouver Island Coalfield and the Making of the British Columbian Working Class* (Montreal & Kingston: McGill-Queen's University Press, 2002), 161-3.
3. Statistics Canada, *Historical Statistics of Canada,* 2nd ed., F. H. Leacy, ed. (Ottawa: Statistics Canada, 1983): D498-511.

needed to do a particular job changed from that of a master craftsman to those of someone able to keep up with the metal and wood machinery. The cumulative effect was to bring down wages while raising productivity and de-skilling the workforce. New skills emerged — particularly those associated with maintaining machinery — but shoe production, for example, went from being a handicraft associated with years of apprenticeship and journeyman study, to something that was done by children. A good example is Lawson's, a tailoring business in Hamilton, that introduced 10 sewing machines in the 1860s. This led to the departure of 71 of their 100 skilled male tailors, and their replacement with 69 women (who were regarded, rightly or wrongly, as unskilled).[4] **Mechanization** — and, in the 20th century, **automation** — would change the way work is done, but its spread was entirely dependent on the ability of capital to invest in emerging technologies. This process of intensified capital inputs on the shop floor would accelerate 30 years after Confederation.

The Second Industrial Revolution

Despite significant changes in the orientation and character of the economy until the mid-1890s, growth was not outstanding. An important measure of the health of Canada's economy is its population and, rather remarkably, from 1861-1901 Canada was a net exporter of people. The American economy was expanding more rapidly and as land and employment opportunities arose, it served as a magnet for thousands of Canadians. Additionally, many of the immigrants to Canada during this period proved to be just passing through. On balance, then, more people left than arrived. From a historian's perspective, this is a sure sign that industrialization in the new Dominion provided fewer opportunities, or less competitive opportunities, than agriculture in the western plains of North America. This was not yet a consumer-led economy so the net loss of population until 1901 did not mean the simultaneous loss of household markets, at least not in the same way it might in the mid-20th century. It did manifest a shortage of labour resources, however, in some corners of the country. As the Maritime's economy began to seize up in the 1870s and 1880s, for example, out-migration was another factor in driving investment to more populous centres in Ontario and southwest Quebec.

In the 1890s, there were several important advances in technology and technique that gave industrialization a new shape. The foremost of these was the development of the Bessemer system for manufacturing steel. Vastly stronger and cheaper than earlier forged metals, this innovation propelled the steel industry and everything that utilized steel. As well, it contributed to the further growth of coking coal production and iron mining and the building of infrastructure to transport these raw materials to processing points. The

4. Bryan D. Palmer, *Working-Class Experience: Rethinking the History of Canadian Labour, 1800-1991*, 2nd ed. (Toronto: McClelland & Stewart, 1992), 87-8.

establishment of the Nova Scotia Steel and Coal Company at New Glasgow in 1882 was followed by the Dominion Coal Company at Glace Bay 11 years later. The Dominion Iron And Steel Company opened in Sydney in 1900, and the Nova Scotia Steel and Coal Company opened at Sydney Mines the same year. All of these developments reflect the accelerating transformation of the industrial order in Canada as a whole and the rise of international markets for output. It also points to a change in industrial capitalism: whereas earlier industrialization depended mostly upon bringing more labour to the task of producing goods, capital inputs were now rewarded. In Ontario alone, the amount of capital invested in the economy leapt from $37 million in 1871 to $175 million in 1891, rising to $595 million in 1911.[5] Machinery, reconceptualized workspaces and architecture, and metal-hulled ships that could move heavy goods at a fraction of the cost of wooden vessels all contributed to the changes associated with what is called the **Second Industrial Revolution**.

The change could be seen in the Canadian labour force. In 1901, the number of operatives and labourers combined (nearly 789,422) surpassed the total number of farmers and farmworkers (715,122).[6] The proportion of Canadians living on the land was still greater than that of urbanites, but, as of 1901, the number of Canadians earning an income from wages pulled ahead of those earning farm incomes. And those wage-earning workers were doing so increasingly in industries and factories that did not much resemble what existed in the 1860s.

5. Gregory S. Kealey, *Workers and Canadian History* (Montreal & Kingston: McGill-Queen's University Press, 1995), 245.

6. Canada, *Historical Statistics of Canada,* 2nd ed., F. H. Leacy, ed. (Ottawa: Statistics Canada, 1983): D86-106.

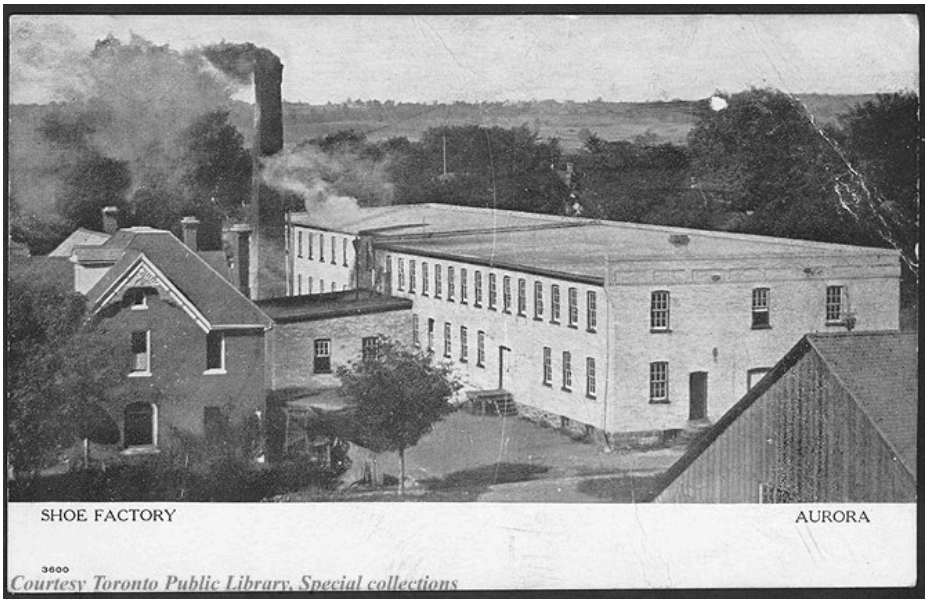

Figure 7.2g As late as 1910, the boundary between rural life and industrial employment was not a great one. The countryside forms a backdrop to a shoe factory in Aurora, Ontario, ca. 1910. Postcards like this one were a way of framing modernization and material progress. Shoe Factory in Aurora, Ontario (#chapter-3-1-the-industrial-revolution) by Warwick Bros. & Rutter, Toronto Public Library, licensed under CC0.

Industrialization marked a significant departure from the pre-Confederation economy, and it brought in its wake social and economic changes that could hardly have been predicted. It was, however, part of a conscious strategy for nation-building and making economic policy. The most obvious expression of that strategic (and, yes, hopeful) thinking was the **National Policy**.

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7.3 - READING LIST

1. Labour force characteristics by province, monthly, seasonally adjusted [New Tab] (https://www150.statcan.gc.ca/t1/tbl1/en/tv.action?pid=1410028703)
2. Key Small Business Statistics (January 2019) [New Tab] (https://www.ic.gc.ca/eic/site/061.nsf/eng/h_03090.html#point1-1)

Reading List compiled by Norm Smith.

CHAPTER 8 INTRODUCTION TO UNEMPLOYMENT

Figure 8.1a Borders was one of the many companies unable to recover from the 2008-2009 economic recession. Borders – Out of business (https://www.flickr.com/photos/maguisso/6102108771/in/photolist-aidUkV) by Luis Villa del Campo is licensed under CC BY 2.0. Modifications made by Steven A. Greenlaw, David Shapiro include cropping and licensed under CC BY 4.0.

Bring It Home

Unemployment and the Great Recession

Nearly eight million U.S. jobs were lost as a consequence of the Great Recession, which lasted from December 2007 to June 2009. At the outset of the recession, the unemployment rate was 5.0%. The rate began rising several months after the recession began, and it peaked at 10.0% in October 2009, several months after the recession ended, according to the Bureau of Labor Statistics (BLS). The job loss represented a huge number of positions gone. Subsequently, the recovery was tepid. Companies added some positions, but as of summer 2013, four years after the end of the recession, unemployment was about 7.5%, well above the pre-recession rate. Employment began increasing at

the outset of 2010, and reached its pre-recession level in mid-2014. However, because of population and labour force growth, the unemployment rate at that point was still slightly above 6%. The economy only returned to an unemployment rate of 5.0% in September 2015, and it has remained at or slightly below that level since then, up through January 2017.

This brief overview of unemployment during and after the Great Recession highlights a few important points. First, unemployment is a lagging indicator of business activity. It didn't begin to increase until a few months after the onset of the recession, and it didn't begin to decline until several months after the recovery. Second, the decline in the unemployment rate was quite slow, with the pre-recession unemployment rate only reaching a higher level than six years after the recession ended. This reflects a combination of slow increase in the number of jobs and ongoing increases in the size of the population and the labour force.

It turns out that recent recessions, going back to the early 1990s, have been characterized by longer periods of recovery than their predecessors. We will return to this point at the end of the chapter. However, first we need to examine unemployment. What constitutes it, and how do we measure it?

Unemployment can be a terrible and wrenching life experience—like a serious automobile accident or a messy divorce—whose consequences only someone who has gone through it can fully understand. For unemployed individuals and their families, there is the day-to-day financial stress of not knowing from where the next paycheck is coming. There are painful adjustments, like watching your savings account dwindle, selling a car and buying a cheaper one, or moving to a less expensive place to live. Even when the unemployed person finds a new job, it may pay less than the previous one. For many people, their job is an important part of their self worth. When unemployment separates people from the workforce, it can affect family relationships as well as mental and physical health.

The human costs of unemployment alone would justify making a low level of unemployment an important public policy priority. However, unemployment also includes economic costs to the broader society. When millions of unemployed but willing workers cannot find jobs, economic resource are unused. An economy with high unemployment is like a company operating with a functional but unused factory. The opportunity cost of unemployment is the output that the unemployed workers could have produced.

This chapter will discuss how economists define and compute the unemployment rate. It will examine the patterns of unemployment over time, for the U.S. economy as a whole, for different demographic groups in the U.S. economy, and for other countries. It will then consider an economic explanation for unemployment, and how it explains the patterns of unemployment and suggests public policies for reducing it.

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Access for free at https://openstax.org/books/principles-economics-2e/pages/1-introduction

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8.1 - INTRODUCTION TO UNEMPLOYMENT

Learning Objectives

- Classify the different measures and types of unemployment
- Define full employment
- Discuss structural unemployment, frictional unemployment, and the natural unemployment rate

Defining Unemployment

Unemployment, also referred to as joblessness, occurs when people are without work and are actively seeking employment. During periods of recession, an economy usually experiences high unemployment rates. There are many proposed causes, consequences, and solutions for unemployment.

Types of Unemployment

- **Classical:** occurs when real wages for jobs are set above the market-clearing level. It causes the number of job seekers to be higher than the number of vacancies.
- **Cyclical:** occurs when there is not enough aggregate demand in the economy to provide jobs for everyone who wants to work. Demand for goods and services decreases, less production is needed, and fewer workers are needed.
- **Structural:** occurs when the labour market is not able to provide jobs for everyone who wants to work. There is a mismatch between the skills of the unemployed workers and the skills needed for available jobs. It differs from **frictional unemployment** because it lasts longer.
- **Frictional:** the time period in between jobs when a worker is searching for work or transitioning from one job to another.

- **Hidden:** the unemployment of potential workers that is not taken into account in official unemployment statistics because of how the data is collected. For example, workers are only considered unemployed if they are looking for work so those without jobs who have stopped looking are no longer considered unemployed.
- **Long-term:** usually defined as unemployment lasting longer than one year.

Measuring Unemployment

Unemployment is calculated as a percentage by dividing the number of unemployed individuals by the number of all individuals currently employed in the workforce. The final measurement is called the rate of unemployment.

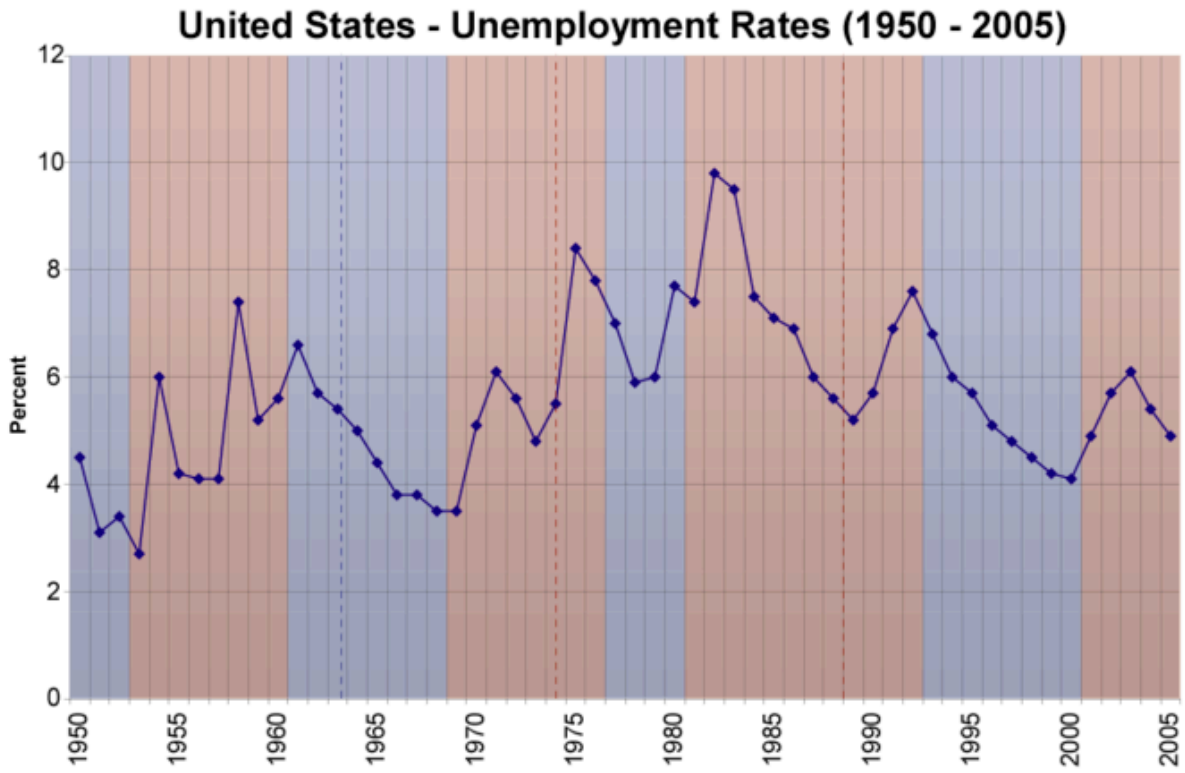

Figure 8.1a Unemployment Rate: Unemployment is calculated as a percentage by dividing the number of unemployed individuals by the number of individual employed in the labour force.Unemployment rates in the United States (1950 – 2005) (https://commons.wikimedia.org/wiki/File:Us_unemployment_rates_1950_2005.png) by Aude, licensed under CC BY-SA.

Effects of Unemployment

When unemployment rates are high and steady, there are negative impacts on the long-run economic growth. Unemployment wastes resources, generates redistributive pressures and distortions, increases poverty, limits

labour mobility, and promotes social unrest and conflict. The effects of unemployment can be broken down into three types:

- **Individual:** people who are unemployed cannot earn money to meet their financial obligations. Unemployment can lead to homelessness, illness, and mental stress. It can also cause underemployment where workers take on jobs that are below their skill level.
- **Social:** an economy that has high unemployment is not using all of its resources efficiently, specifically labour. When individuals accept employment below their skill level the economies efficiency is reduced further. Workers lose skills which causes a loss of human capital.
- **Socio-political:** high unemployment rates can cause civil unrest in a country.

Reducing Unemployment

There are numerous solutions that can help reduce the amount of unemployment:

- **Demand side solutions:** many countries aid unemployed workers through social welfare programs. Individuals receive unemployment benefits including insurance, compensation, welfare, and subsidies to aid in retraining. An example of a demand side solution is government funded employment of the able-bodied poor.
- **Supply side solutions:** the labour market is not 100% efficient. Supply side solutions remove the minimum wage and reduce the power of unions. The policies are designed to make the market more flexible in an attempt to increase long-run economic growth. Examples of supply side solutions include cutting taxes on businesses, reducing regulation, and increasing education.

Defining Full Employment

Full employment is defined as an acceptable level of unemployment somewhere above 0%; there is no cyclical or deficient-demand unemployment.

Full Employment

In macroeconomics, **full employment** is the level of employment rates where there is no cyclical or deficient-demand unemployment. Mainstream economists define full employment as an acceptable level of unemployment somewhere above 0%. Full employment represents a range of possible unemployment rates based on the country, time period, and political biases.

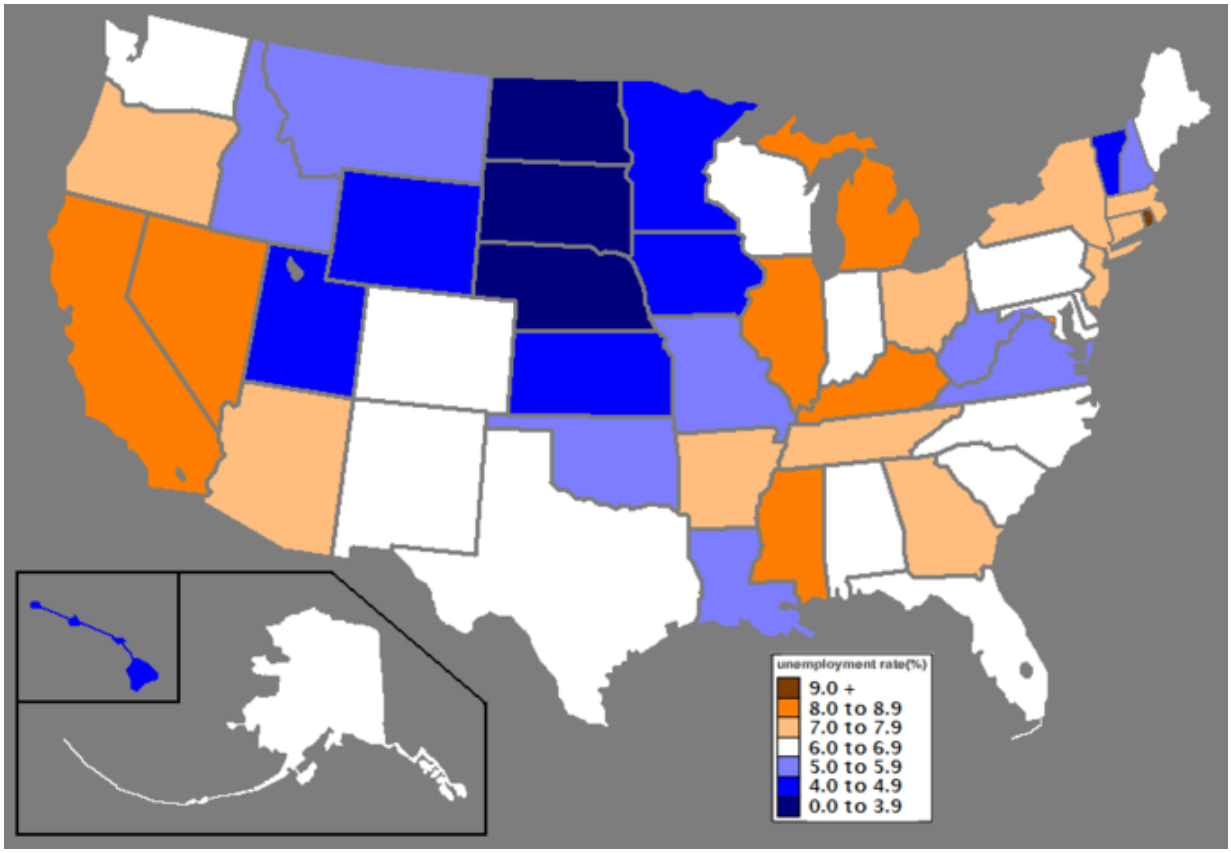

Figure 8.1b. U.S. Unemployment: The graph shows the unemployment rates in the United States. Full employment is defined as "ideal" unemployment. It is important because it keeps inflation under control. Map of U.S. states by unemployment rate (https://en.wikipedia.org/w/index.php?title=File:Map_of_U.S._states_by_unemployment_rate.png&offset=&limit=500#file) by Bullshark44, licensed under CC BY-SA. Colours modified January 2014 by Armouredduck, licensed under CC BY-SA.

Ideal Unemployment

Full employment is often seen as an "ideal" unemployment rate. Ideal unemployment excludes types of unemployment where labour-market inefficiency is reflected. Only some frictional and voluntary unemployment exists, where workers are temporarily searching for new jobs. This classifies the unemployed individuals as being without a job voluntarily. Ideal unemployment promotes the efficiency of the economy.

Lord William Beveridge defined "full employment" as the situation where the number of unemployed workers equaled the number of job vacancies available. He preferred that the economy be kept above the full employment level to allow for maximum economic production.

Non-Accelerating Inflation Rate of Unemployment (NAIRU)

The full employment unemployment rate is also referred to as "natural" unemployment. In an effort to avoid this normative connotation, James Tobin introduced the term "Non-Accelerating Inflation Rate of Unemployment" also known as the NAIRU. It corresponds to the level of unemployment when real GDP equals potential output. The NAIRU has been called the "inflation threshold. " The NAIRU states the inflation does not rise or fall when unemployment equals the natural rate.

As an example, the United States is committed to full employment. The "Full Employment Act" was passed in 1946 and revised in 1978. It states that full employment in the United States is no more than 3% unemployment for persons 20 and older, and 4% for persons aged 16 and over.

Types of Unemployment: Frictional, Structural, Cyclical

In economics, unemployment is occurs when people are without work while actively searching for employment.

Unemployment

In economics, unemployment occurs when people are without work while actively searching for employment. The unemployment rate is a percentage, and calculated by dividing the number of unemployed individuals by the number of all currently employed individuals in the labour force. The causes, consequences, and solutions vary based on the specific type of unemployment that is present within a country.

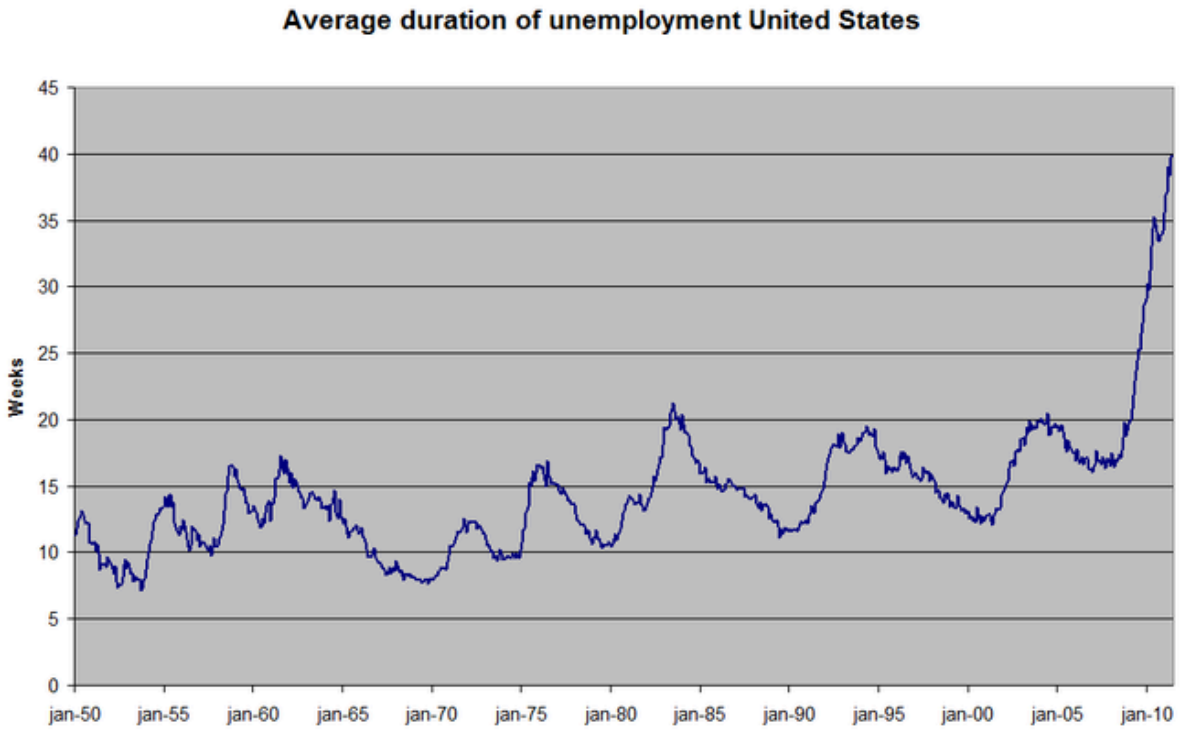

Figure 8.1c U.S. Unemployment: This graph shows the average duration of unemployment in the United States from 1950-2010. Unemployment occurs when there are more individuals seeking jobs than there are vacancies.US average duration of unemployment (https://commons.wikimedia.org/wiki/File:US_average_duration_of_unemployment.png) by MartinD, licensed under CC BY-SA.

Structural Unemployment

Structural unemployment is one of the main types of unemployment within an economic system. It focuses on the structural problems within an economy and inefficiencies in labour markets. Structural unemployment occurs when a labour market is not able to provide jobs for everyone who is seeking employment. There is a mismatch between the skills of the unemployed workers and the skills needed for the jobs that are available. It is often impacted by persistent cyclical unemployment. For example, when an economy experiences long-term unemployment individuals become frustrated and their skills become obsolete. As a result, when the economy recovers they may not fit the requirements of new jobs due to their inactivity.

Figure 8.1d Retraining: When there is structural unemployment, workers may seek to learn different skills so that they can apply to new types of jobs. Stone Hall Adult Education Centre, Warwick Road, Acocks Green – sign (https://www.flickr.com/photos/ell-r-brown/4325684057) by Elliott Brown, licensed under CC BY.

Frictional Unemployment

Frictional unemployment is another type of unemployment within an economy. It is the time period between jobs when a worker is searching for or transitioning from one job to another. Frictional unemployment is always present to some degree in an economy. It occurs when there is a mismatch between the workers and jobs. The mismatch can be related to skills, payment, work time, location, seasonal industries, attitude, taste, and other factors. Frictional unemployment is influenced by voluntary decisions to work based on each individual's valuation of their own work and how that compares to current wage rates as well as the time and effort required to find a job.

Cyclical Unemployment

Cyclical unemployment is a type of unemployment that occurs when there is not enough aggregate demand in the economy to provide jobs for everyone who wants to work. In an economy, demand for most goods falls, less production is needed, and less workers are needed. With cyclical unemployment the number of unemployed workers is greater that the number of job vacancies.

The Natural Unemployment Rate

The natural unemployment rate, sometimes called the structural unemployment rate, was developed by Friedman and Phelps in the 1960s. It represents the hypothetical unemployment rate that is consistent with aggregate production being at a long-run level. The natural rate of unemployment is a combination of structural and frictional unemployment. It is present in an efficient and expanding economy when labour and resource markets are at equilibrium. The natural unemployment rate occurs within an economy when disturbances are not present.

Key Takeaways

- Types of unemployment determine what the causes, consequences, and solutions. The types of unemployment include: classical, cyclical, structural, frictional, hidden, and long-term.
- Unemployment is calculated as a percentage by dividing the number of unemployed individuals by the number of all the individuals currently employed in the work force.
- When unemployment rates are high and steady, there are negative impacts on the long-run economic growth.
- Demand side and supply side solutions are used to reduce unemployment rates.
- Full employment represents a range of possible unemployment rates based on the country, time period, and political biases.
- Full employment is often seen as an "ideal" unemployment rate. Ideal unemployment excludes types of unemployment where labour-market inefficiency is reflected.
- The full employment unemployment rate is also referred to as "natural" unemployment.
- The Non-Accelerating Inflation Rate of Unemployment (NAIRU) corresponds to the unemployment rate when real GDP equals potential output.
- Structural unemployment focuses on the structural problems within an economy and inefficiencies in labour markets.
- Frictional unemployment is the time period between jobs when a worker is searching for or transitioning from one job to another.
- Cyclical unemployment is a type of unemployment that occurs when there is not enough aggregate demand in the economy to provide jobs for everyone who wants to work.
- Classical unemployment occurs when real wages for a jobs are set above the marketing

clearing level.
- The natural unemployment rate represents the hypothetical unemployment rate that is consistent with aggregate production being at a long-run level.

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8.2 - HOW ECONOMISTS DEFINE AND COMPUTE UNEMPLOYMENT RATE

Learning Objectives

- Calculate the labour force participation rate and the unemployment rate
- Explain hidden unemployment and what it means to be in or out of the labour force
- Evaluate the collection and interpretation of unemployment data

Newspaper or television reports typically describe unemployment as a percentage or a rate. A recent report might have said, for example, *from August 2009 to November 2009, the U.S. unemployment rate rose from 9.7% to 10.0%, but by June 2010, it had fallen to 9.5%*. At a glance, the changes between the percentages may seem small. However, remember that the U.S. economy has about 160 million adults (as of the beginning of 2017) who either have jobs or are looking for them. A rise or fall of just 0.1% in the unemployment rate of 160 million potential workers translates into 160,000 people, which is roughly the total population of a city like Syracuse, New York, Brownsville, Texas, or Pasadena, California. Large rises in the unemployment rate mean large numbers of job losses. In November 2009, at the peak of the recession, about 15 million people were out of work. Even with the unemployment rate now at 4.8% as of January 2017, about 7.6 million people who would like to have jobs are out of work.

Link It Up

The Bureau of Labor Statistics [New Tab] (http://openstax.org/l/BLS1) tracks and reports all data related to unemployment.

Who's In or Out of the Labour Force?

Should we count everyone without a job as unemployed? Of course not. For example, we should not count children as unemployed. Surely, we should not count the retired as unemployed. Many full-time college students have only a part-time job, or no job at all, but it seems inappropriate to count them as suffering the pains of unemployment. Some people are not working because they are rearing children, ill, on vacation, or on parental leave.

The point is that we do not just divide the adult population into employed and unemployed. A third group exists: people who do not have a job, and for some reason—retirement, looking after children, taking a voluntary break before a new job—are not interested in having a job, either. It also includes those who do want a job but have quit looking, often due to discouragement due to their inability to find suitable employment. Economists refer to this third group of those who are not working and not looking for work as **out of the labour force** or not in the labour force.

The U.S. unemployment rate, which is based on a monthly survey carried out by the U.S. Bureau of the Census, asks a series of questions to divide the adult population into employed, unemployed, or not in the labour force. To be classified as unemployed, a person must be without a job, currently available to work, and actively looking for work in the previous four weeks. Thus, a person who does not have a job but who is not currently available to work or has not actively looked for work in the last four weeks is counted as out of the labour force.

Employed: currently working for pay

Unemployed: Out of work and actively looking for a job

Out of the labour force: Out of paid work and not actively looking for a job

Labour force: the number of employed plus the unemployed

Calculating the Unemployment Rate

Figure 8.2a shows the three-way division of the 16-and-over population. In January 2017, about 62.9% of the adult population was "in the labour force"; that is, people are either employed or without a job but looking for work. We can divide those in the labour force into the employed and the unemployed. Table 8.2a shows those values. The unemployment rate is not the percentage of the total adult population without jobs, but rather the percentage of adults who are in the labour force but who do not have jobs:

$$\text{Unemployment rate} = \frac{\text{Unemployment rate}}{\text{Total labour force}} \times 100$$

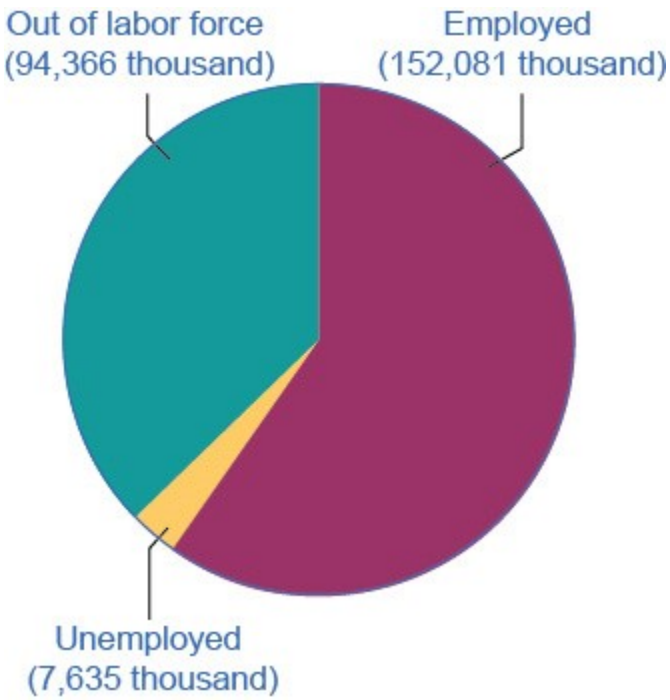

Figure 8.2a Employed, Unemployed, and Out of the Labour Force Distribution of Adult Population (age 16 and older), January 2017.
Figure by Steven A. Greenlaw & David Shapiro (OpenStax), licensed under CC BY 4.0.

Figure 8.2a Employed, Unemployed, and Out of the Labor Force Distribution of Adult Population (age 16 and older), January 2017 The total adult, working-age population in January 2017 was 254.1 million. Out of this total population, 152.1 were classified as employed, and 7.6 million were classified as unemployed. The remaining 94.4 were classified as out of the labour force. As you will learn, however, this seemingly simple chart does not tell the whole story.

Table 8.2a U.S. Employment and Unemployment, January 2017 (Source: https://data.bls.gov)

Total adult population over the age of 16	254.082 million
In the labour force	159.716 million (62.9%)
Employed	152.081 million
Unemployed	7.635 million
Out of the labour force	94.366 million (37.1%)

In this example, we can calculate the unemployment rate as 7.635 million unemployed people divided by 159.716 million people in the labour force, which works out to a 4.8% rate of unemployment. The following Work It Out feature will walk you through the steps of this calculation.

Work It Out

Calculating Labour Force Percentages

How do economists arrive at the percentages in and out of the labour force and the unemployment rate? We will use the values in Table 21.1 to illustrate the steps.

To determine the percentage in the labour force:

Step 1. Divide the number of people in the labour force (159.716 million) by the total adult (working-age) population (254.082 million).

Step 2. Multiply by 100 to obtain the percentage.

$$\begin{aligned}\text{Percentage in the labour force} &= \frac{159.716}{254.082}\\ &= 0.6286\\ &= 62\%\end{aligned}$$

To determine the percentage out of the labour force:

Step 1. Divide the number of people out the labour force (94.366 million) by the total adult (working-age) population (254.082 million).

Step 2. Multiply by 100 to obtain the percentage.

$$\begin{aligned}\text{Percentage in the labour force} &= \frac{94.366}{254.082}\\ &= 0.3714\\ &= 37.1\%\end{aligned}$$

To determine the unemployment rate:

Step 1. Divide the number of unemployed people (7.635 million) by the total labour force (157 million).

Step 2. Multiply by 100 to obtain the rate.

$$\begin{aligned}\text{Unemployment rate} &= \frac{7.635}{159.716}\\ &= 0.0478\\ &= 4.8\%\end{aligned}$$

Hidden Unemployment

Even with the "out of the labour force" category, there are still some people who are mislabeled in the categorization of employed, unemployed, or out of the labour force. There are some people who have only part time or temporary jobs, and they are looking for full time and permanent employment that are counted as employed, although they are not employed in the way they would like or need to be. Additionally, there are individuals who are **underemployed**. This includes those who are trained or skilled for one type or level of work but are working in a lower paying job or one that does not utilize their skills. For example, we would consider an individual with a college degree in finance who is working as a sales clerk underemployed. They are, however, also counted in the employed group. All of these individuals fall under the umbrella of the term "hidden unemployment." Discouraged workers, those who have stopped looking for employment and, hence, are no longer counted in the unemployed also fall into this group

Labour Force Participation Rate

Another important statistic is the labour force participation rate. This is the percentage of adults in an economy who are either employed or who are unemployed and looking for a job. Using the data in Figure 8.2a and Table 8.2a, those included in this calculation would be the 159.716 million individuals in the labour force. We calculate the rate by taking the number of people in the labour force, that is, the number employed and the number unemployed, divided by the total adult population and multiplying by 100 to get the percentage. For the data from January 2017, the labour force participation rate is 62.9%. Historically, the civilian labour force participation rate in the United States climbed beginning in the 1960s as women increasingly entered the workforce, and it peaked at just over 67% in late 1999 to early 2000. Since then, the labour force participation rate has steadily declined, slowly to about 66% in 2008, early in the Great Recession, and then more rapidly during and after that recession, reaching its present level, where it has remained stable, near the end of 2013.

The Establishment Payroll Survey

When the unemployment report comes out each month, the Bureau of Labor Statistics (BLS) also reports on the number of jobs created—which comes from the establishment payroll survey. The payroll survey is based on a survey of about 147,000 businesses and government agencies throughout the United States. It generates payroll employment estimates by the following criteria: all employees, average weekly hours worked, and average hourly, weekly, and overtime earnings. One of the criticisms of this survey is that it does not count the self-employed. It also does not make a distinction between new, minimum wage, part time or temporary jobs and full time jobs with "decent" pay.

How Does the U.S. Bureau of Labor Statistics Collect the U.S. Unemployment Data?

The unemployment rate announced by the U.S. Bureau of Labor Statistics on the first Friday of each month for the previous month is based on the Current Population Survey (CPS), which the Bureau has carried out every month since 1940. The Bureau takes great care to make this survey representative of the country as a whole. The country is first divided into 3,137 areas. The U.S. Bureau of the Census then selects 729 of these areas to survey. It divides the 729 areas into districts of about 300 households each, and divides each district into clusters of about four dwelling units. Every month, Census Bureau employees call about 15,000 of the four-household clusters, for a total of 60,000 households. Employees interview households for four consecutive months, then rotate them out of the survey for eight months, and then interview them again for the same four months the following year, before leaving the sample permanently.

Based on this survey, state, industry, urban and rural areas, gender, age, race or ethnicity, and level of education statistics comprise components that contribute to unemployment rates. A wide variety of other information is available, too. For example, how long have people been unemployed? Did they become unemployed because they quit, or were laid off, or their employer went out of business? Is the unemployed person the only wage earner in the family? The Current Population Survey is a treasure trove of information about employment and unemployment. If you are wondering what the difference is between the CPS and EPS, read the following Clear it Up feature.

Clear It Up

What is the difference between CPS and EPS?

The United States Census Bureau conducts the Current Population Survey (CPS), which measures the percentage of the labour force that is unemployed. The Bureau of Labor Statistics' establishment payroll survey (EPS) is a payroll survey that measures the net change in jobs created for the month.

Criticisms of Measuring Unemployment

There are always complications in measuring the number of unemployed. For example, what about people who do not have jobs and would be available to work, but are discouraged by the lack of available jobs in their area and stopped looking? Such people, and their families, may be suffering the pains of unemployment. However, the survey counts them as out of the labour force because they are not actively looking for work.

Other people may tell the Census Bureau that they are ready to work and looking for a job but, truly, they are not that eager to work and are not looking very hard at all. They are counted as unemployed, although they might more accurately be classified as out of the labour force. Still other people may have a job, perhaps doing something like yard work, child care, or cleaning houses, but are not reporting the income earned to the tax authorities. They may report being unemployed, when they actually are working.

Although the unemployment rate gets most of the public and media attention, economic researchers at the Bureau of Labor Statistics publish a wide array of surveys and reports that try to measure these kinds of issues and to develop a more nuanced and complete view of the labour market. It is not exactly a hot news flash that economic statistics are imperfect. Even imperfect measures like the unemployment rate, however, can still be quite informative, when interpreted knowledgeably and sensibly.

Link It Up

To learn more about the CPS and to read frequently asked questions about employment and labour take a look at Labour Force Statistics from the Current Population Survey [New Tab]. (https://www.bls.gov/cps/)

Key Concepts and Summary

Unemployment imposes high costs. Unemployed individuals suffer from loss of income and from stress. An economy with high unemployment suffers an opportunity cost of unused resources. We can divide the adult population into those in the labour force and those out of the labour force. In turn, we divide those in the labour force into employed and unemployed. A person without a job must be willing and able to work and actively looking for work to be counted as unemployed; otherwise, a person without a job is counted as out of the labour force. Economists define the unemployment rate as the number of unemployed persons divided by the number of persons in the labour force (not the overall adult population). The Current Population Survey (CPS) conducted by the United States Census Bureau measures the percentage of the labour force that is unemployed.

The establishment payroll survey by the Bureau of Labor Statistics measures the net change in jobs created for the month.

Attribution

Except where otherwise noted, this chapter is adapted from "How Economists Define and Compute Unemployment Rate (https://openstax.org/books/principles-economics-2e/pages/21-1-how-economists-define-and-compute-unemployment-rate)" and "Key Concepts and Summary" In *Principles of Economics 2e (https://openstax.org/books/principles-economics-2e/pages/1-introduction)*. (OpenStax) by Steven A. Greenlaw, David Shapiro, licensed under CC BY 4.0. /Adaptations include addition of chapter key concepts and summary.

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Original Source Chapter References

Bureau of Labor Statistics. Labor Force Statistics from the Current Population Survey. *Accessed March 6, 2015* http://data.bls.gov/timeseries/LNS14000000.

Cappelli, P. (20 June 2012). "Why Good People Can't Get Jobs: Chasing After the Purple Squirrel." http://knowledge.wharton.upenn.edu/article.cfm?articleid=3027.

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8.3 - PATTERNS OF UNEMPLOYMENT

Learning Objectives

- Explain historical patterns of unemployment in the U.S.
- Identify trends of unemployment based on demographics
- Evaluate global unemployment rates

Let's look at how unemployment rates have changed over time and how various groups of people are affected by unemployment differently.

The Historical U.S. Unemployment Rate

Figure 8.3a shows the historical pattern of U.S. unemployment since 1955.

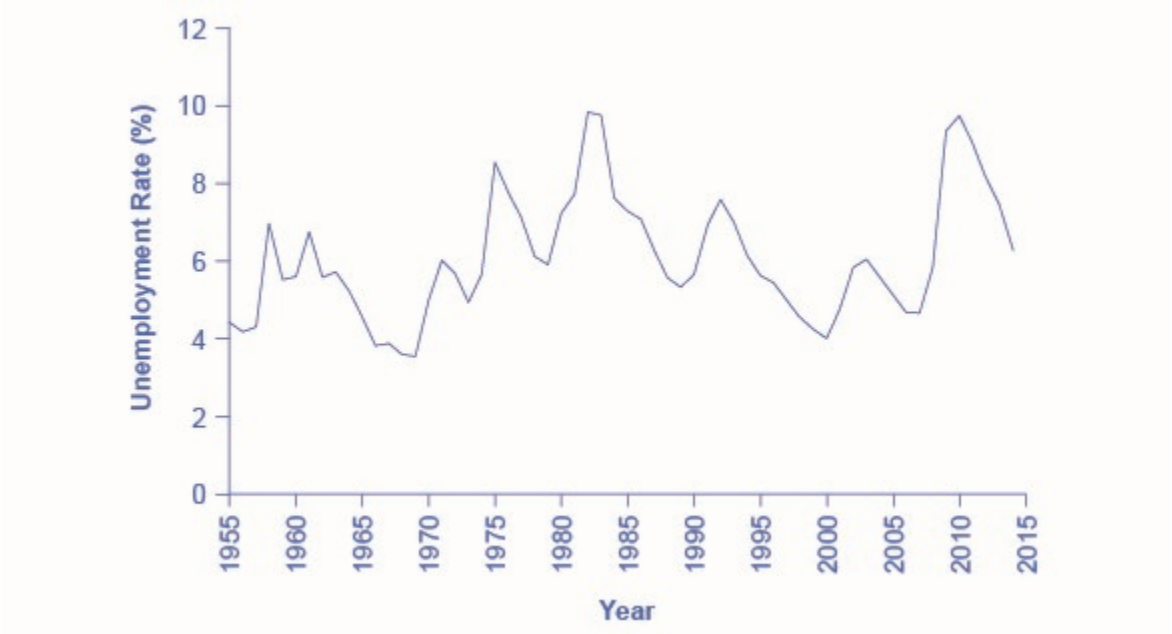

Figure 8.3a The U.S. Unemployment Rate, 1955–2015. The U.S. unemployment rate moves up and down as the economy moves in and out of recessions. However, over time, the unemployment rate seems to return to a range of 4% to 6%. There does not seem to be a long-term trend toward the rate moving generally higher or generally lower. (Source: Federal Reserve Economic Data (FRED) https://research.stlouisfed.org/fred2/series/LRUN64TTUSA156S0) Figure by Steven A. Greenlaw & David Shapiro (OpenStax), licensed under CC BY 4.0.

As we look at this data, several patterns stand out:

1. Unemployment rates do fluctuate over time. During the deep recessions of the early 1980s and of 2007–2009, unemployment reached roughly 10%. For comparison, during the 1930s Great Depression, the unemployment rate reached almost 25% of the labour force.
2. Unemployment rates in the late 1990s and into the mid-2000s were rather low by historical standards. The unemployment rate was below 5% from 1997 to 2000, and near 5% during almost all of 2006–2007, and 5% or slightly less from September 2015 through January 2017 (the latest date for which data are available as of this writing). The previous time unemployment had been less than 5% for three consecutive years was three decades earlier, from 1968 to 1970.
3. The unemployment rate never falls all the way to zero. It almost never seems to get below 3%—and it stays that low only for very short periods. (We discuss reasons why this is the case later in this chapter.)
4. The timing of rises and falls in unemployment matches fairly well with the timing of upswings and downswings in the overall economy, except that unemployment tends to lag changes in economic activity, and especially so during upswings of the economy following a recession. During periods of recession and depression, unemployment is high. During periods of economic growth, unemployment tends to be lower.

5. No significant upward or downward trend in unemployment rates is apparent. This point is especially worth noting because the U.S. population more than quadrupled from 76 million in 1900 to over 324 million by 2017. Moreover, a higher proportion of U.S. adults are now in the paid workforce, because women have entered the paid labour force in significant numbers in recent decades. Women comprised 18% of the paid workforce in 1900 and nearly half of the paid workforce in 2017. However, despite the increased number of workers, as well as other economic events like globalization and the continuous invention of new technologies, the economy has provided jobs without causing any long-term upward or downward trend in unemployment rates.

Link it Up

FRED graph on the Unemployment Rate from 1948 to present [New Tab] shows the rate moves up and down as the economy moves in and out of recessions.

Unemployment Rates by Group

Unemployment is not distributed evenly across the U.S. population. Figure 8.3b shows unemployment rates broken down in various ways: by gender, age, and race/ethnicity.

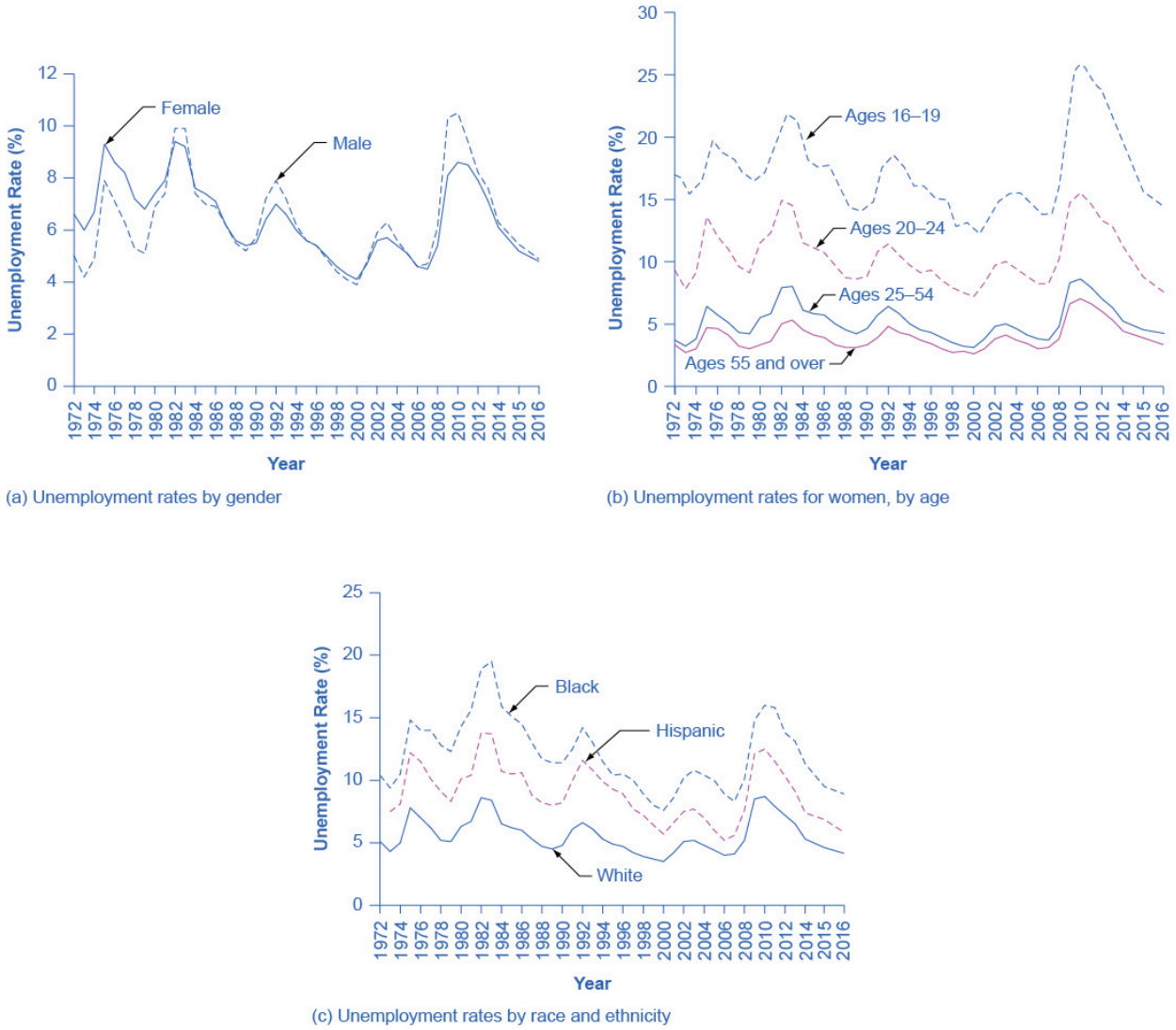

Figure 8.3b Unemployment Rate by Demographic Group. Figure by Steven A. Greenlaw & David Shapiro (OpenStax), licensed under CC BY 4.0.

Figure 8.3b Unemployment Rate by Demographic Group (Text Version)

Graph a shows the trends in unemployment rates by gender for the year 1972 to 2014. In 1972 the graph starts out at 6.6% for females. It jumps to 9.3% in 1975 for females, gradually goes back down until 2009, when it rises to 8.1%. It gradually lowers to 6.1% in 2014 for females. For males, it starts out at around 5% in 1972, goes up and down periodically, and ends at 6.3% in 2014. Graph b shows the trends in unemployment rates for women, by age for the year 1972 to 2014. In 1972, the graph starts out around 9% for women aged 20–24, goes up to 13.6% in 1975, and ends at 11.2% in 2014. In 1972, the graph starts out at 3.7% for women aged 25–54, jumps to 6.4% in 1975, and ends at around 5% in 2014. In 1972, the graph starts out around 3% for women aged 55 and over. It remains between 3–5% until 2010, when it jumps to 7%. In 2014, it drops down to 4.4%. Graph c shows the trends in unemployment rates by race and ethnicity for the year 1972 to

2014. In 1972, the graph starts out at 10.4% for Blacks, rises to nearly 15% in 1975, rises even more in 1983 to 19.5%, and ends up around 11% in 2014. In 1972, the graph starts out around 7% for Hispanics, rises to around 12% in 1975, and ends at 7.4% in 2014. In 1972, the graph starts out around 5% for Whites, jumps to nearly 8% in 1975, jumps again to nearly 8.5% in 1982, and ends up at around 5% in 2014.

Figure 8.3b Unemployment Rate by Demographic Group (a) By gender, 1972–2016. Unemployment rates for men used to be lower than unemployment rates for women, but in recent decades, the two rates have been very close, often– and especially during and soon after the Great Recession – with the unemployment rate for men somewhat higher. (b) By age, 1972–2016. Unemployment rates are highest for the very young and become lower with age. (c) By race and ethnicity, 1972–2016. Although unemployment rates for all groups tend to rise and fall together, the unemployment rate for Blacks is typically about twice as high as that for Whites, while the unemployment rate for Hispanics is in between. (Source: www.bls.gov).

The unemployment rate for women had historically tended to be higher than the unemployment rate for men, perhaps reflecting the historical pattern that women were seen as "secondary" earners. By about 1980, however, the unemployment rate for women was essentially the same as that for men, as Figure 8.3b (a) shows. During the 2008-2009 recession and in the immediate aftermath, the unemployment rate for men exceeded the unemployment rate for women. Subsequently, however, the gap has narrowed.

Link It Up

BLS Spotlight on Statistics: The Recession of 2007–2009 [New Tab] (https://www.bls.gov/spotlight/2012/recession/audio.htm) contains detailed information on the 2008–2009 recession and some very useful information on the statistics of unemployment.

Younger workers tend to have higher unemployment, while middle-aged workers tend to have lower unemployment, probably because the middle-aged workers feel the responsibility of needing to have a job more heavily. Younger workers move in and out of jobs more than middle-aged workers, as part of the process of matching of workers and jobs, and this contributes to their higher unemployment rates. In addition, middle-aged workers are more likely to feel the responsibility of needing to have a job more heavily. Elderly workers have extremely low rates of unemployment, because those who do not have jobs often exit the labour force by retiring, and thus are not counted in the unemployment statistics. Figure 8.3b (b) shows unemployment rates for women divided by age. The pattern for men is similar.

The unemployment rate for African-Americans is substantially higher than the rate for other racial or ethnic groups, a fact that surely reflects, to some extent, a pattern of discrimination that has constrained Blacks' labour market opportunities. However, the gaps between unemployment rates for Whites and for Blacks and

Hispanics diminished in the 1990s, as Figure 8.3b (c) shows. In fact, unemployment rates for Blacks and Hispanics were at the lowest levels for several decades in the mid-2000s before rising during the recent Great Recession.

Finally, those with less education typically suffer higher unemployment. In January 2017, for example, the unemployment rate for those with a college degree was 2.5%; for those with some college but not a four year degree, the unemployment rate was 3.8%; for high school graduates with no additional degree, the unemployment rate was 5.3%; and for those without a high school diploma, the unemployment rate was 7.7%. This pattern arises because additional education typically offers better connections to the labour market and higher demand. With less attractive labour market opportunities for low-skilled workers compared to the opportunities for the more highly-skilled, including lower pay, low-skilled workers may be less motivated to find jobs.

Breaking Down Unemployment in Other Ways

The Bureau of Labor Statistics also gives information about the reasons for unemployment, as well as the length of time individuals have been unemployed. Table 8.3a, for example, shows the four reasons for unemployment and the percentages of the currently unemployed that fall into each category. Table 8.3b shows the length of unemployment. For both of these, the data is from January 2017.(bls.gov)

Table 8.3a Reasons for Unemployment, January 2017

Reason	Percentage
New Entrants	10.8%
Re-entrants	28.7%
Job Leavers	11.4%
Job Losers: Temporary	14.0%
Job Losers: Non Temporary	35.1%

Table 8.3b Length of Unemployment, January 2017

Length of Time	Percentage
Under 5 weeks	32.5%
5 to 14 weeks	27.5%
15 to 26 weeks	15.7%
Over 27 weeks	27.4%

Link It Up

Listen to the Ted Talk Are droids taking our jobs? [New Tab] (https://www.ted.com/talks/andrew_mcafee_are_droids_taking_our_jobs) to learn about the impact of droids on the labour market.

International Unemployment Comparisons

From an international perspective, the U.S. unemployment rate typically has looked a little better than average. Table 8.3c compares unemployment rates for 1991, 1996, 2001, 2006 (just before the recession), and 2012 (somewhat after the recession) from several other high-income countries.

Table 8.3c International Comparisons of Unemployment Rates

Country	1991	1996	2001	2006	2012
United States	6.8%	5.4%	4.8%	4.4%	8.1%
Canada	9.8%	8.8%	6.4%	6.2%	6.3%
Japan	2.1%	3.4%	5.1%	4.5%	3.9%
France	9.5%	12.5%	8.7%	10.1%	10.0%
Germany	5.6%	9.0%	8.9%	9.8%	5.5%
Italy	6.9%	11.7%	9.6%	7.8%	10.8%
Sweden	3.1%	9.9%	5.0%	5.2%	7.9%
United Kingdom	8.8%	8.1%	5.1%	5.5%	8.0%

However, we need to treat cross-country comparisons of unemployment rates with care, because each country has slightly different definitions of unemployment, survey tools for measuring unemployment, and also different labour markets. For example, Japan's unemployment rates appear quite low, but Japan's economy has been mired in slow growth and recession since the late 1980s, and Japan's unemployment rate probably paints too rosy a picture of its labour market. In Japan, workers who lose their jobs are often quick to exit the labour force and not look for a new job, in which case they are not counted as unemployed. In addition, Japanese firms are often quite reluctant to fire workers, and so firms have substantial numbers of workers who are on reduced hours or officially employed, but doing very little. We can view this Japanese pattern as an unusual method for society to provide support for the unemployed, rather than a sign of a healthy economy.

Link It Up

We hear about the Chinese economy in the news all the time. The value of the Chinese yuan in comparison to the U.S. dollar is likely to be part of the nightly business report, so why is the Chinese economy not included in this discussion of international unemployment? The lack of reliable statistics is the reason. Divining (https://www.bloomberg.com/news/articles/2013-07-26/divining-unemployment-in-china#xj4y7vzkg)Unemployment in China [New Tab] explains China's unemployment figures.

Comparing unemployment rates in the United States and other high-income economies with unemployment rates in Latin America, Africa, Eastern Europe, and Asia is very difficult. One reason is that the statistical agencies in many poorer countries lack the resources and technical capabilities of the U.S. Bureau of the Census. However, a more difficult problem with international comparisons is that in many low-income countries, most workers are not involved in the labour market through an employer who pays them regularly. Instead, workers in these countries are engaged in short-term work, subsistence activities, and barter. Moreover, the effect of unemployment is very different in high-income and low-income countries. Unemployed workers in the developed economies have access to various government programs like unemployment insurance, welfare, and food stamps. Such programs may barely exist in poorer countries. Although unemployment is a serious problem in many low-income countries, it manifests itself in a different way than in high-income countries.

Key Concepts and Summary

The U.S. unemployment rate rises during periods of recession and depression, but falls back to the range of 4% to 6% when the economy is strong. The unemployment rate never falls to zero. Despite enormous growth in the size of the U.S. population and labour force in the twentieth century, along with other major trends like globalization and new technology, the unemployment rate shows no long-term rising trend.

Unemployment rates differ by group: higher for African-Americans and Hispanics than for Whites; higher for less educated than more educated; higher for the young than the middle-aged. Women's

unemployment rates used to be higher than men's, but in recent years men's and women's unemployment rates have been very similar. In recent years, unemployment rates in the United States have compared favorably with unemployment rates in most other high-income economies.

Attribution

Except where otherwise noted, this chapter is adapted from "Patterns of Unemployment (https://openstax.org/books/principles-economics-2e/pages/21-2-patterns-of-unemployment)" and "Key Concepts an Summary" In *Principles of Economics 2e (https://openstax.org/books/principles-economics-2e/pages/1-introduction)*. (OpenStax) by Steven A. Greenlaw, David Shapiro, licensed under CC BY 4.0. Adaptations include addition of chapter key concepts and summary.
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Original Source Chapter References

Bureau of Labor Statistics. Labor Force Statistics from the Current Population Survey. *Accessed March 6, 2015* http://data.bls.gov/timeseries/LNS14000000.
Cappelli, P. (20 June 2012). "Why Good People Can't Get Jobs: Chasing After the Purple Squirrel." http://knowledge.wharton.upenn.edu/article.cfm?articleid=3027.

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8.4 - WHAT CAUSES CHANGES IN UNEMPLOYMENT OVER THE SHORT RUN

Learning Objectives

- Analyze cyclical unemployment
- Explain the relationship between sticky wages and employment using various economic arguments
- Apply supply and demand models to unemployment and wages

We have seen that unemployment varies across times and places. What causes changes in unemployment? There are different answers in the short run and in the long run. Let's look at the short run first.

Cyclical Unemployment

Let's make the plausible assumption that in the short run, from a few months to a few years, the quantity of hours that the average person is willing to work for a given wage does not change much, so the labour supply curve does not shift much. In addition, make the standard *ceteris paribus* assumption that there is no substantial short-term change in the age structure of the labour force, institutions and laws affecting the labour market, or other possibly relevant factors.

One primary determinant of the demand for labour from firms is how they perceive the state of the macro economy. If firms believe that business is expanding, then at any given wage they will desire to hire a greater quantity of labour, and the labour demand curve shifts to the right. Conversely, if firms perceive that the economy is slowing down or entering a recession, then they will wish to hire a lower quantity of labour at any given wage, and the labour demand curve will shift to the left. Economists call the variation in unemployment

that the economy causes moving from expansion to recession or from recession to expansion (i.e. the business cycle) cyclical unemployment.

From the standpoint of the supply-and-demand model of competitive and flexible labour markets, unemployment represents something of a puzzle. In a supply-and-demand model of a labour market, as Figure 8.4a illustrates, the labour market should move toward an equilibrium wage and quantity. At the equilibrium wage (We), the equilibrium quantity (Qe) of labour supplied by workers should be equal to the quantity of labour demanded by employers.

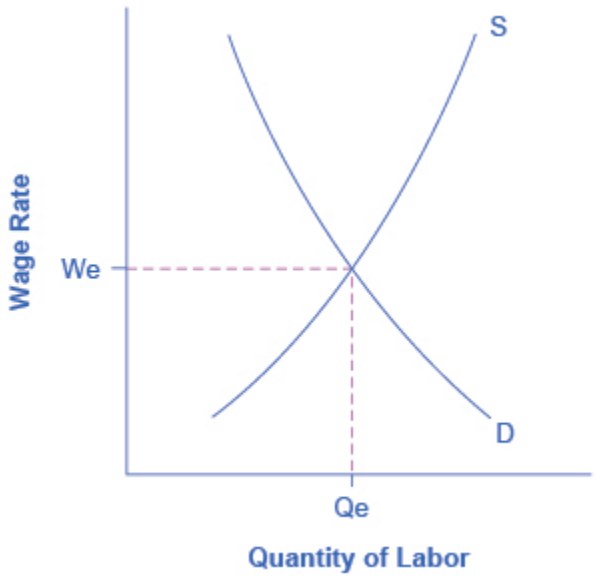

Figure 8.4a The Unemployment and Equilibrium in the Labour Market. In a labour market with flexible wages, the equilibrium will occur at wage We and quantity Qe, where the number of people who want jobs (shown by S) equals the number of jobs available (shown by D). Figure by Steven A. Greenlaw & David Shapiro (OpenStax), licensed under CC BY 4.0.

The graph reveals the complexity of unemployment in that, presumably, the number of jobs available should equal the number of individuals pursuing employment. Probably a few people are unemployed because of unrealistic expectations about wages, but they do not represent the majority of the unemployed. Instead, unemployed people often have friends or acquaintances of similar skill levels who are employed, and the unemployed would be willing to work at the jobs and wages similar to what those people are receiving. However, the employers of their friends and acquaintances do not seem to be hiring. In other words, these people are involuntarily unemployed. What causes involuntary unemployment?

Why Wages Might Be Sticky Downward

If a labour market model with flexible wages does not describe unemployment very well—because it predicts that anyone willing to work at the going wage can always find a job—then it may prove useful to consider economic models in which wages are not flexible or adjust only very slowly. In particular, even though wage increases may occur with relative ease, wage decreases are few and far between.

One set of reasons why wages may be "sticky downward," as economists put it, involves economic laws and institutions. For low-skilled workers receiving minimum wage, it is illegal to reduce their wages. For union workers operating under a multiyear contract with a company, wage cuts might violate the contract and create a labour dispute or a strike. However, minimum wages and union contracts are not a sufficient reason why wages would be sticky downward for the U.S. economy as a whole. After all, out of the 150 million or so employed workers in the U.S. economy, only about 2.6 million—less than 2% of the total—do not receive compensation above the minimum wage. Similarly, labour unions represent only about 11% of American wage and salary workers. In other high-income countries, more workers may have their wages determined by unions or the minimum wage may be set at a level that applies to a larger share of workers. However, for the United States, these two factors combined affect only about 15% or less of the labour force.

Economists looking for reasons why wages might be sticky downwards have focused on factors that may characterize most labour relationships in the economy, not just a few. Many have proposed a number of different theories, but they share a common tone.

One argument is that even employees who are not union members often work under an **implicit contract,** which is that the employer will try to keep wages from falling when the economy is weak or the business is having trouble, and the employee will not expect huge salary increases when the economy or the business is strong. This wage-setting behavior acts like a form of insurance: the employee has some protection against wage declines in bad times, but pays for that protection with lower wages in good times. Clearly, this sort of implicit contract means that firms will be hesitant to cut wages, lest workers feel betrayed and work less hard or even leave the firm.

Efficiency wage theory argues that workers' productivity depends on their pay, and so employers will often find it worthwhile to pay their employees somewhat more than market conditions might dictate. One reason is that employees who receive better pay than others will be more productive because they recognize that if they were to lose their current jobs, they would suffer a decline in salary. As a result, they are motivated to work harder and to stay with the current employer. In addition, employers know that it is costly and time-consuming to hire and train new employees, so they would prefer to pay workers a little extra now rather than to lose them and have to hire and train new workers. Thus, by avoiding wage cuts, the employer minimizes costs of training and hiring new workers, and reaps the benefits of well-motivated employees.

The **adverse selection of wage cuts argument** points out that if an employer reacts to poor business conditions by reducing wages for all workers, then the best workers, those with the best employment alternatives at other firms, are the most likely to leave. The least attractive workers, with fewer employment alternatives, are more likely to stay. Consequently, firms are more likely to choose which workers should depart, through layoffs and firings, rather than trimming wages across the board. Sometimes companies that are experiencing difficult times can persuade workers to take a pay cut for the short term, and still retain most of the firm's workers. However, it is far more typical for companies to lay off some workers, rather than to cut wages for everyone.

The **insider-outsider model** of the labour force, in simple terms, argues that those already working for firms are "insiders," while new employees, at least for a time, are "outsiders." A firm depends on its insiders to keep the organization running smoothly, to be familiar with routine procedures, and to train new employees. However, cutting wages will alienate the insiders and damage the firm's productivity and prospects.

Finally, the **relative wage coordination argument** points out that even if most workers were hypothetically willing to see a decline in their own wages in bad economic times as long as everyone else also experiences such a decline, there is no obvious way for a decentralized economy to implement such a plan. Instead, workers confronted with the possibility of a wage cut will worry that other workers will not have such a wage cut, and so a wage cut means being worse off both in absolute terms and relative to others. As a result, workers fight hard against wage cuts.

These theories of why wages tend not to move downward differ in their logic and their implications, and figuring out the strengths and weaknesses of each theory is an ongoing subject of research and controversy among economists. All tend to imply that wages will decline only very slowly, if at all, even when the economy or a business is having tough times. When wages are inflexible and unlikely to fall, then either short-run or long-run unemployment can result. Figure 8.4b illustrates this.

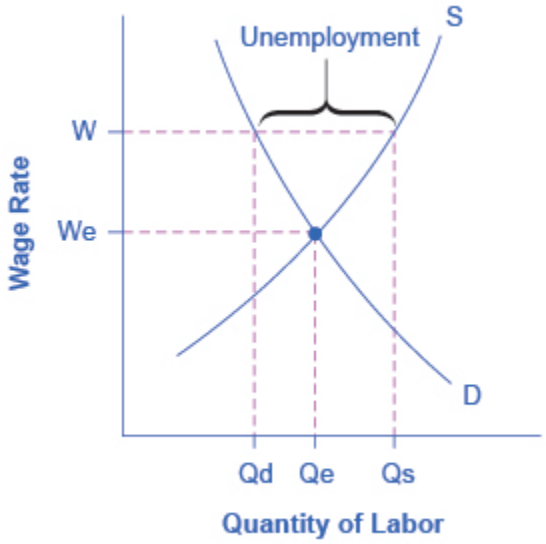

Figure 8.4b Sticky Wages in the Labour Market. Because the wage rate is stuck at W, above the equilibrium, the number of those who want jobs (Qs) is greater than the number of job openings (Qd). The result is unemployment, shown by the bracket in the figure. Figure by Steven A. Greenlaw & David Shapiro (OpenStax), licensed under CC BY 4.0,

Figure 8.4b Sticky Wages in the Labour Market (Text Version)

The graph provides a visual of how sticky wages impact the unemployment rate. The vertical axis is Wage Rate and the horizontal axis is Quantity of Labour. The supply curve (S) slopes upward from left to right and the demand curve (D) slope downward from left to right. The equilibrium occurs where S and D intersect, at point We and Qe. The wage rate, point W, is stuck above the equilibrium; as a result the number of those who want jobs (Qs) is greater than the number of job openings (Qd). Qs is greater then Qe and Qd is lesser then Qe. Unemployment, shown by the bracket in the figure, spans between Qd and Qs at W.

Figure 8.4c shows the interaction between shifts in labour demand and wages that are sticky downward. Figure 8.4c (a) illustrates the situation in which the demand for labour shifts to the right from D_0 to D_1. In this case, the equilibrium wage rises from W_0 to W_1 and the equilibrium quantity of labour hired increases from Q_0 to Q_1. It does not hurt employee morale at all for wages to rise.

Figure 8.4c (b) shows the situation in which the demand for labour shifts to the left, from D_0 to D_1, as it would tend to do in a recession. Because wages are sticky downward, they do not adjust toward what would have been the new equilibrium wage (W_1), at least not in the short run. Instead, after the shift in the labour demand curve, the same quantity of workers is willing to work at that wage as before; however, the quantity

of workers demanded at that wage has declined from the original equilibrium (Q_0) to Q_2. The gap between the original equilibrium quantity (Q_0) and the new quantity demanded of labour (Q_2) represents workers who would be willing to work at the going wage but cannot find jobs. The gap represents the economic meaning of unemployment.

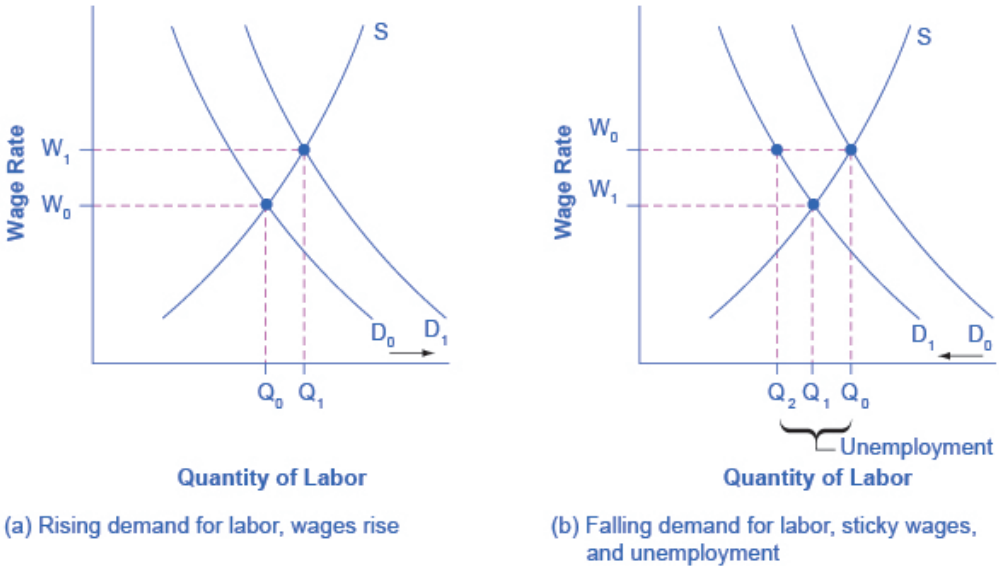

Figure 8.4c Rising Wage and Low Unemployment: Where Is the Unemployment in Supply and Demand?(a) In a labour market where wages are able to rise, an increase in the demand for labour from D_0 to D_1 leads to an increase in equilibrium quantity of labour hired from Q_0 to Q_1 and a rise in the equilibrium wage from W_0 to W_1. (b) In a labour market where wages do not decline, a fall in the demand for labour from D_0 to D_1 leads to a decline in the quantity of labour demanded at the original wage (W_0) from Q_0 to Q_2. These workers will want to work at the prevailing wage (W_0), but will not be able to find jobs. Figure by Steven A. Greenlaw & David Shapiro (OpenStax), licesned under CC BY 4.0.

Figure 8.4c Rising Wage and Low Unemployment: Where Is the Unemployment in Supply and Demand? (Text Version)

There are two graphs that show how supply and demand influence unemployment. Both graphs have a vertical axis is Wage Rate and the horizontal axis is Quantity of Labour.

Graph A – Rising demand for labour, wages rise: In a labour market where wages are able to rise the supply curve (S) slopes upward from left to right and the original demand curve (D) slopes downward from left to right. The equilibrium occurs where the S and D intersect, at point W_0 and Q_0. An increase in the demand for labour shifts the original demand curve (D_0) to the right to D_1, resulting in equilibrium quantity of labour hired shifting to the right from Q_0 to Q_1 and a rise in the equilibrium wage from W_0 to W_1. The new equilibrium occurs where S and D_1 intersect at W_1 and Q_1 .

Graph B – Falling demand for labour, sticky wages, and unemployment: In a labour market where

wages do not decline, a fall in the demand for labour occurs. The supply curve (S) slopes upward from left to right and the original demand curve (D) slopes downward from left to right. The equilibrium occurs where the S and D intersect, at point W_0 and Q_0. The original demand curve (D_0) shifts to the left to D1 resulting in a decline in the quantity of labour demanded at the original wage (W_0) shift to the left from Q_0 to Q_2. These workers will want to work at the prevailing wage (W_0), but will not be able to find jobs. The new equilibrium occurs where S and D_1 intersect at W_1 and Q_1. Q_1 occurs between Q_2 and Q_0. The span between Q_2 and Q_0 is unemployment.

This analysis helps to explain the connection that we noted earlier: that unemployment tends to rise in recessions and to decline during expansions. The overall state of the economy shifts the labour demand curve and, combined with wages that are sticky downwards, unemployment changes. The rise in unemployment that occurs because of a recession is **cyclical unemployment**.

Link It Up

The St. Louis Federal Reserve Bank is the best resource for macroeconomic time series data, known as the Federal Reserve Economic Data (FRED). FRED [New Tab] (https://fred.stlouisfed.org/categories/12) provides complete data sets on various measures of the unemployment rate as well as the monthly Bureau of Labor Statistics report on the results of the household and employment surveys.

Key Concepts and Summary

Cyclical unemployment rises and falls with the business cycle. In a labour market with flexible wages, wages will adjust in such a market so that quantity demanded of labour always equals the quantity supplied of labour at the equilibrium wage. Economists have proposed many theories for why wages might not be flexible, but instead may adjust only in a “sticky” way, especially when it comes to downward adjustments: implicit contracts, efficiency wage theory, adverse selection of wage cuts, insider-outsider model, and relative wage coordination.

Attribution

Except where otherwise noted, this chapter is adapted from "What Causes Changes in Unemployment over the Short Run (https://openstax.org/books/principles-economics-2e/pages/21-3-what-causes-changes-in-unemployment-over-the-short-run)" and "Key Concepts and Summary" In *Principles of Economics 2e (https://openstax.org/books/principles-economics-2e/pages/1-introduction)*. (OpenStax) by Steven A. Greenlaw, David Shapiro, licensed under CC BY 4.0./Adaptations include addition of chapter key concepts and summary.
Access for free at https://openstax.org/books/principles-economics-2e/pages/1-introduction

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8.5 - WHAT CAUSES CHANGES IN UNEMPLOYMENT OVER THE LONG RUN

Learning Objectives

- Explain frictional and structural unemployment
- Assess relationships between the natural rate of employment and potential real GDP, productivity, and public policy
- Identify recent patterns in the natural rate of employment
- Propose ways to combat unemployment

Cyclical unemployment explains why unemployment rises during a recession and falls during an economic expansion, but what explains the remaining level of unemployment even in good economic times? Why is the unemployment rate never zero? Even when the U.S. economy is growing strongly, the unemployment rate only rarely dips as low as 4%. Moreover, the discussion earlier in this chapter pointed out that unemployment rates in many European countries like Italy, France, and Germany have often been remarkably high at various times in the last few decades. Why does some level of unemployment persist even when economies are growing strongly? Why are unemployment rates continually higher in certain economies, through good economic years and bad? Economists have a term to describe the remaining level of unemployment that occurs even when the economy is healthy: they call it the **natural rate of unemployment**.

The Long Run: The Natural Rate of Unemployment

The natural rate of unemployment is not "natural" in the sense that water freezes at 32 degrees Fahrenheit or boils at 212 degrees Fahrenheit. It is not a physical and unchanging law of nature. Instead, it is only the "natural" rate because it is the unemployment rate that would result from the combination of economic, social, and political factors that exist at a time—assuming the economy was neither booming nor in recession.

These forces include the usual pattern of companies expanding and contracting their workforces in a dynamic economy, social and economic forces that affect the labour market, or public policies that affect either the eagerness of people to work or the willingness of businesses to hire. Let's discuss these factors in more detail.

Frictional Unemployment

In a market economy, some companies are always going broke for a variety of reasons: old technology; poor management; good management that happened to make bad decisions; shifts in tastes of consumers so that less of the firm's product is desired; a large customer who went broke; or tough domestic or foreign competitors. Conversely, other companies will be doing very well for just the opposite reasons and looking to hire more employees. In a perfect world, all of those who lost jobs would immediately find new ones. However, in the real world, even if the number of job seekers is equal to the number of job vacancies, it takes time to find out about new jobs, to interview and figure out if the new job is a good match, or perhaps to sell a house and buy another in proximity to a new job. Economists call the unemployment that occurs in the meantime, as workers move between jobs, frictional unemployment. Frictional unemployment is not inherently a bad thing. It takes time on part of both the employer and the individual to match those looking for employment with the correct job openings. For individuals and companies to be successful and productive, you want people to find the job for which they are best suited, not just the first job offered.

In the mid-2000s, before the 2008–2009 recession, it was true that about 7% of U.S. workers saw their jobs disappear in any three-month period. However, in periods of economic growth, these destroyed jobs are counterbalanced for the economy as a whole by a larger number of jobs created. In 2005, for example, there were typically about 7.5 million unemployed people at any given time in the U.S. economy. Even though about two-thirds of those unemployed people found a job in 14 weeks or fewer, the unemployment rate did not change much during the year, because those who found new jobs were largely offset by others who lost jobs.

Of course, it would be preferable if people who were losing jobs could immediately and easily move into newly created jobs, but in the real world, that is not possible. Someone who is laid off by a textile mill in South Carolina cannot turn around and immediately start working for a textile mill in California. Instead, the adjustment process happens in ripples. Some people find new jobs near their old ones, while others find that they must move to new locations. Some people can do a very similar job with a different company, while others must start new career paths. Some people may be near retirement and decide to look only for part-time work, while others want an employer that offers a long-term career path. The frictional unemployment that results from people moving between jobs in a dynamic economy may account for one to two percentage points of total unemployment.

The level of frictional unemployment will depend on how easy it is for workers to learn about alternative jobs,

which may reflect the ease of communications about job prospects in the economy. The extent of frictional unemployment will also depend to some extent on how willing people are to move to new areas to find jobs—which in turn may depend on history and culture.

Frictional unemployment and the natural rate of unemployment also seem to depend on the age distribution of the population. Figure 8.3a (b) showed that unemployment rates are typically lower for people between 25–54 years of age or aged 55 and over than they are for those who are younger. "Prime-age workers," as those in the 25–54 age bracket are sometimes called, are typically at a place in their lives when they want to have a job and income arriving at all times. In addition, older workers who lose jobs may prefer to opt for retirement. By contrast, it is likely that a relatively high proportion of those who are under 25 will be trying out jobs and life options, and this leads to greater job mobility and hence higher frictional unemployment. Thus, a society with a relatively high proportion of young workers, like the U.S. beginning in the mid-1960s when Baby Boomers began entering the labour market, will tend to have a higher unemployment rate than a society with a higher proportion of its workers in older ages.

Structural Unemployment

Another factor that influences the natural rate of unemployment is the amount of **structural unemployment**. The structurally unemployed are individuals who have no jobs because they lack skills valued by the labour market, either because demand has shifted away from the skills they do have, or because they never learned any skills. An example of the former would be the unemployment among aerospace engineers after the U.S. space program downsized in the 1970s. An example of the latter would be high school dropouts.

Some people worry that technology causes structural unemployment. In the past, new technologies have put lower skilled employees out of work, but at the same time they create demand for higher skilled workers to use the new technologies. Education seems to be the key in minimizing the amount of structural unemployment. Individuals who have degrees can be retrained if they become structurally unemployed. For people with no skills and little education, that option is more limited.

Natural Unemployment and Potential Real GDP

The natural unemployment rate is related to two other important concepts: full employment and potential real GDP. Economists consider the economy to be at full employment when the actual unemployment rate is equal to the natural unemployment rate. When the economy is at full employment, real GDP is equal to potential real GDP. By contrast, when the economy is below full employment, the unemployment rate is greater than the natural unemployment rate and real GDP is less than potential. Finally, when the economy is

above full employment, then the unemployment rate is less than the natural unemployment rate and real GDP is greater than potential. Operating above potential is only possible for a short while, since it is analogous to all workers working overtime.

Productivity Shifts and the Natural Rate of Unemployment

Unexpected shifts in productivity can have a powerful effect on the natural rate of unemployment. Over time, workers' productivity determines the level of wages in an economy. After all, if a business paid workers more than could be justified by their productivity, the business will ultimately lose money and go bankrupt. Conversely, if a business tries to pay workers less than their productivity then, in a competitive labour market, other businesses will find it worthwhile to hire away those workers and pay them more.

However, adjustments of wages to productivity levels will not happen quickly or smoothly. Employers typically review wages only once or twice a year. In many modern jobs, it is difficult to measure productivity at the individual level. For example, how precisely would one measure the quantity produced by an accountant who is one of many people working in the tax department of a large corporation? Because productivity is difficult to observe, employers often determine wage increases based on recent experience with productivity. If productivity has been rising at, say, 2% per year, then wages rise at that level as well. However, when productivity changes unexpectedly, it can affect the natural rate of unemployment for a time.

The U.S. economy in the 1970s and 1990s provides two vivid examples of this process. In the 1970s, productivity growth slowed down unexpectedly (as we discussed in Economic Growth). For example, output per hour of U.S. workers in the business sector increased at an annual rate of 3.3% per year from 1960 to 1973, but only 0.8% from 1973 to 1982. Figure 8.5a (a) illustrates the situation where the demand for labour—that is, the quantity of labour that business is willing to hire at any given wage—has been shifting out a little each year because of rising productivity, from D_0 to D_1 to D_2. As a result, equilibrium wages have been rising each year from W_0 to W_1 to W_2. However, when productivity unexpectedly slows down, the pattern of wage increases does not adjust right away. Wages keep rising each year from W_2 to W_3 to W_4, but the demand for labour is no longer shifting up. A gap opens where the quantity of labour supplied at wage level W_4 is greater than the quantity demanded. The natural rate of unemployment rises. In the aftermath of this unexpectedly low productivity in the 1970s, the national unemployment rate did not fall below 7% from May, 1980 until 1986. Over time, the rise in wages will adjust to match the slower gains in productivity, and the unemployment rate will ease back down, but this process may take years.

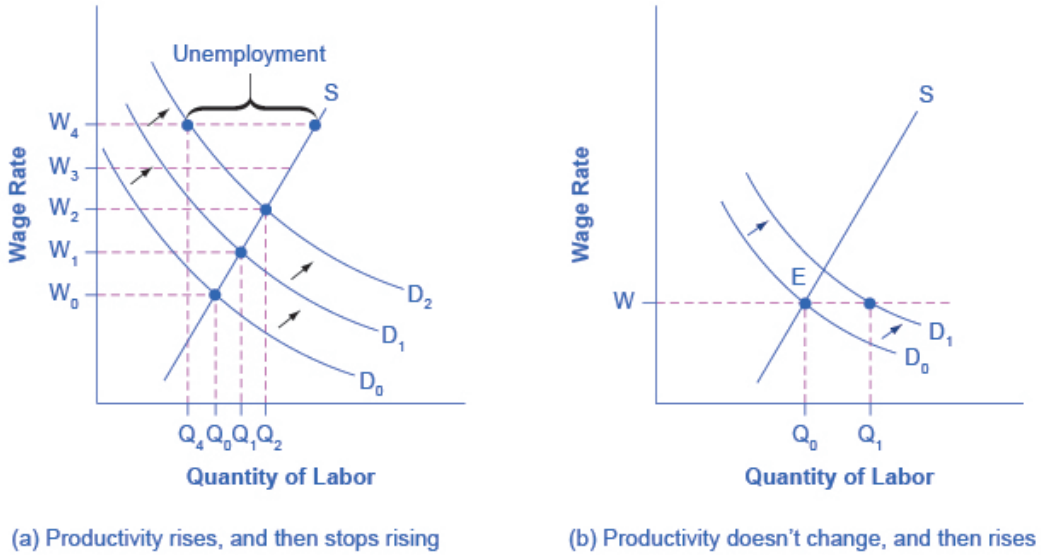

Figure 8.5a Unexpected Productivity Changes and Unemployment. (a) Productivity is rising, increasing the demand for labour. Employers and workers become used to the pattern of wage increases. Then productivity suddenly stops increasing. However, the expectations of employers and workers for wage increases do not shift immediately, so wages keep rising as before. However, the demand for labour has not increased, so at wage W_4, unemployment exists where the quantity supplied of labour exceeds the quantity demanded. (b) The rate of productivity increase has been zero for a time, so employers and workers have come to accept the equilibrium wage level (W). Then productivity increases unexpectedly, shifting demand for labour from D_0 to D_1. At the wage (W), this means that the quantity demanded of labour exceeds the quantity supplied, and with job offers plentiful, the unemployment rate will be low. Figure by Steven A. Greenlaw & David Shapiro (OpenStax), licensed under CC BY 4.0.

The late 1990s provide an opposite example: instead of the surprise decline in productivity that occurred in the 1970s, productivity unexpectedly rose in the mid-1990s. The annual growth rate of real output per hour of labour increased from 1.7% from 1980–1995, to an annual rate of 2.6% from 1995–2001. Let's simplify the situation a bit, so that the economic lesson of the story is easier to see graphically, and say that productivity had not been increasing at all in earlier years, so the intersection of the labour market was at point E in Figure 8.5a (b), where the demand curve for labour (D_0) intersects the supply curve for labour. As a result, real wages were not increasing. Now, productivity jumps upward, which shifts the demand for labour out to the right, from D_0 to D_1. At least for a time, however, wages are still set according to the earlier expectations of no productivity growth, so wages do not rise. The result is that at the prevailing wage level (W), the quantity of labour demanded (Qd) will for a time exceed the quantity of labour supplied (Qs), and unemployment will be very low—actually below the natural level of unemployment for a time. This pattern of unexpectedly high productivity helps to explain why the unemployment rate stayed below 4.5%—quite a low level by historical standards—from 1998 until after the U.S. economy had entered a recession in 2001.

Levels of unemployment will tend to be somewhat higher on average when productivity is unexpectedly low,

and conversely, will tend to be somewhat lower on average when productivity is unexpectedly high. However, over time, wages do eventually adjust to reflect productivity levels.

Public Policy and the Natural Rate of Unemployment

Public policy can also have a powerful effect on the natural rate of unemployment. On the supply side of the labour market, public policies to assist the unemployed can affect how eager people are to find work. For example, if a worker who loses a job is guaranteed a generous package of unemployment insurance, welfare benefits, food stamps, and government medical benefits, then the opportunity cost of unemployment is lower and that worker will be less eager to seek a new job.

What seems to matter most is not just the amount of these benefits, but how long they last. A society that provides generous help for the unemployed that cuts off after, say, six months, may provide less of an incentive for unemployment than a society that provides less generous help that lasts for several years. Conversely, government assistance for job search or retraining can in some cases encourage people back to work sooner. See the Clear it Up to learn how the U.S. handles unemployment insurance.

Link It Up

For an explanation of exactly who is eligible for unemployment benefits take a look at The Impacts of Unemployment Benefits on Job Match Quality and Labour Market Functioning [New Tab]. (https://voxeu.org/article/unemployment-benefits-job-match-quality-and-labour-market-functioning)

On the demand side of the labour market, government rules, social institutions, and the presence of unions can affect the willingness of firms to hire. For example, if a government makes it hard for businesses to start up or to expand, by wrapping new businesses in bureaucratic red tape, then businesses will become more discouraged about hiring. Government regulations can make it harder to start a business by requiring that a new business obtain many permits and pay many fees, or by restricting the types and quality of products that a company can sell. Other government regulations, like zoning laws, may limit where companies can conduct business, or whether businesses are allowed to be open during evenings or on Sunday.

Whatever defenses may be offered for such laws in terms of social value—like the value some Christians place on not working on Sunday, or Orthodox Jews or highly observant Muslims on Saturday—these kinds of restrictions impose a barrier between some willing workers and other willing employers, and thus contribute to a higher natural rate of unemployment. Similarly, if government makes it difficult to fire or lay off workers, businesses may react by trying not to hire more workers than strictly necessary—since laying these workers off

would be costly and difficult. High minimum wages may discourage businesses from hiring low-skill workers. Government rules may encourage and support powerful unions, which can then push up wages for union workers, but at a cost of discouraging businesses from hiring those workers.

The Natural Rate of Unemployment in Recent Years

The underlying economic, social, and political factors that determine the natural rate of unemployment can change over time, which means that the natural rate of unemployment can change over time, too.

Estimates by economists of the natural rate of unemployment in the U.S. economy in the early 2000s run at about 4.5 to 5.5%. This is a lower estimate than earlier. We outline three of the common reasons that economists propose for this change below.

1. The internet has provided a remarkable new tool through which job seekers can find out about jobs at different companies and can make contact with relative ease. An internet search is far easier than trying to find a list of local employers and then hunting up phone numbers for all of their human resources departments, and requesting a list of jobs and application forms. Social networking sites such as LinkedIn have changed how people find work as well.
2. The growth of the temporary worker industry has probably helped to reduce the natural rate of unemployment. In the early 1980s, only about 0.5% of all workers held jobs through temp agencies. By the early 2000s, the figure had risen above 2%. Temp agencies can provide jobs for workers while they are looking for permanent work. They can also serve as a clearinghouse, helping workers find out about jobs with certain employers and getting a tryout with the employer. For many workers, a temp job is a stepping-stone to a permanent job that they might not have heard about or obtained any other way, so the growth of temp jobs will also tend to reduce frictional unemployment.
3. The aging of the "baby boom generation"—the especially large generation of Americans born between 1946 and 1964—meant that the proportion of young workers in the economy was relatively high in the 1970s, as the boomers entered the labour market, but is relatively low today. As we noted earlier, middle-aged and older workers are far more likely to experience low unemployment than younger workers, a factor that tends to reduce the natural rate of unemployment as the baby boomers age.

The combined result of these factors is that the natural rate of unemployment was on average lower in the 1990s and the early 2000s than in the 1980s. The 2008–2009 Great Recession pushed monthly unemployment rates up to 10% in late 2009. However, even at that time, the Congressional Budget Office was forecasting that by 2015, unemployment rates would fall back to about 5%. During the last four months of 2015 the unemployment rate held steady at 5.0%. Throughout 2016 and up through January 2017, the unemployment rate has remained at or slightly below 5%. As of the first quarter of 2017, the Congressional

Budget Office estimates the natural rate to be 4.74%, and the measured unemployment rate for January 2017 is 4.8%.

The Natural Rate of Unemployment in Europe

By the standards of other high-income economies, the natural rate of unemployment in the U.S. economy appears relatively low. Through good economic years and bad, many European economies have had unemployment rates hovering near 10%, or even higher, since the 1970s. European rates of unemployment have been higher not because recessions in Europe have been deeper, but rather because the conditions underlying supply and demand for labour have been different in Europe, in a way that has created a much higher natural rate of unemployment.

Many European countries have a combination of generous welfare and unemployment benefits, together with nests of rules that impose additional costs on businesses when they hire. In addition, many countries have laws that require firms to give workers months of notice before laying them off and to provide substantial severance or retraining packages after laying them off. The legally required notice before laying off a worker can be more than three months in Spain, Germany, Denmark, and Belgium, and the legally required severance package can be as high as a year's salary or more in Austria, Spain, Portugal, Italy, and Greece. Such laws will surely discourage laying off or firing current workers. However, when companies know that it will be difficult to fire or lay off workers, they also become hesitant about hiring in the first place.

We can attribute the typically higher levels of unemployment in many European countries in recent years, which have prevailed even when economies are growing at a solid pace, to the fact that the sorts of laws and regulations that lead to a high natural rate of unemployment are much more prevalent in Europe than in the United States.

A Preview of Policies to Fight Unemployment

The remedy for unemployment will depend on the diagnosis. Cyclical unemployment is a short-term problem, caused because the economy is in a recession. Thus, the preferred solution will be to avoid or minimize recessions. Governments can enact this policy by stimulating the overall buying power in the economy, so that firms perceive that sales and profits are possible, which makes them eager to hire.

Dealing with the natural rate of unemployment is trickier. In a market-oriented economy, firms will hire and fire workers. Governments cannot control this. Furthermore, the evolving age structure of the economy's population, or unexpected shifts in productivity are beyond a government's control and, will affect the natural rate of unemployment for a time. However, as the example of high ongoing unemployment rates for

many European countries illustrates, government policy clearly can affect the natural rate of unemployment that will persist even when GDP is growing.

When a government enacts policies that will affect workers or employers, it must examine how these policies will affect the information and incentives employees and employers have to find one another. For example, the government may have a role to play in helping some of the unemployed with job searches. Governments may need to rethink the design of their programs that offer assistance to unemployed workers and protections to employed workers so that they will not unduly discourage the supply of labour. Similarly, governments may need to reassess rules that make it difficult for businesses to begin or to expand so that they will not unduly discourage the demand for labour. The message is not that governments should repeal all laws affecting labour markets, but only that when they enact such laws, a society that cares about unemployment will need to consider the tradeoffs involved.

Bring It Home

Unemployment and the Great Recession

In the review of unemployment during and after the Great Recession at the outset of this chapter, we noted that unemployment tends to be a lagging indicator of business activity. This has historically been the case, and it is evident for all recessions that have taken place since the end of World War II. In brief, this results from the costs to employers of recruitment, hiring, and training workers. Those costs represent investments by firms in their work forces.

At the outset of a recession, when a firm realizes that demand for its product or service is not as strong as anticipated, it has an incentive to lay off workers. However, doing so runs the risk of losing those workers, and if the weak demand proves to be only temporary, the firm will be obliged to recruit, hire, and train new workers. Thus, firms tend to retain workers initially in a downturn. Similarly, as business begins to pick up when a recession is over, firms are not sure if the improvement will last. Rather than incur the costs of hiring and training new workers, they will wait, and perhaps resort to overtime work for existing workers, until they are confident that the recession is over.

Another point that we noted at the outset is that the duration of recoveries in employment following recessions has been longer following the last three recessions (going back to the early 1990s) than previously. Nir Jaimovich and Henry Siu have argued that these “jobless recoveries” are a consequence of job polarization – the disappearance of employment opportunities focused on “routine” tasks. Job polarization refers to the increasing concentration of employment in the highest- and lowest-wage occupations, as jobs in middle-skill occupations disappear. Job polarization is an outcome of technological progress in robotics, computing, and information and communication technology. The

result of this progress is a decline in demand for labour in occupations that perform "routine" tasks – tasks that are limited in scope and can be performed by following a well-defined set of procedures – and hence a decline in the share of total employment that is composed of routine occupations. Jaimovich and Siu have shown that job polarization characterizes the aftermath of the last three recessions, and this appears to be responsible for the jobless recoveries.

Key Concepts and Summary

The natural rate of unemployment is the rate of unemployment that the economic, social, and political forces in the economy would cause even when the economy is not in a recession. These factors include the frictional unemployment that occurs when people either choose to change jobs or are put out of work for a time by the shifts of a dynamic and changing economy. They also include any laws concerning conditions of hiring and firing that have the undesired side effect of discouraging job formation. They also include structural unemployment, which occurs when demand shifts permanently away from a certain type of job skill.

Attribution

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Access for free at https://openstax.org/books/principles-economics-2e/pages/1-introduction

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8.6 - UNEMPLOYMENT

Learning Objectives

- Explain how unemployment is measured in Canada.
- Define three different types of unemployment.
- Define and illustrate graphically what is meant by the natural level of employment. Relate the natural level of employment to the natural rate of unemployment.

For an economy to produce all it can and achieve a solution on its production possibilities curve, the factors of production in the economy must be fully employed. Failure to fully employ these factors leads to a solution inside the production possibilities curve in which society is not achieving the output it is capable of producing.

In thinking about the employment of society's factors of production, we place special emphasis on labour. The loss of a job can wipe out a household's entire income; it is a more compelling human problem than, say, unemployed capital, such as a vacant apartment. In measuring unemployment, we thus focus on labour rather than on capital and natural resources.

Measuring Unemployment

Statistics Canada defines a person as unemployed if he or she is not working but is looking for and available for work. The labour force is the total number of people working or unemployed. The **unemployment rate** is the percentage of the labour force that is unemployed.

To estimate the unemployment rate, government uses the information they collect in surveys of various Canadian households. At each of these randomly selected households, the surveyor asks about the employment status of each adult (everyone age 15 or over) who lives there. Many households include more

than one adult; the survey gathers information on about roughly 100,000 adults. The surveyor asks if each adult is working. If the answer is yes, the person is counted as employed. If the answer is no, the surveyor asks if that person has looked for work at some time during the previous four weeks and is available for work at the time of the survey. If the answer to that question is yes, the person is counted as unemployed. If the answer is no, that person is not counted as a member of the labour force. Figure 8.6a "Computing the Unemployment Rate" shows the survey's results for the civilian (nonmilitary) population for November 2010. The unemployment rate is then computed as the number of people unemployed divided by the labour force—the sum of the number of people not working but available and looking for work plus the number of people working.

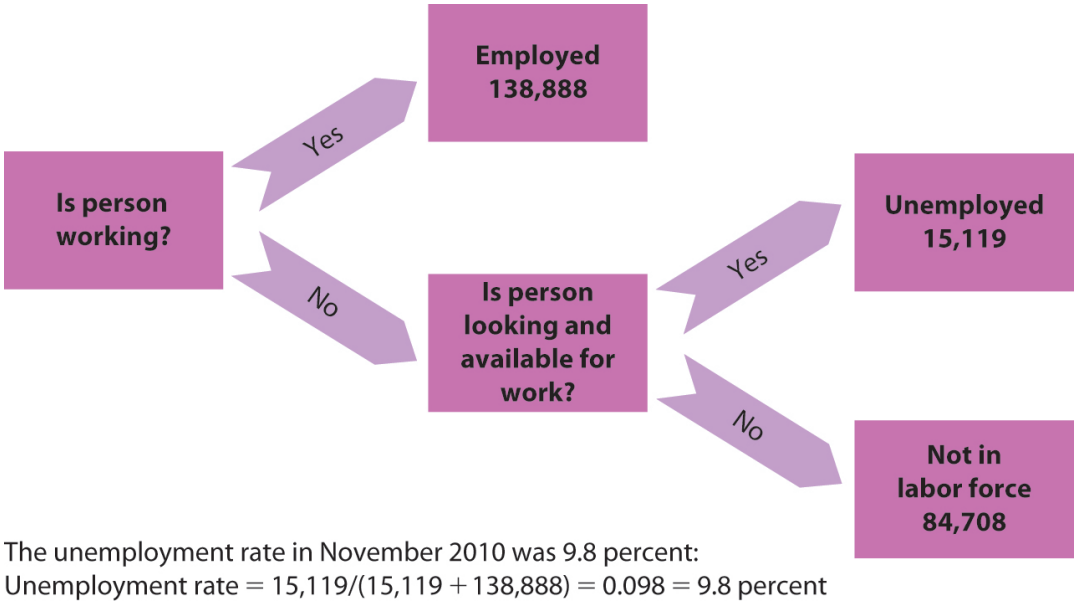

Figure 8.6a Computing the Unemployment Rate. Computing the Unemployment Rate by University of Minnesota, licensed under CC BY-SA.

Figure 8.6a Computing the Unemployment Rate

Illustrates the survey results for the civilian (nonmilitary) population for November 2010.

Starting with the question – Is the person working? If yes, Employed: 138, 888.

If no, then is the person looking and available for work? If yes, then Unemployed: 15, 119. If no, then Not in the labour force: 84,708.

The unemployment rate in November 10 2012 was 9.8 percent: Unemployment rate = 15, 119/(15,119 + 138, 888) = 0.0098 = 9.8 percent

A monthly survey of households divides the civilian adult population into three groups. Those who have jobs

are counted as employed; those who do not have jobs but are looking for them and are available for work are counted as unemployed; and those who are not working and are not looking for work are not counted as members of the labour force. The unemployment rate equals the number of people looking for work divided by the sum of the number of people looking for work and the number of people employed.

The problem of understating unemployment among women has been fixed, but others remain. A worker who has been cut back to part-time work still counts as employed, even if that worker would prefer to work full time. A person who is out of work, would like to work, has looked for work in the past year, and is available for work, but who has given up looking, is considered a discouraged worker. **Discouraged workers** are not counted as unemployed, but a tally is kept each month of the number of discouraged workers.

The official measures of employment and unemployment can yield unexpected results. For example, when firms expand output, they may be reluctant to hire additional workers until they can be sure the demand for increased output will be sustained. They may respond first by extending the hours of employees previously reduced to part-time work or by asking full-time personnel to work overtime. None of that will increase employment, because people are simply counted as "employed" if they are working, regardless of how much or how little they are working. In addition, an economic expansion may make discouraged workers more optimistic about job prospects, and they may resume their job searches. Engaging in a search makes them unemployed again—and increases unemployment. Thus, an economic expansion may have little effect initially on employment and may even increase unemployment.

Types of Unemployment

Workers may find themselves unemployed for different reasons. Each source of unemployment has quite different implications, not only for the workers it affects but also for public policy.

Figure 8.6b "The Natural Level of Employment" applies the demand and supply model to the labour market. The price of labour is taken as the real wage, which is the nominal wage divided by the price level; the symbol used to represent the real wage is the Greek letter omega, ω. The supply curve is drawn as upward sloping, though steep, to reflect studies showing that the quantity of labour supplied at any one time is nearly fixed. Thus, an increase in the real wage induces a relatively small increase in the quantity of labour supplied. The demand curve shows the quantity of labour demanded at each real wage. The lower the real wage, the greater the quantity of labour firms will demand. In the case shown here, the real wage, ω_e, equals the equilibrium solution defined by the intersection of the demand curve D_1 and the supply curve S_1. The quantity of labour demanded, L_e, equals the quantity supplied. The employment level at which the quantity of labour demanded equals the quantity supplied is called the natural level of employment. It is sometimes referred to as full employment.

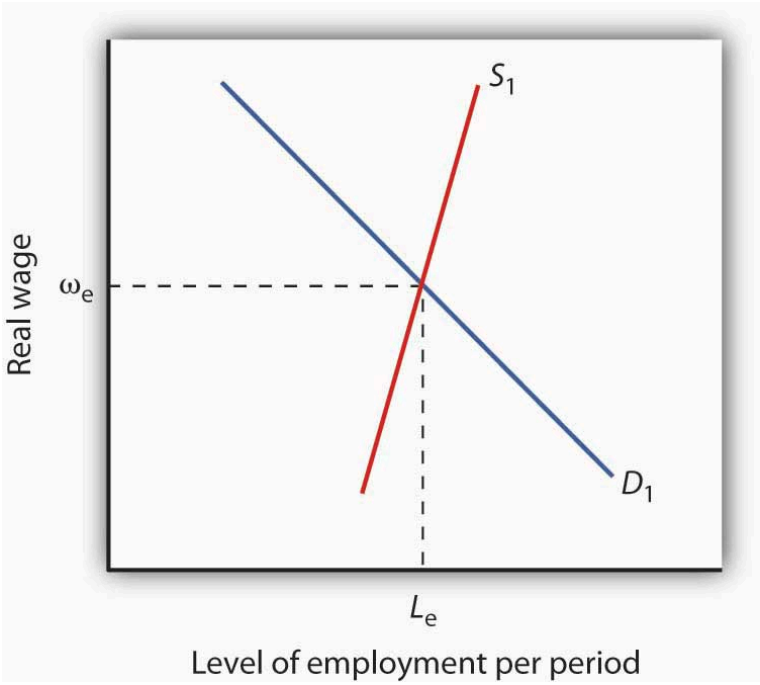

Figure 8.6b The Natural Level of Employment. The employment level at which the quantity of labour demanded equals the quantity supplied is called the natural level of employment. Here, the natural level of employment is L_e, which is achieved at a real wage ω_e. The Natural Level of Employment by University of Minnesota, licensed under CC BY-SA.

Figure 8.6b The Natural Level of Employment (Text Version)

The employment level at which the quantity of labour demanded equals the quantity supplied is called the natural level of employment. The vertical axis is Real wage (W) and horizontal axis is level of employment per period (L). The supply curve (S_1) slopes upward from left to right and the demand curve (D_1) slopes downward from left to right; S_1 and D_1 intersect at W_e and L_e. The natural level of employment is L_e, which is achieved at a real wage ωe.

Even if the economy is operating at its natural level of employment, there will still be some unemployment. The rate of unemployment consistent with the natural level of employment is called the natural rate of unemployment. Business cycles may generate additional unemployment. We discuss these various sources of unemployment below.

Frictional Unemployment

Even when the quantity of labour demanded equals the quantity of labour supplied, not all employers and

potential workers have found each other. Some workers are looking for jobs, and some employers are looking for workers. During the time it takes to match them up, the workers are unemployed. Unemployment that occurs because it takes time for employers and workers to find each other is called **frictional unemployment**.

The case of college graduates engaged in job searches is a good example of frictional unemployment. Those who did not land a job while still in school will seek work. Most of them will find jobs, but it will take time. During that time, these new graduates will be unemployed. If information about the labour market were costless, firms and potential workers would instantly know everything they needed to know about each other and there would be no need for searches on the part of workers and firms. There would be no frictional unemployment. But information is costly. Job searches are needed to produce this information, and frictional unemployment exists while the searches continue.

Structural Unemployment

Another reason there can be unemployment even if employment equals its natural level stems from potential mismatches between the skills employers seek and the skills potential workers offer. Every worker is different; every job has its special characteristics and requirements. The qualifications of job seekers may not match those that firms require. Even if the number of employees firms demand equals the number of workers available, people whose qualifications do not satisfy what firms are seeking will find themselves without work. Unemployment that results from a mismatch between worker qualifications and the characteristics employers require is called structural unemployment.

Structural unemployment emerges for several reasons. Technological change may make some skills obsolete or require new ones. The widespread introduction of personal computers since the 1980s, for example, has lowered demand for typists who lacked computer skills.

Structural unemployment can occur if too many or too few workers seek training or education that matches job requirements. Students cannot predict precisely how many jobs there will be in a particular category when they graduate, and they are not likely to know how many of their fellow students are training for these jobs. Structural unemployment can easily occur if students guess wrong about how many workers will be needed or how many will be supplied.

Structural unemployment can also result from geographical mismatches. Economic activity may be booming in one region and slumping in another. It will take time for unemployed workers to relocate and find new jobs. And poor or costly transportation may block some urban residents from obtaining jobs only a few miles away.

Public policy responses to structural unemployment generally focus on job training and education to equip

workers with the skills firms demand. The government publishes regional labour-market information, helping to inform unemployed workers of where jobs can be found. The North American Free Trade Agreement (NAFTA) which is now called USMCA, created a free trade region encompassing Mexico, the United States, and Canada, has created some structural unemployment in the three countries.

Although government programs may reduce frictional and structural unemployment, they cannot eliminate it. Information in the labour market will always have a cost, and that cost creates frictional unemployment. An economy with changing demands for goods and services, changing technology, and changing production costs will always have some sectors expanding and others contracting—structural unemployment is inevitable. An economy at its natural level of employment will therefore have frictional and structural unemployment.

Cyclical Unemployment

Of course, the economy may not be operating at its natural level of employment, so unemployment may be above or below its natural level. In a later chapter we will explore what happens when the economy generates employment greater or less than the natural level. Cyclical unemployment is unemployment in excess of the unemployment that exists at the natural level of employment.

Figure 8.6c "Unemployment Rate, 1960–2010" shows the unemployment rate in the United States for the period from 1960 through November 2010. We see that it has fluctuated considerably. How much of it corresponds to the natural rate of unemployment varies over time with changing circumstances. For example, in a country with a demographic "bulge" of new entrants into the labour force, frictional unemployment is likely to be high, because it takes the new entrants some time to find their first jobs. This factor alone would raise the natural rate of unemployment. A demographic shift toward more mature workers would lower the natural rate. During recessions, highlighted in Figure 8.6c "Unemployment Rate, 1960–2010", the part of unemployment that is cyclical unemployment grows. The analysis of fluctuations in the unemployment rate, and the government's responses to them, will occupy center stage in much of the remainder of this book.

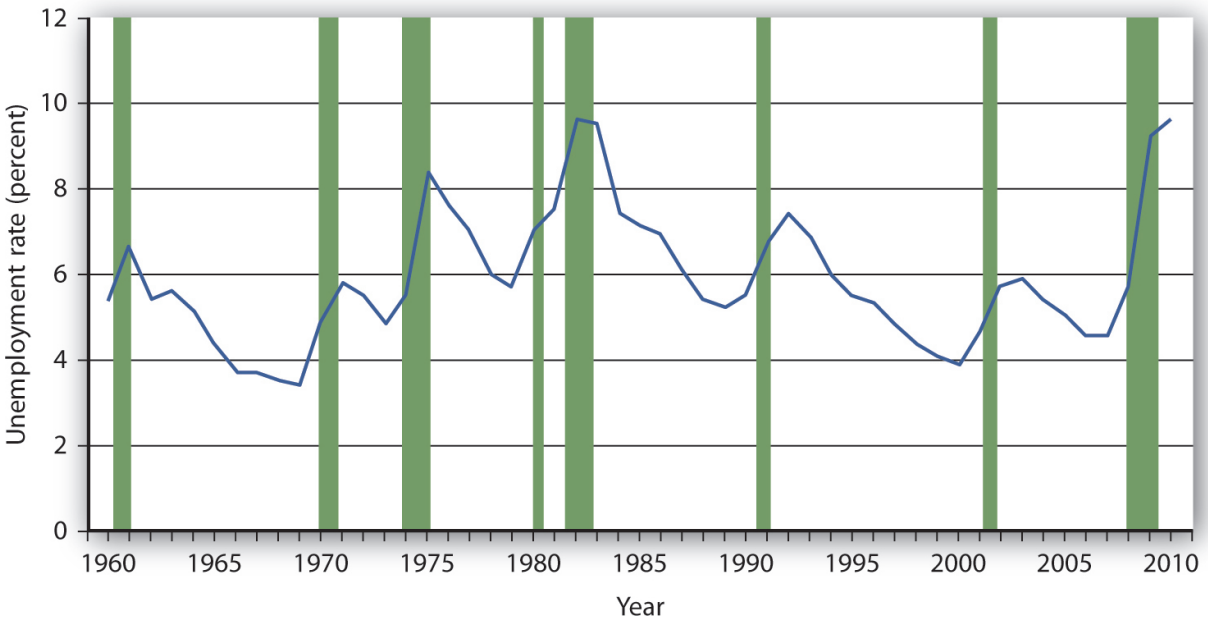

Figure 8.6c Unemployment Rate in the US, 1960–2010. Unemployment Rate, 1960–2010 by University of Minnesota, licensed under CC BY-SA. **Data Source**: U.S. Bureau of Labor Statistics. (2010, February). Table B-42: Civilian unemployment rate, 1962-2009 [Economic Report of the President]. https://www.govinfo.gov/content/pkg/ERP-2010/pdf/ERP-2010-table42.pdf

Unemployment Rates in Canada

To learn more about unemployment rates in Canada visit Trading Economics Canada's Unemployment Rate [New Tab] (https://tradingeconomics.com/canada/unemployment-rate) webpage.

Learn more about joblessness in Canada due to Covid19 by reading the CBC News article Canada lost nearly 2 million jobs in April amid COVID-19 crisis: Statistics Canada [New Tab] (https://www.cbc.ca/news/business/canada-jobs-april-1.5561001).

KEY TAKEAWAYS

- People who are not working but are looking and available for work at any one time are considered unemployed. The unemployment rate is the percentage of the labour force that is unemployed.
- When the labour market is in equilibrium, employment is at the natural level and the unemployment rate equals the natural rate of unemployment.
- Even if employment is at the natural level, the economy will experience frictional and structural unemployment. Cyclical unemployment is unemployment in excess of that associated with the natural level of employment.

Try It!

Given the data in the table, compute the unemployment rate in Year 1 and in Year 2. Explain why, in this example, both the number of people employed and the unemployment rate increased.

Table 8.6a Unemployment Rate in Year 1 and 2

Year	Number employed (in millions)	Number unemployed (in millions)
1	20	2
2	21	2.4

Check your answer[1]

Attribution

Except where otherwise noted, this chapter was adapted from "Unemployment (https://pressbooks.senecacollege.ca/macroeconomics/chapter/20-3-unemployment/)" In *BUS 400 Business Economics* (https://pressbooks.senecacollege.ca/macroeconomics) by Sandra Wellman, licensed under CC BY-NC-SA. / A derivative of "Unemployment" In *Principles of Economics* (https://open.lib.umn.edu/principleseconomics/chapter/20-3-unemployment/) by University of Minnesota, licensed under CC BY-NC-SA./ Adaptations include removal of case in point section.

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1. In Year 1 the total labour force includes 22 million workers, and so the unemployment rate is [latex]{\scriptsize\ 2 \div 22 = 9.1\%}[/latex].In Year 2 the total labour force numbers 23.4 million workers; therefore the unemployment rate is [latex]{\scriptsize \; 2.4\div 23.4 = 10.3\%}[/latex].In this example, both the number of people employed and the unemployment rate rose, because more people ([latex]{\scriptsize \; 23.4 – 22 = 1.4 \text{million}}[/latex]) entered the labour force, of whom 1 million found jobs and 0.4 million were still looking for jobs.

8.7 - MEASURING UNEMPLOYMENT

Learning Objectives

- Classify the six measures of unemployment calculated by the Bureau of Labor Statistics (BLS)
- Describe the rates in the U.S. of those who are employed, unemployed, and not in the labour force
- Distinguish between short-term and long-term unemployment and the impact on people and economy

Measuring the Unemployment Rate

The **labour force** is the actual number of people available for work; economists use the labour force participation rate to determine the unemployment rate.

Unemployment Rate

Unemployment occurs when people are without work *and* are actively seeking employment. In an economy, the labour force is the actual number of people available for work. Economists use the **labour force participation rate** to determine the unemployment rate.

Unemployment can be broken down into three types of unemployment:

- Cyclical unemployment: occurs when there is not enough aggregate demand in the economy to provide jobs for everyone who wants to work.
- Structural unemployment: occurs when the labour market is unable to provide jobs for everyone who wants to work. There is a mismatch between the skills of the unemployed workers and the skills necessary for the jobs available.

- Frictional unemployment: the time period between jobs when a worker is looking for a job or transitioning from one job to another.

Measuring Unemployment

The U.S. Bureau of Labor Statistics measures employment and unemployment for individuals over the age of 16. The unemployment rate is measured using two different labour force surveys.

- The Current Population Survey (CPS): also known as the "household survey" the CPS is conducted based on a sample of 60,000 households. The survey measures the unemployment rate based on the ILO definition.
- The Current Employment Statistics Survey (CES): also known as the "payroll survey" the CES is conducted based on a sample of 160,000 businesses and government agencies that represent 400,000 individual employees.

The unemployment rate is also calculated using weekly claims reports for unemployed insurance. The government provides this data. The unemployment rate is updated on a monthly basis.

Six Measures of Unemployment

The U.S. Bureau of Labor Statistics uses six measurements when calculating the unemployment rate. The measures range from U1 to U6 and were reported from 1950 through 2010. They calculate different aspects of unemployment. These measures are depicted in the Unemployment Rate figure below.

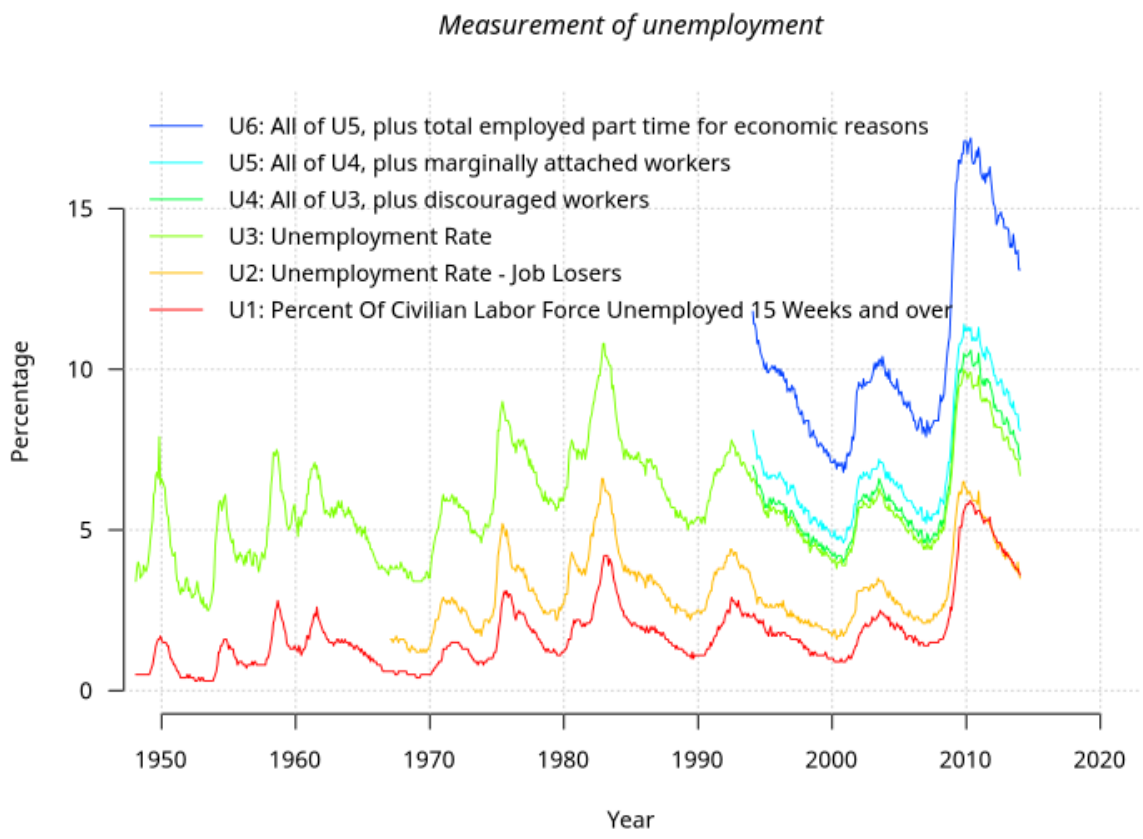

Figure 8.7a Unemployment Rate. The U.S. Bureau of Labor Statistics used the six employment measures to calculate the unemployment rate in the United States from 1950 to 2010. The vertical axis is percentage and the horizontal axis is years 1950 to 2010. US Unemployment measures (https://en.wikipedia.org/wiki/File:US_Unemployment_measures.svg) by Autopilot, licensed under CC BY-SA 3.0.

Figure 8.7a Unemployment Rate figure depicts these six employment measures ranging from lowest to highest:

- U1: the percentage of labour force unemployed for 15 weeks or longer. Signified by the lowest red line.
- U2: the percentage of labour force who lost jobs or completed temporary work. Signified by the next line (orange line).
- U3: the official unemployment rate that occurs when people are without jobs and they have actively looked for work within the past four weeks. Signified by the next highest line (neon green line).
- U4: the individuals described in U3 plus "discouraged workers," those who have stopped looking for work because current economic conditions make them think that no work is available for them. Signified by the next highest line (green line).
- U5: the individuals described in U4 plus other "marginally attached workers," "loosely attached workers," or those who "would like" and are able to work, but have not looked for work recently.

Signified by the next highest line (light blue line).

- U6: the individuals described in U5 plus part-time workers who want to work full-time, but cannot due to economic reasons, primarily underemployment. The highest line (dark blue).

Shortcomings of the Measurement

Unemployment is not an absolute calculation and it is prone to errors and biases related to data assembly and inconsistencies in reporting.

Unemployment

Unemployment, also called joblessness, occurs when people are without work and are actively seeking employment. Unemployment is measured in order to determine the unemployment rate. The rate is a percentage that is calculated by dividing the number of unemployed individuals by the number of individuals currently employed in the labour force.

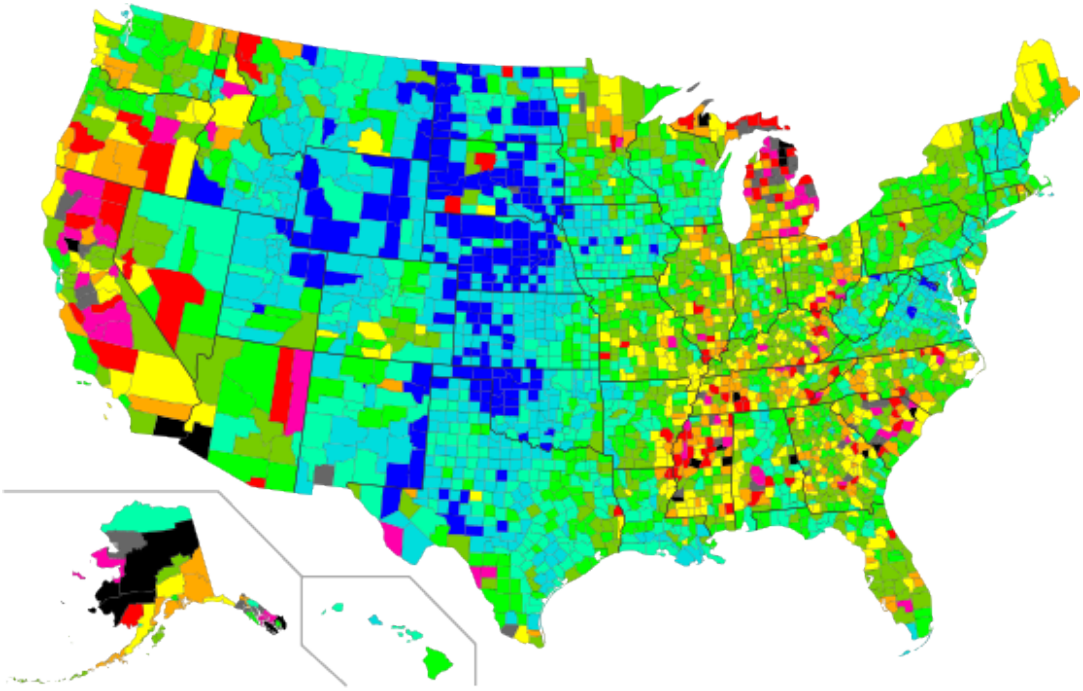

Figure 8.7b U.S. Unemployment Rate. Shows the unemployment rates by county throughout the United States in 2008. The unemployment rate is the percentage of unemployment calculated by dividing the number of unemployed individuals by the number of individuals currently employed in the labour force. USA 2008 unemployment by county (https://commons.wikimedia.org/wiki/File:USA_2008_unemployment_by_county.svg) by Mike Serfas, licensed under CC BY-SA, a derivative of USA counties FIPS text addressable, licensed under CC BY-SA.

Measurements

In order to find the rate of unemployment, four methods are used:

- **Labour Force Sample Surveys:** provide the most comprehensive results. Calculates unemployment by different categories such as race and gender. This method is the most internationally comparable.
- **Official Estimates:** combines information from the three other methods. The method is not the preferred method to use when calculating the rate of unemployment.
- **Social Insurance Statistics:** these statistics are calculated based on the number of individuals receiving unemployment benefits. The method is criticized because unemployment benefits can expire before an individual finds employment which makes the calculations inaccurate.
- **Employment Office Statistics:** only include a monthly total of unemployed individuals who enter unemployment offices. This method is the least effective for measuring unemployment.

Measurement Shortcomings

The measurement of unemployment is not an absolute calculation and is prone to errors. For example, the unemployment rate does not take into account individuals who are not actively seeking employment, such as individuals attending college or even individuals who are in U.S. prisons. Individuals who are self-employed, those who were forced to take early retirement, those with disability pensions who would like to work, and those who work part-time and seek full-time employment are not factored in to the unemployment rate. Some individuals also choose not to enter the labour force and these statistics are also not considered. By not including all **underemployed** or unemployed individuals in the measurement of the unemployment rate, the calculation does not provide an accurate assessment of how unemployment truly impacts society. Errors and biases are also present due to data assembly and reporting inconsistencies.

Typical Lengths of Unemployment

Short-term unemployment is any period of joblessness that lasts fewer than 27 weeks. Long-term unemployment lasts 27 or more weeks.

Unemployment

Unemployment, also referred to as joblessness, occurs when people are without work and actively seeking employment. Generally, unemployment is high during recessions. Individuals struggle to find work when there are more job-seekers than vacant positions.

There are three types of unemployment:

- **Cyclical:** occurs when there is not enough aggregate demand in the economy to provide jobs for everyone who wants to work. The demand for most goods and services declines, less production is needed, and fewer workers are needed. Wages are sticky and do not fall to meet the equilibrium level which results in mass unemployment.
- **Structural:** occurs when the labour market is not able to provide jobs for everyone who wants to work. There is a mismatch between the skills of the workers and the skills needed for the jobs that are available. Structural unemployment is similar to frictional unemployment, but it lasts longer.
- **Frictional:** when a worker is searching for a job or transitioning from one job to another. Frictional unemployment is always present in an economy.

Lengths of Unemployment

Short-term unemployment is considered any unemployment period that lasts less than 27 weeks. The unemployment period is temporary and often includes the time needed to switch from one job to another. Also, if an individual is searching for employment the search period is relatively short.

Long-term unemployment is classified as unemployment that lasts for 27 weeks or longer. Being unemployed for a long period of time can have substantial impacts on individuals. Jobs skills, certifications, and qualifications lessen over time. When the job market finally increases many individuals will no longer match the requirements for the new positions. Long-term unemployment can also result in older workers taking early retirement.

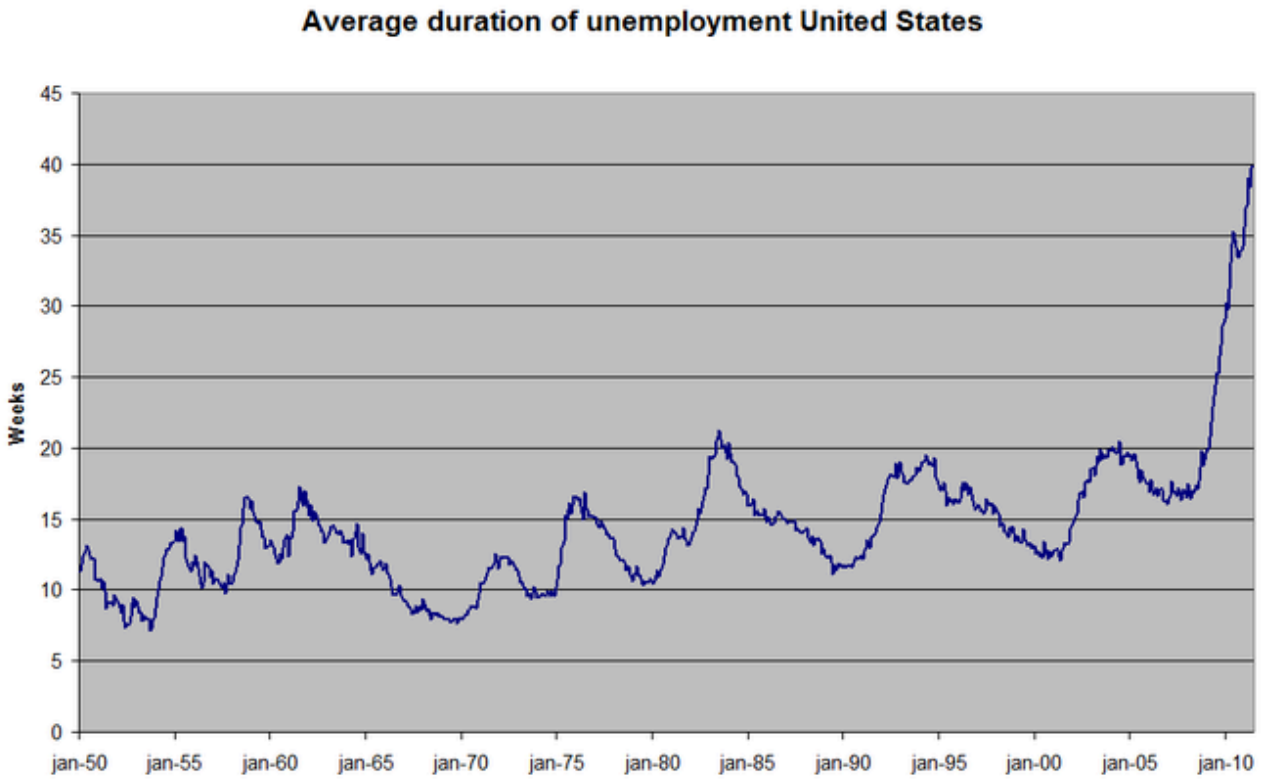

Figure 8.7c Average Length of Unemployment in the US. Shows the average length of unemployment in the United States from 1950-2010. The U.S. Bureau of Labor Statistics used the six employment measures to calculate the unemployment rate in the United States from 1950 to 2010. The vertical axis is percentage and the horizontal axis is years 1950 to 2010. US average duration of unemployment (https://en.wikipedia.org/wiki/File:US_average_duration_of_unemployment.png) by MartinD, licensed under CC BY-SA.

Social and Individual Impacts

Unemployment can have lasting impacts of individual people as well as the economy as a whole.

- **Social:** Within the economy, long-term unemployment increases the inequality present in the economy and impedes long-run economic growth. Unemployment wastes resources and generates redistributive pressures and distortions within the economy. When unemployment is high, the economy is not using all of the available resources, specifically labour. Unemployment can also reduce the efficiency of the economy because unemployed workers are willing to accept employment that is below their skill level.
- **Individual:** For individual people, unemployment increases **poverty**, creates poor labour mobility, and impacts self-esteem. When individuals are unemployed they are unable to meet their financial obligations. It is not uncommon for social unrest and conflict that get worse during times of mass unemployment.

Key Takeaways

- Unemployment occurs when people are without work and are actively seeking employment.
- There are three types of unemployment: cyclical, structural, and frictional.
- The CPS and CES are two surveys that the U.S. Bureau of Labor Statistics uses to determine the unemployment rate for households, businesses, and government agencies.
- The U.S. Bureau of Labor Statistics uses six measurements when calculating the unemployment rate. The measures range from U1 – U6 and were reported from 1950 through 2010. They calculate different aspects of unemployment.
- The rate of unemployment is a percentage that is calculated by dividing the number of unemployed individuals by the number of individuals currently employed in the work force.
- The rate of unemployment is calculated using four methods: the Labor Force Sample Surveys, Official Estimates, Social Insurance Statistics, and Employment Office Statistics.
- The measurement of unemployment does have some shortcomings based on who is and is not measured.
- By not including all under-employed or unemployed individuals in the measurement of the unemployment rate, the calculation does not provide an accurate assessment of how unemployment truly impacts society.
- Unemployment occurs when people are without work and are actively seeking employment.
- Unemployment impacts the economy and society by increasing inequality, impeding long-term economic growth, wasting resources, and reducing economic efficiency.
- Unemployment impacts individuals because they are not able to meet their financial obligations which can lead to poverty, poor labour mobility, and low self-esteem. Unemployment is also know to cause civil unrest and conflict.

Additional Key Terms

- **unemployment:** The state of being jobless and looking for work.
- **labour force:** The collective group of people who are available for employment, i.e. including both the employed and the unemployed.
- **poverty:** The quality or state of being poor or indigent; want or scarcity of means of subsistence; indigence; need.

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8.8 - SELF-CHECK, CRITICAL THINKING & REVIEW QUESTIONS

Self-Check Questions

1. Suppose the adult population over the age of 16 is 237.8 million and the labour force is 153.9 million (of whom 139.1 million are employed). How many people are "not in the labour force?" What are the proportions of employed, unemployed and not in the labour force in the population? *Hint*: Proportions are percentages.
2. Using the above data, what is the unemployment rate? These data are U.S. statistics from 2010. How does it compare to the February 2015 unemployment rate computed earlier?
3. Over the long term, has the U.S. unemployment rate generally trended up, trended down, or remained at basically the same level?

    1. Whites or non-Whites?
    2. The young or the middle-aged?
    3. College graduates or high school graduates?

4. Beginning in the 1970s and continuing for three decades, women entered the U.S. labour force in a big way. If we assume that wages are sticky in a downward direction, but that around 1970 the demand for labour equaled the supply of labour at the current wage rate, what do you imagine happened to the wage rate, employment, and unemployment as a result of increased labour force participation?
5. Is the increase in labour force participation rates among women better thought of as causing an increase in cyclical unemployment or an increase in the natural rate of unemployment? Why?
6. Many college students graduate from college before they have found a job. When graduates begin to look for a job, they are counted as what category of unemployed?

Check your answers

1. The population is divided into those "in the labour force" and those "not in the labour force." Thus, the number of adults not in the labour force is$237.8 - 153.9 = 83.9 \text{ million}$.. Since the labour force is divided into employed persons and unemployed persons, the number of unemployed persons is $153.9 - 139.1 = 14.8 \text{ million}$. Thus, the adult population has the following proportions:
    - $139.1 \div 237.8 = 58.5\% \text{ employed persons}$
    - $14.8 \div 237.8 = 6.2\% \text{ unemployed persons}$
    - $83.9 \div 237.8 = 35.3\% \text{ persons out of the labour force}$
2. The unemployment rate is defined as the number of unemployed persons as a percentage of the labour force or $14.8 \div 153.9 = 9.6\%$. This is higher than the February 2015 unemployment rate, computed earlier, of 5.5%.
3. Over the long term, the U.S. unemployment rate has remained basically the same level.
    1. Non-Whites
    2. The young
    3. High school graduates
4. Because of the influx of women into the labour market, the supply of labour shifts to the right. Since wages are sticky downward, the increased supply of labour causes an increase in people looking for jobs (Qs), but no change in the number of jobs available (Qe). As a result, unemployment increases by the amount of the increase in the labour supply. This can be seen in the following figure. Over time, as labour demand grows, the unemployment will decline and eventually wages will begin to increase again. But this increase in labour demand goes beyond the scope of this problem.

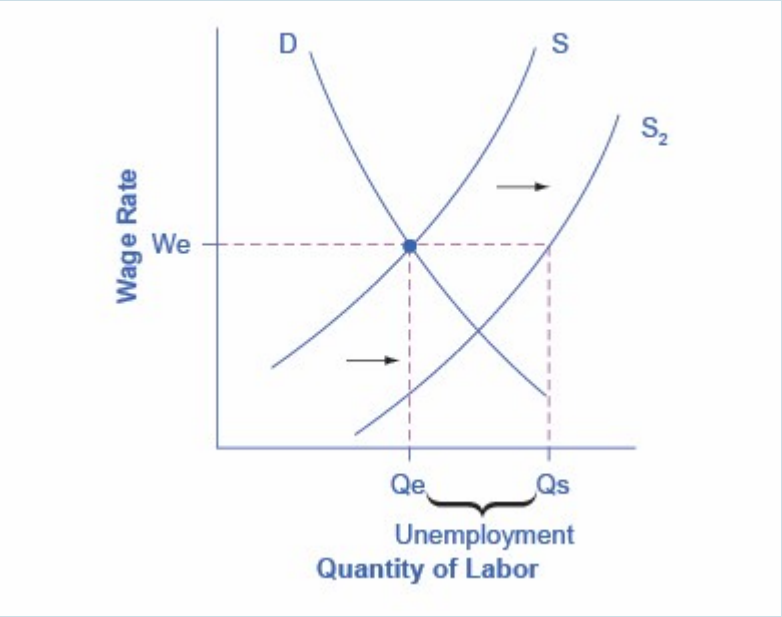

Figure 8.8a Figure by Steven A. Greenlaw & David Shapiro (OpenStax), licensed under CC BY 4.0.

Figure 8.8a (Text Version)

The vertical axis is Wage Rate and the horizontal axis is Quantity of Labour. The demand curve (D) slopes downward from left to right. The original supply curve (S) slopes upward from left to right. S and D intersects at We and Qe.

Because of the influx of women into the labour market, the original supply curve (S) shifts to the right and down to S2.

Since wages are sticky downward, the increased supply of labour causes an increase in people looking for jobs (Qs), which occurs at the same wage rate (We); however, there is no change in the number of jobs available (Qe).

As a result, unemployment increases by the amount of the increase in the labour supply. Unemployment is shown by the distance between Qe and Qs.

5. The increase in labour supply was a social demographic trend—it was not caused by the economy falling into a recession. Therefore, the influx of women into the work force increased the natural rate of unemployment.
6. New entrants to the labour force, whether from college or otherwise, are counted as frictionally unemployed until they find a job.

Critical Thinking Questions

1. Using the definition of the unemployment rate, is an increase in the unemployment rate necessarily a bad thing for a nation?
2. Is a decrease in the unemployment rate necessarily a good thing for a nation? Explain.
3. If many workers become discouraged from looking for jobs, explain how the number of jobs could decline but the unemployment rate could fall at the same time.
4. Would you expect hidden unemployment to be higher, lower, or about the same when the unemployment rate is high, say 10%, versus low, say 4%? Explain.
5. Is the higher unemployment rates for minority workers necessarily an indication of discrimination? What could be some other reasons for the higher unemployment rate?
6. While unemployment is highly negatively correlated with the level of economic activity, in the real world it responds with a lag. In other words, firms do not immediately lay off workers in response to a sales decline. They wait a while before responding. Similarly, firms do not immediately hire workers when sales pick up. What do you think accounts for the lag in response time?
7. Why do you think that unemployment rates are lower for individuals with more education?
8. Do you think it is rational for workers to prefer sticky wages to wage cuts, when the consequence of sticky wages is unemployment for some workers? Why or why not? How do the reasons for sticky wages explained in this section apply to your argument?
9. Under what condition would a decrease in unemployment be bad for the economy?
10. Under what condition would an increase in the unemployment rate be a positive sign?
11. As the baby boom generation retires, the ratio of retirees to workers will increase noticeably. How will this affect the Social Security program? How will this affect the standard of living of the average American?
12. Unemployment rates have been higher in many European countries in recent decades than in the United States. Is the main reason for this long-term difference in unemployment rates more likely to be cyclical unemployment or the natural rate of unemployment? Explain briefly.
13. Is it desirable to pursue a goal of zero unemployment? Why or why not?
14. Is it desirable to eliminate natural unemployment? Why or why not? *Hint*: Think about what our economy would look like today and what assumptions would have to be met to have a

zero rate of natural unemployment.

15. The U.S. unemployment rate increased from 4.6% in July 2001 to 5.9% by June 2002. Without studying the subject in any detail, would you expect that a change of this kind is more likely to be due to cyclical unemployment or a change in the natural rate of unemployment? Why?

Review Questions

1. What is the difference between being unemployed and being out of the labour force?
2. How do you calculate the unemployment rate? How do you calculate the labour force participation rate?
3. Are all adults who do not hold jobs counted as unemployed?
4. If you are out of school but working part time, are you considered employed or unemployed in U.S. labour statistics? If you are a full time student and working 12 hours a week at the college cafeteria are you considered employed or not in the labour force? If you are a senior citizen who is collecting social security and a pension and working as a greeter at Wal-Mart are you considered employed or not in the labour force?
5. What happens to the unemployment rate when unemployed workers are reclassified as discouraged workers?
6. What happens to the labour force participation rate when employed individuals are reclassified as unemployed? What happens when they are reclassified as discouraged workers?
7. What are some of the problems with using the unemployment rate as an accurate measure of overall joblessness?
8. What criteria do the BLS use to count someone as employed? As unemployed?
9. Assess whether the following would be counted as “unemployed” in the Current Employment Statistics survey.

    1. A husband willingly stays home with children while his wife works.
    2. A manufacturing worker whose factory just closed down.

   3. A college student doing an unpaid summer internship.
   4. A retiree.
   5. Someone who has been out of work for two years but keeps looking for a job.
   6. Someone who has been out of work for two months but isn't looking for a job.
   7. Someone who hates her present job and is actively looking for another one.
   8. Someone who decides to take a part time job because she could not find a full time position.

10. Are U.S. unemployment rates typically higher, lower, or about the same as unemployment rates in other high-income countries?
11. Are U.S. unemployment rates distributed evenly across the population?
12. When would you expect cyclical unemployment to be rising? Falling?
13. Why is there unemployment in a labour market with flexible wages?
14. Name and explain some of the reasons why wages are likely to be sticky, especially in downward adjustments.
15. What term describes the remaining level of unemployment that occurs even when the economy is healthy?
16. What forces create the natural rate of unemployment for an economy?
17. Would you expect the natural rate of unemployment to be roughly the same in different countries?
18. Would you expect the natural rate of unemployment to remain the same within one country over the long run of several decades?
19. What is frictional unemployment? Give examples of frictional unemployment.
20. What is structural unemployment? Give examples of structural unemployment.
21. After several years of economic growth, would you expect the unemployment in an economy to be mainly cyclical or mainly due to the natural rate of unemployment? Why?
22. What type of unemployment (cyclical, frictional, or structural) applies to each of the following:

    1. landscapers laid off in response to a drop in new housing construction during a recession.
    2. coal miners laid off due to EPA regulations that shut down coal fired power
    3. a financial analyst who quits his/her job in Chicago and is pursing similar work in Arizona
    4. printers laid off due to drop in demand for printed catalogues and flyers as firms go the

internet to promote an advertise their products.

5. factory workers in the U.S. laid off as the plants shut down and move to Mexico and Ireland.

Problems

1. A country with a population of eight million adults has five million employed, 500,000 unemployed, and the rest of the adult population is out of the labour force. What's the unemployment rate? What share of population is in the labour force? Sketch a pie chart that divides the adult population into these three groups.
2. A government passes a family-friendly law that no companies can have evening, nighttime, or weekend hours, so that everyone can be home with their families during these times. Analyze the effect of this law using a demand and supply diagram for the labour market: first assuming that wages are flexible, and then assuming that wages are sticky downward.
3. As the baby boomer generation retires, what should happen to wages and employment? Can you show this graphically?

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8.9 - READING LIST

1. Labour force characteristics by province, monthly, seasonally adjusted (statcan.gc.ca) [New Tab] (https://www150.statcan.gc.ca/t1/tbl1/en/tv.action?pid=1410028703)

Reading List compiled by Norm Smith.

CHAPTER 9: COMPENSATION AND INCOME DISTRIBUTION

9.1 - WHY IT MATTERS: INCOME DISTRIBUTION

Why analyze the distribution of income?

Figure 9.1a for rent sign (https://www.flickr.com/photos/sadsnaps/5064815865) by Steven Damron, licensed under CC BY 2.0.

In a market economy, labour markets work efficiently to match job seekers with employers needing their skills who, in turn, pay wages and salaries based on the value that workers bring to firms. Since not everyone has the same job skills, labour markets result in considerable **income inequality**.

In 2016, the median American household income was $59,039 (the median is the level where half of all families had more than that level and half had less). At the same time, the lowest quintile of American households (a quintile is one fifth or 20%) earned no more $24,002, while the highest quintile earned at least $121,019. While income inequality can motivate people to work harder and improve their skills, recent evidence suggests that if income inequality gets too extreme, it can adversely affect the functioning of the economy as a whole.

Labour markets do not take into account how much income a family needs for food, shelter, clothing, and health care. Market forces do not worry about what happens to families when a major local employer goes out of business. Market forces do not take time to contemplate whether those who are earning higher incomes should pay an even higher share of taxes.

According to the U.S. Census Bureau, in 2016 the federal government classified almost 41 million Americans as living with family incomes below the poverty line. Think about a family of three—perhaps a single mother with two children—attempting to pay for the basics of life on perhaps $17,916 per year. After paying for rent, healthcare, clothing, and transportation, such a family might have $6,000 to spend on food. Spread over 365 days, the food budget for the entire family would be about $17 per day. To put this in perspective, most cities have restaurants where $17 will buy you an appetizer for one.

This module begins by exploring how the U.S. government defines poverty, the balance between assisting the poor without discouraging work, and how federal antipoverty programs work. The module also discusses income inequality—how economists measure inequality, why inequality has changed in recent decades, the range of possible government policies to reduce inequality, and the danger of a tradeoff that too great a reduction in inequality may reduce incentives for producing output.

In this module, we will consider questions such as:

- What can be done to reduce the amount of poverty?
- How does the social safety net result in a poverty trap?
- Can we, and should we, reduce the amount of economic inequality?
- If so, what's the best way?

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9.2 - INTRODUCTION TO POVERTY AND ECONOMIC INEQUALITY

Occupy Wall Street

In September 2011, a group of protesters gathered in Zuccotti Park in New York City to decry what they perceived as increasing social and economic inequality in the United States. Calling their protest "Occupy Wall Street," they argued that the concentration of wealth among the richest 1% in the United States was both economically unsustainable and inequitable, and needed to be changed. The protest then spread to other major cities, and the Occupy movement was born.

Why were people so upset? How much wealth is concentrated among the top 1% in our society? How did they acquire so much wealth? These are very real, very important questions in the United States now, and this chapter on poverty and economic inequality will help us address the causes behind this sentiment.

The labour markets that determine the pay that workers receive do not take into account how much **income** a family needs for food, shelter, clothing, and health care. Market forces do not worry about what happens to families when a major local employer goes out of business. Market forces do not take time to contemplate whether those who are earning higher incomes should pay an even higher share of taxes.

However, labour markets do create considerable income inequalities. In 2014, the median American family income was $57,939 (the median is the level where half of all families had more than that level and half had less). According to the U.S. Census Bureau, the federal government classified almost nine million U.S. families as below the **poverty line** in that year. Think about a family of three—perhaps a single mother with two children—attempting to pay for the basics of life on perhaps $17,916 per year. After paying for rent, healthcare, clothing, and transportation, such a family might have $6,000 to spend on food. Spread over 365 days, the food budget for the entire family would be about $17 per day. To put this in perspective, most cities have restaurants where $17 will buy you an appetizer for one.

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Inequality (https://openstax.org/books/principles-economics-2e/pages/15-introduction-to-poverty-and-economic-inequality)" In *Principles of Economics 2e (https://openstax.org/books/principles-economics-2e/pages/1-introduction)* by Steven A. Greenlaw & David Shapiro, licensed under CC BY 4.0. Access for free at https://openstax.org/books/principles-economics-2e/pages/1-introduction / Adaptations include the removal of next chapter explanation and learning objectives.

9.3 - DRAWING THE POVERTY LINE

Learning Objectives

- Explain economic inequality and how the poverty line is determined
- Analyze the U.S. poverty rate over time, noting its prevalence among different groups of citizens

Comparisons of high and low incomes raise two different issues: economic inequality and poverty. Poverty is measured by the number of people who fall below a certain level of income—called the poverty line that defines the income one needs for a basic standard of living. Income inequality compares the share of the total income (or wealth) in society that different groups receive. For example, compare the share of income that the top 10% receive to the share of income that the bottom 10% receive.

In the United States, the official definition of the poverty line traces back to a single person: Mollie Orshansky. In 1963, Orshansky, who was working for the Social Security Administration, published an article called "Children of the Poor" in a highly useful and dry-as-dust publication called the *Social Security Bulletin*. Orshansky's idea was to define a poverty line based on the cost of a healthy diet.

Her previous job had been at the U.S. Department of Agriculture, where she had worked in an agency called the Bureau of Home Economics and Human Nutrition. One task of this bureau had been to calculate how much it would cost to feed a nutritionally adequate diet to a family. Orshansky found that the average family spent one-third of its income on food. She then proposed that the poverty line be the amount one requires to buy a nutritionally adequate diet, given the size of the family, multiplied by three.

The current U.S. poverty line is essentially the same as the Orshansky poverty line, although the government adjusts the dollar amounts to represent the same buying power over time.The U.S. poverty line in 2015 ranged from $11,790 for a single individual to $25,240 for a household of four people.

Figure 9.3a shows the U.S. poverty rate over time; that is, the percentage of the population below the poverty line in any given year. The poverty rate declined through the 1960s, rose in the early 1980s and early 1990s, but seems to have been slightly lower since the mid-1990s. However, in no year in the last four decades has the poverty rate been less than 11% of the U.S. population—that is, at best about one American in nine is below the poverty line. In recent years, the poverty rate appears to have peaked at 15.9% in 2011 before dropping to 14.5% in 2013. Table 9.3a compares poverty rates for different groups in 2011. As you will see when we delve further into these numbers, poverty rates are relatively low for Whites, for the elderly, for the well-educated, and for male-headed households. Poverty rates for females, Hispanics, and African Americans are much higher than for Whites. While Hispanics and African Americans have a higher percentage of individuals living in poverty than others, most people in the United States living below the poverty line are White.

Link It Up

Visit the United States Census Bureau Income and Poverty publication [New Tab]for more information on U.S. poverty.

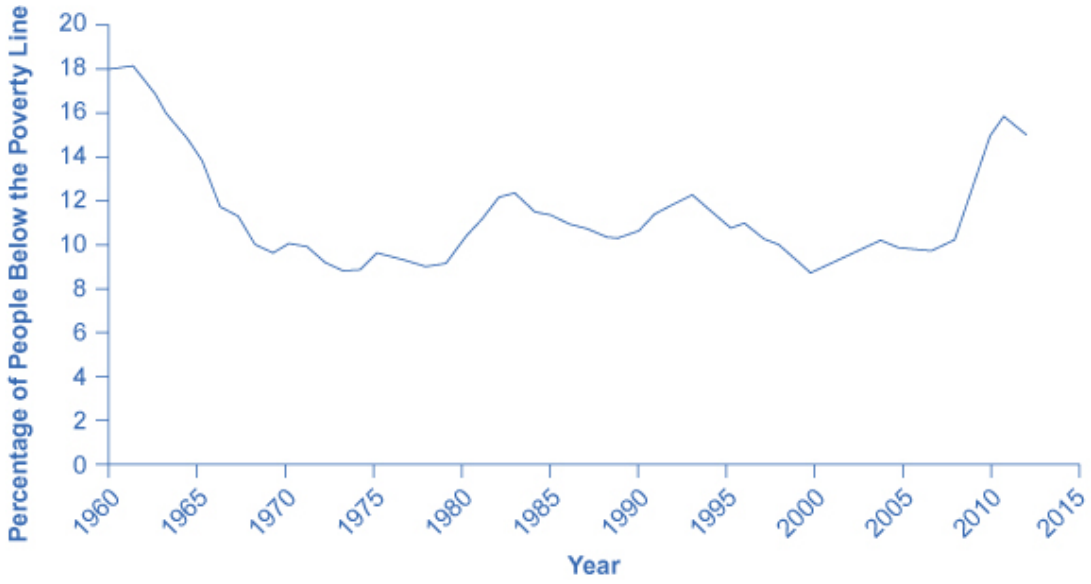

Figure 9.3a The U.S. Poverty Rate since 1960. The poverty rate fell dramatically during the 1960s, rose in the early 1980s and early 1990s, and, after declining in the 1990s through mid-2000s, rose to 15.9% in 2011, which is close to the 1960 levels. In 2013, the poverty dropped slightly to 14.5%. (Source: U.S. Census Bureau). Figure by Steven A. Greenlaw & David Shapiro (OpenStax), licensed under CC BY 4.0.

Table 9.3a Poverty Rates by Group, 2013

Group	Poverty Rate
Females	15.8%
Males	13.1%
White	9.6%
Black	27.1%
Hispanic	23.5%
Under age 18	19.9%
Ages 18–24	20.6%
Ages 25–34	15.9%
Ages 35–44	12.2%
Ages 45–54	10.9%
Ages 55–59	10.7%
Ages 60–64	10.8%
Ages 65 and older	9.5%

The concept of a poverty line raises many tricky questions. In a vast country like the United States, should there be a national poverty line? After all, according to the Federal Register, the median household income for a family of four was $102,552 in New Jersey and $57,132 in Mississippi in 2013, and prices of some basic goods like housing are quite different between states. The poverty line is based on cash income, which means it does not account for government programs that provide assistance to the poor in a non-cash form, like Medicaid (health care for low-income individuals and families) and food aid. Also, low-income families can qualify for federal housing assistance. (We will discuss these and other government aid programs in detail later in this chapter.)

Should the government adjust the poverty line to account for the value of such programs? Many economists and policymakers wonder whether we should rethink the concept of what poverty means in the twenty-first century. The following Clear It Up feature explains the poverty lines set by the World Bank for low-income countries around the world.

Clear It Up

How do economists measure poverty in low-income countries?

The World Bank sets two poverty lines for low-income countries around the world. One poverty line is set at an income of $1.25/day per person.The other is at $2/day. By comparison, the U.S. 2015 poverty line of $20,090 annually for a family of three works out to $18.35 per person per day.

Clearly, many people around the world are far poorer than Americans, as Table 9.3b shows. China and India both have more than a billion people; Nigeria is the most populous country in Africa; and Egypt is the most populous country in the Middle East. In all four of those countries, in the mid-2000s, a substantial share of the population subsisted on less than $2/day. About half the world lives on less than $2.50 a day, and 80 percent of the world lives on less than $10 per day. (Of course, the cost of food, clothing, and shelter in those countries can be very different from those costs in the United States, so the $2 and $2.50 figures may mean greater purchasing power than they would in the United States.)

Table 9.3b Poverty Lines for Low-Income Countries, mid-2000s (Source: http://data.worldbank.org/indicator/SI.POV.DDAY)

Country	Share of Population below $1.25/Day	Share of Population below $2.00/Day
Brazil (in 2009)	6.1%	10.8%
China (in 2009)	11.8%	27.2%
Egypt (in 2008)	1.7%	15.4%
India (in 2010)	32.7%	68.8%
Mexico (in 2010)	0.7%	4.5%
Nigeria (in 2010)	68.0%	84.5%

Any poverty line will be somewhat arbitrary, and it is useful to have a poverty line whose basic definition does not change much over time. If Congress voted every few years to redefine poverty, then it would be difficult to compare rates over time. After all, would a lower poverty rate change the definition, or that people were actually better off? Government statisticians at the U.S. Census Bureau have ongoing research programs to address questions like these.

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9.4 - THE POVERTY TRAP

Learning Objectives

- Explain the poverty trap, noting how government programs impact it
- Identify potential issues in government programs that seek to reduce poverty
- Calculate a budget constraint line that represents the poverty trap

Can you give people too much help, or the wrong kind of help? When people are provided with food, shelter, healthcare, income, and other necessities, assistance may reduce their incentive to work. Consider a program to fight **poverty** that works in this reasonable-sounding manner: the government provides assistance to the poor, but as the poor earn income to support themselves, the government reduces the level of assistance it provides. With such a program, every time a poor person earns $100, the person loses $100 in government support. As a result, the person experiences no net gain for working. Economists call this problem the **poverty trap**.

Consider the situation a single-parent family faces. Figure 9.4a illustrates a single mother (earning $8 an hour) with two children. First, consider the labour-leisure budget constraint that this family faces in a situation without government assistance. On the horizontal axis is hours of leisure (or time spent with family responsibilities) increasing in quantity from right to left. Also on the horizontal axis is the number of hours at paid work, going from zero hours on the right to the maximum of 2,500 hours on the left. On the vertical axis is the amount of income per year rising from low to higher amounts of income. The budget constraint line shows that at zero hours of leisure and 2,500 hours of work, the maximum amount of income is $20,000 ($\$8 \times 2,500$; hours). At the other extreme of the budget constraint line, an individual would work zero hours, earn zero income, but enjoy 2,500 hours of leisure. At point A on the budget constraint line, by working 40 hours a week, 50 weeks a year, the utility-maximizing choice is to work a total of 2,000 hours per year and earn $16,000.

Now suppose that a government antipoverty program guarantees every family with a single mother and two

children $18,000 in income. This is represented on the graph by a horizontal line at $18,000. With this program, each time the mother earns $1,000, the government will deduct $1,000 of its support. Table 9.4a shows what will happen at each combination of work and government support.

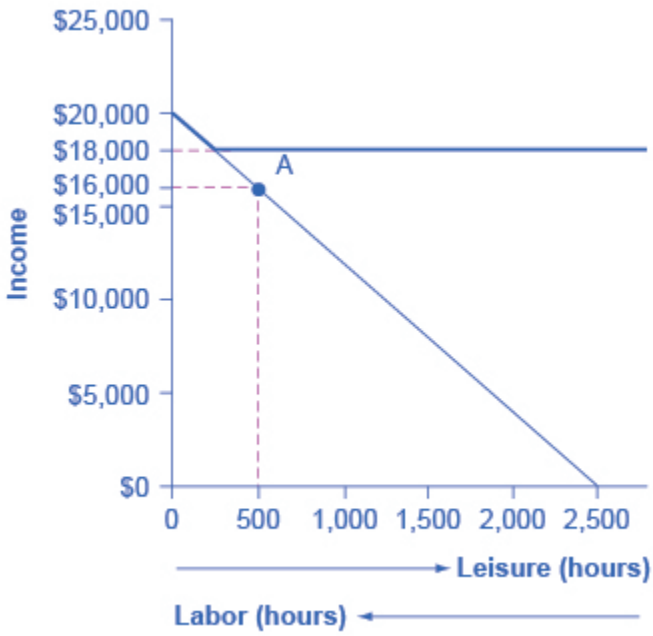

Figure 9.4a The Poverty Trap in Action. The original choice is 500 hours of leisure, 2,000 hours of work at point A, and income of $16,000. With a guaranteed income of $18,000, this family would receive $18,000 whether it provides zero hours of work or 2,000 hours of work. Only if the family provides, say, 2,300 hours of work does its income rise above the guaranteed level of $18,000—and even then, the marginal gain to income from working many hours is small. Figure by Steven A. Greenlaw & David Shapiro (OpenStax), licensed under CC BY 4.0.

The graph shows a downward sloping line that begins at $20,000 on the y-axis and ends at 2,500 on the x-axis. A horizontal line extends from $18,000 on the y-axis. A dashed plum line extends from $16,000 on the y-axis and intersects with the vertical line extending from 500 on the x-axis at point A. Beneath the x-axis is an arrow pointing to the right indicating leisure (hours) and an arrow pointing to the left indicating labor (hours).

Table 9.4a Total Income at Various Combinations of Work and Support

Amount Worked (hours)	Total Earnings ($)	Government Support ($)	Total Income ($)
0	0	18,000	18,000
500	4,000	14,000	18,000
1,000	8,000	10,000	18,000
1,500	12,000	6,000	18,000
2,000	16,000	2,000	18,000
2,500	20,000	0	20,000

The new budget line, with the antipoverty program in place, is the horizontal and heavy line that is flat at $18,000. If the mother does not work at all, she receives $18,000, all from the government. If she works full time, giving up 40 hours per week with her children, she still ends up with $18,000 at the end of the year. Only if she works 2,300 hours in the year—which is an average of 44 hours per week for 50 weeks a year—does household income rise to $18,400. Even in this case, all of her year's work means that household income rises by only $400 over the income she would receive if she did not work at all. She would need to work 50 hours a week to reach $20,000.

The poverty trap is even stronger than this simplified example shows, because a working mother will have extra expenses like clothing, transportation, and child care that a nonworking mother will not face, making the economic gains from working even smaller. Moreover, those who do not work fail to build up job experience and contacts, which makes working in the future even less likely.

To reduce the poverty trap the government could design an antipoverty program so that, instead of reducing government payments by $1 for every $1 earned, the government would reduce payments by some smaller amount instead. Imposing requirements for work as a condition of receiving benefits and setting a time limit on benefits can also reduce the harshness of the poverty trap.

Figure 9.4b has the vertical axis income and a horizontal axis labour hours. Figure 9.4b illustrates a government program that guarantees $18,000 in income, even for those who do not work at all, but then reduces this amount by 50 cents for each $1 earned. The new, higher budget line in Figure 9.4b shows that, with this program, additional hours of work will bring some economic gain. Because of the reduction in government income when an individual works, an individual earning $8.00 will really net only $4.00 per hour. The vertical intercept of this higher budget constraint line is at $28,000 ($\$18,000 + 2,500 \text{ hours} \times \$4.00 = \$28,000$). The horizontal intercept is at the point on the graph where $18,000 and 2500 hours of leisure is set. Table 9.4b shows the total income differences with various choices of labour and leisure.

However, this type of program raises other issues. First, even if it does not eliminate the incentive to work by reducing government payments by $1 for every $1 earned, enacting such a program may still reduce the incentive to work. At least some people who would be working 2,000 hours each year without this program might decide to work fewer hours but still end up with more income—that is, their choice on the new budget line would be like S, above and to the right of the original choice P. Of course, others may choose a point like R, which involves the same amount of work as P, or even a point to the left of R that involves more work.

The second major issue is that when the government phases out its support payments more slowly, the antipoverty program costs more money. Still, it may be preferable in the long run to spend more money on a program that retains a greater incentive to work, rather than spending less money on a program that nearly eliminates any gains from working.

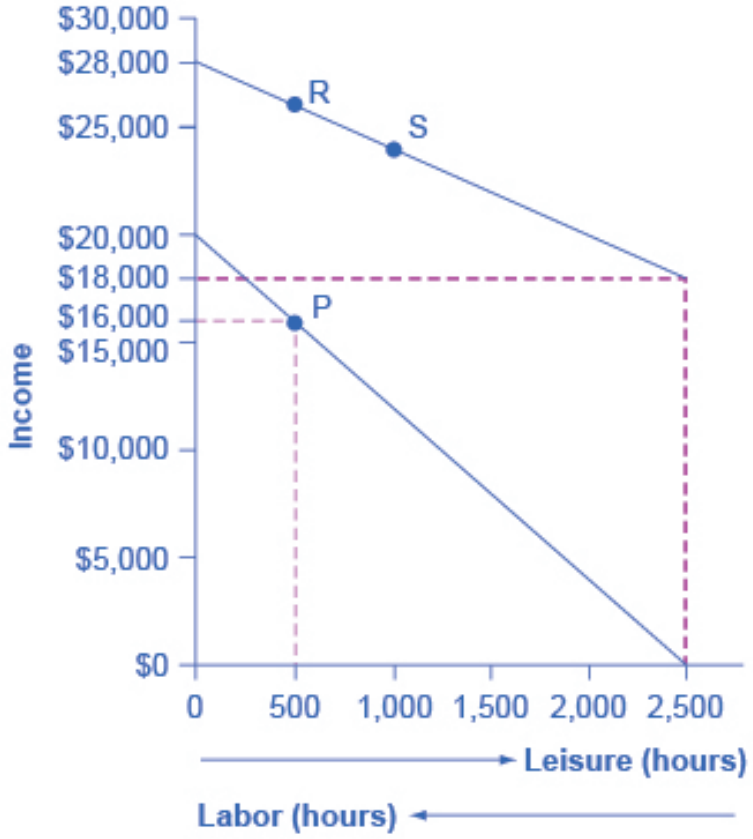

Figure 9.4b Loosening the Poverty Trap: Reducing Government Assistance by 50 Cents for Every $1 Earned. On the original labour-leisure opportunity set, the lower budget set shown by the smaller dashed line in the figure, the preferred choice P is 500 hours of leisure and $16,000 of income. Then, the government created an antipoverty program that guarantees $18,000 in income even to those who work zero hours, shown by the larger dashed line. In addition, every $1 earned means phasing out 50 cents of benefits. This program leads to the higher budget set, which the diagram shows. The hope is that this program will provide incentives to work the same or more hours, despite receiving income assistance. However, it is possible that the recipients will choose a point on the new budget set like S, with less work, more leisure, and greater income, or a point like R, with the same work and greater income.Figure by Steven A. Greenlaw & David Shapiro (OpenStax), licensed under CC BY 4.0.

Figure 9.4b Loosening the Poverty Trap: Reducing Government Assistance by 50 Cents for Every $1 Earned

The x-axis is leisure (hours) and y-axis is Income in thousands. The graph shows a downward sloping line that extends from $28,000 on the y-axis to $18,000 on the y-axis (from 0 to 2,500 on the x-axis). Two points R and S appear on the line. Another line starts at (0, $20,000) and ends at (2,500, 0). A dashed plum line

extends horizontally from $18,000 on the y-axis and meets with the vertical line extending from 2,500 on the x-axis. Another dashed plum line extends from $16,000 on the y-axis and intersects with the vertical line extending from 500 on the x-axis at point P. Beneath the x-axis is an arrow pointing to the right indicating leisure (hours) and an arrow pointing to the left indicating labour (hours).

Table 9.4b The Labour-Leisure Tradeoff with Assistance Reduced by 50 Cents for Every Dollar Earned

Amount Worked (hours)	Total Earnings ($)	Government Support ($)	Total Income ($)
0	0	18,000	18,000
500	4,000	16,000	20,000
1,000	8,000	14,000	22,000
1,500	12,000	12,000	24,000
2,000	16,000	10,000	26,000
2,500	20,000	8,000	28,000

The next module will consider a variety of government support programs focused specifically on the poor, including welfare, SNAP (Supplemental Nutrition Assistance Program), Medicaid, and the **earned income tax credit (EITC)**. Although these programs vary from state to state, it is generally a true statement that in many states from the 1960s into the 1980s, if poor people worked, their level of income barely rose—or did not rise at all—after factoring in the reduction in government support payments. The following Work It Out feature shows how this happens.

Work It Out

Calculating a Budget Constraint Line

Jason earns $9.00 an hour, and a government antipoverty program provides a floor of $10,000 guaranteed income. The government reduces government support by $0.50 for each $1.00 earned. What are the horizontal and vertical intercepts of the budget constraint line? Assume the maximum hours for work or leisure is 2,500 hours.

Step 1. Determine the amount of the government guaranteed income. In this case, it is $10,000.

Step 2. Plot that guaranteed income as a horizontal line on the budget constraint line.

Step 3. Determine what Jason earns if he has no income and enjoys 2,500 hours of leisure. In this case, he will receive the guaranteed $10,000 (the horizontal intercept).

Step 4. Calculate how much Jason's salary will be reduced due to the reduction in government income.

In Jason's case, it will be reduced by one half. He will, in effect, net only $4.50 an hour.
Step 5. If Jason works 1,000 hours, at a maximum what income will Jason receive? Jason will receive $10,000 in government assistance. He will net only $4.50 for every hour he chooses to work. If he works 1,000 hours at $4.50, his earned income is $4,500 plus the $10,000 in government income. Thus, the total maximum income (the vertical intercept) is $\$10,000 + \$4,500 = \$14,500$.

Key Concepts and Summary

A poverty trap occurs when government-support payments for the poor decline as the poor earn more income. As a result, the poor do not end up with much more income when they work, because the loss of government support largely or completely offsets any income that one earns by working. Phasing out government benefits more slowly, as well as imposing requirements for work as a condition of receiving benefits and a time limit on benefits can reduce the harshness of the poverty trap.

Attribution

Except where otherwise noted, this chapter is adapted from "The Poverty Trap (https://openstax.org/books/principles-economics-2e/pages/15-2-the-poverty-trap)" and "Key Concepts and Summary" In *Principles of Economics 2e (https://openstax.org/books/principles-economics-2e/pages/1-introduction)* by Steven A. Greenlaw & David Shapiro, licensed under CC BY 4.0./ Adaptations include the addition of chapter key concepts and summary.

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9.5 - INCOME INEQUALITY: MEASUREMENT AND CAUSES

Learning Objectives

- Explain the distribution of income, and analyze the sources of income inequality in a market economy
- Measure income distribution in quintiles
- Calculate and graph a Lorenz curve
- Show income inequality through demand and supply diagrams

Poverty levels can be subjective based on the overall income levels of a country. Typically a government measures poverty based on a percentage of the median income. **Income inequality**, however, has to do with the distribution of that income, in terms of which group receives the most or the least income. Income inequality involves comparing those with high incomes, middle incomes, and low incomes—not just looking at those below or near the poverty line. In turn, measuring income inequality means dividing the population into various groups and then comparing the groups, a task that we can be carry out in several ways, as the next Clear It Up feature shows.

Clear It Up

How do you separate poverty and income inequality?

Poverty can change even when inequality does not move at all. Imagine a situation in which income for everyone in the population declines by 10%. Poverty would rise, since a greater share of the population would now fall below the poverty line. However, inequality would be the same, because

everyone suffered the same proportional loss. Conversely, a general rise in income levels over time would keep inequality the same, but reduce poverty.

It is also possible for income inequality to change without affecting the **poverty rate**. Imagine a situation in which a large number of people who already have high incomes increase their incomes by even more. Inequality would rise as a result—but the number of people below the poverty line would remain unchanged.

Why did inequality of household income increase in the United States in recent decades? A trend toward greater income inequality has occurred in many countries around the world, although the effect has been more powerful in the U.S. economy. Economists have focused their explanations for the increasing inequality on two factors that changed more or less continually from the 1970s into the 2000s. One set of explanations focuses on the changing shape of American households. The other focuses on greater inequality of wages, what some economists call "winner take all" labour markets. We will begin with how we measure inequality, and then consider the explanations for growing inequality in the United States.

Measuring Income Distribution by Quintiles

One common way of measuring income inequality is to rank all households by income, from lowest to highest, and then to divide all households into five groups with equal numbers of people, known as quintiles. This calculation allows for measuring the distribution of income among the five groups compared to the total. The first quintile is the lowest fifth or 20%, the second quintile is the next lowest, and so on. We can measure income inequality by comparing what share of the total income each quintile earns.

U.S. income distribution by quintile appears in Table 9.5a. In 2011, for example, the bottom quintile of the income distribution received 3.2% of income; the second quintile received 8.4%; the third quintile, 14.3%; the fourth quintile, 23.0%; and the top quintile, 51.14%. The final column of Table 9.5a shows what share of income went to households in the top 5% of the income distribution: 22.3% in 2011. Over time, from the late 1960s to the early 1980s, the top fifth of the income distribution typically received between about 43% to 44% of all income. The share of income that the top fifth received then begins to rise. Census Bureau researchers trace, much of this increase in the share of income going to the top fifth to an increase in the share of income going to the top 5%. The quintile measure shows how income inequality has increased in recent decades.

Table 9.5a Share of Aggregate Income Received by Each Fifth and Top 5% of Households, 1967–2013 (Source: U.S. Census Bureau, Table 2)

Year	Lowest Quintile	Second Quintile	Third Quintile	Fourth Quintile	Highest Quintile	Top 5%
1967	4.0	10.8	17.3	24.2	43.6	17.2
1970	4.1	10.8	17.4	24.5	43.3	16.6
1975	4.3	10.4	17.0	24.7	43.6	16.5
1980	4.2	10.2	16.8	24.7	44.1	16.5
1985	3.9	9.8	16.2	24.4	45.6	17.6
1990	3.8	9.6	15.9	24.0	46.6	18.5
1995	3.7	9.1	15.2	23.3	48.7	21.0
2000	3.6	8.9	14.8	23.0	49.8	22.1
2005	3.4	8.6	14.6	23.0	50.4	22.2
2010	3.3	8.5	14.6	23.4	50.3	21.3
2013	3.2	8.4	14.4	23.0	51	22.2

It can also be useful to divide the income distribution in ways other than quintiles; for example, into tenths or even into percentiles (that is, hundredths). A more detailed breakdown can provide additional insights. For example, the last column of Table 9.5a shows the income received by the top 5% percent of the income distribution. Between 1980 and 2013, the share of income going to the top 5% increased by 5.7 percentage points (from 16.5% in 1980 to 22.2% in 2013). From 1980 to 2013 the share of income going to the top quintile increased by 7.0 percentage points (from 44.1% in 1980 to 51% in 2013). Thus, the top 20% of householders (the fifth quintile) received over half (51%) of all the income in the United States in 2013.

Lorenz Curve

We can present the data on income inequality in various ways. For example, you could draw a bar graph that showed the share of income going to each fifth of the income distribution. Figure 9.5a presents an alternative way of showing inequality data in a **Lorenz curve**. This curve shows the cumulative share of population on the horizontal axis and the cumulative percentage of total income received on the vertical axis.

Figure 9.5a The Lorenz Curve. Figure by Steven A. Greenlaw & David Shapiro (OpenStax), licensed under CC BY 4.0.

Figure 9.5a The Lorenz Curve A Lorenz curve graphs the cumulative shares of income received by everyone up to a certain quintile. The income distribution in 1980 was closer to the perfect equality line than the income distribution in 2011—that is, the U.S. income distribution became more unequal over time.

Every Lorenz curve diagram begins with a line sloping up at a 45-degree angle. We show it as a dashed line in Figure 9.5a. The points along this line show what perfect equality of the income distribution looks like. It would mean, for example, that the bottom 20% of the income distribution receives 20% of the total income, the bottom 40% gets 40% of total income, and so on. The other lines reflect actual U.S. data on inequality for 1980 and 2011.

The trick in graphing a Lorenz curve is that you must change the shares of income for each specific quintile, which we show in the first column of numbers in Table 9.5b, into cumulative income, which we show in the second column of numbers. For example, the bottom 40% of the cumulative income distribution will be the sum of the first and second quintiles; the bottom 60% of the cumulative income distribution will be the sum of the first, second, and third quintiles, and so on. The final entry in the cumulative income column needs to be 100%, because by definition, 100% of the population receives 100% of the income.

Table 9.5b Calculating the Lorenz Curve

Income Category	Share of Income in 1980 (%)	Cumulative Share of Income in 1980 (%)	Share of Income in 2013 (%)	Cumulative Share of Income in 2013 (%)
First quintile	4.2	4.2	3.2	3.2
Second quintile	10.2	14.4	8.4	11.6
Third quintile	16.8	31.2	14.4	26.0
Fourth quintile	24.7	55.9	23.0	49.0
Fifth quintile	44.1	100.0	51.0	100.0

In a Lorenz curve diagram, a more unequal distribution of income will loop farther down and away from the 45-degree line, while a more equal distribution of income will move the line closer to the 45-degree line. Figure 9.5a illustrates the greater inequality of the U.S. income distribution between 1980 and 2013 because the Lorenz curve for 2013 is farther from the 45-degree line than for 1980. The Lorenz curve is a useful way of presenting the quintile data that provides an image of all the quintile data at once. The next Clear It Up feature shows how income inequality differs in various countries compared to the United States.

Clear It Up

How does economic inequality vary around the world?

The U.S. economy has a relatively high degree of income inequality by global standards. As Table 9.5b shows, based on a variety of national surveys for a selection of years in the last five years of the 2000s (with the exception of Germany, and adjusted to make the measures more comparable), the U.S. economy has greater inequality than Germany (along with most Western European countries). The region of the world with the highest level of income inequality is Latin America, illustrated in the numbers for Brazil and Mexico. The level of inequality in the United States is lower than in some of the low-income countries of the world, like China and Nigeria, or some middle-income countries like the Russian Federation. However, not all poor countries have highly unequal income distributions. India provides a counterexample.

Table 9.5c Income Distribution in Select Countries
(Source: U.S. data from U.S. Census Bureau Table 2. Other data from The World Bank Poverty and Inequality Data Base, https://data.worldbank.org/indicator/SI.DST.FRST.20?end=2017&start=2017&view=ba)

Country	Survey Year	First Quintile	Second Quintile	Third Quintile	Fourth Quintile	Fifth Quintile
United States	2013	3.2%	8.4%	14.4%	23.0%	51.0%
Germany	2000	8.5%	13.7%	17.8%	23.1%	36.9%
Brazil	2009	2.9%	7.1%	12.4%	19.0%	58.6%
Mexico	2010	4.9%	8.8%	13.3%	20.2%	52.8%
China	2009	4.7%	9.7%	15.3%	23.2%	47.1%
India	2010	8.5%	12.1%	15.7%	20.8%	42.8%
Russia	2009	6.1%	10.4%	14.8%	21.3%	47.1%
Nigeria	2010	4.4%	8.3%	13.0%	20.3%	54.0%

Link It Up

Take A Look At Income Inequality In The United States [New Tab] (https://www.youtube.com/watch?v=qc7g6Uhi1i4) video to hear more about wealth inequality across the world.

Causes of Growing Inequality: The Changing Composition of American Households

In 1970, 41% of married women were in the labour force, but by 2015, according to the Bureau of Labor Statistics, 56.7% of married women were in the labour force. One result of this trend is that more households have two earners. Moreover, it has become more common for one high earner to marry another high earner. A few decades ago, the common pattern featured a man with relatively high earnings, such as an executive or a doctor, marrying a woman who did not earn as much, like a secretary or a nurse. Often, the woman would leave paid employment, at least for a few years, to raise a family. However, now doctors are marrying doctors and executives are marrying executives, and mothers with high-powered careers are often returning to work while their children are quite young. This pattern of households with two high earners tends to increase the proportion of high-earning households.

According to data in the National Journal, even as two-earner couples have increased, so have single-parent

households. Of all U.S. families, 13.1% were headed by single mothers. The poverty rate among single-parent households tends to be relatively high.

These changes in family structure, including the growth of single-parent families who tend to be at the lower end of the income distribution, and the growth of two-career high-earner couples near the top end of the income distribution, account for roughly half of the rise in income inequality across households in recent decades.

Link It Up

Take a look at the video Wealth Inequality in America [New Tab] (https://www.youtube.com/watch?v=QPKKQnijnsM) too see illustrated data on the distribution of wealth in the United States.

Causes of Growing Inequality: A Shift in the Distribution of Wages

Another factor behind the rise in U.S. income inequality is that earnings have become less equal since the late 1970s. In particular, the earnings of high-skilled labour relative to low-skilled labour have increased. Winner-take-all labour markets result from changes in technology, which have increased global demand for "stars,"—whether the best CEO, doctor, basketball player, or actor. This global demand pushes salaries far above productivity differences versus educational differences. One way to measure this change is to take workers' earnings with at least a four-year college bachelor's degree (including those who went on and completed an advanced degree) and divide them by workers' earnings with only a high school degree. The result is that those in the 25–34 age bracket with college degrees earned about 1.67 times as much as high school graduates in 2010, up from 1.59 times in 1995, according to U.S. Census data. Winner-take-all labour market theory argues that the salary gap between the median and the top 1 percent is not due to educational differences.

Economists use the demand and supply model to reason through the most likely causes of this shift. According to the National Center for Education Statistics, in recent decades, the supply of U.S. workers with college degrees has increased substantially. For example, 840,000 four-year bachelor's degrees were conferred on Americans in 1970. In 2013-2014, 1,894,934 such degrees were conferred—an increase of over 90%. In Figure 9.5b, this shift in supply to the right, from S_0 to S_1, should result in a lower equilibrium wage for high-skilled labour. Thus, we can explain the increase in the price of high-skilled labour by a greater demand, like

the movement from D_0 to D_1. Evidently, combining both the increase in supply and in demand has resulted in a shift from E_0 to E_1, and a resulting higher wage.

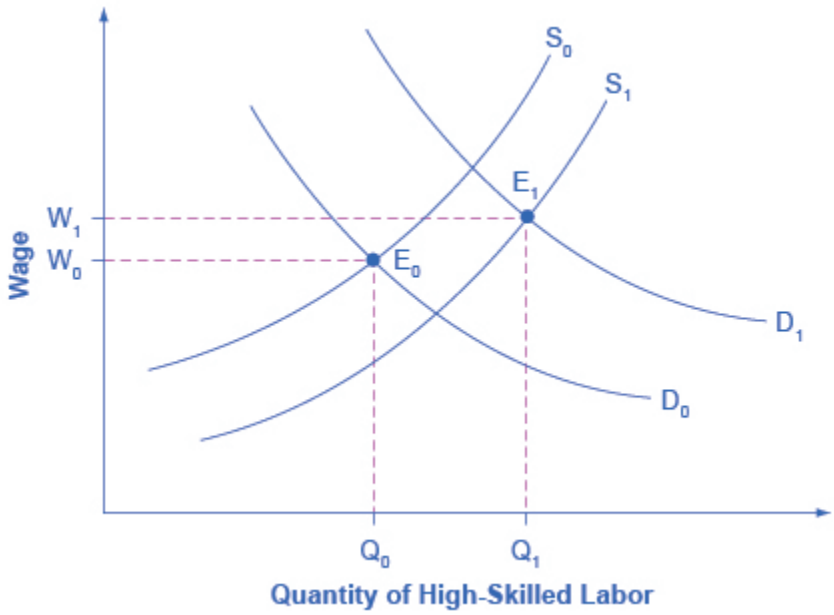

Figure 9.5b Why Would Wages Rise for High-Skilled Labour? The proportion of workers attending college has increased in recent decades, so the supply curve for high-skilled labor has shifted to the right, from S_0 to S_1. If the demand for high-skilled labor had remained at D_0, then this shift in supply would have led to lower wages for high-skilled labor. However, the wages for high-skilled labor, especially if there is a large global demand, have increased even with the shift in supply to the right. The explanation must lie in a shift to the right in demand for high-skilled labor, from D_0 to D_1. The figure shows how a combination of the shift in supply, from S_0 to S_1, and the shift in demand, from D_0 to D_1, led to both an increase in the quantity of high-skilled labor hired and also to a rise in the wage for such labor, from W_0 to W_1. Figure by Steven A. Greenlaw & David Shapiro (OpenStax), licensed under CC BY 4.0.

Figure 9.5b Why Would Wages Rise for High-Skilled Labour? (Text Version)

The vertical axis is Wage (W) and the horizontal axis is quantity of high-skilled labour (Q). Both supply curves (S_0 and S_1) slope upwards from left to right and both demand curves (D_0 and D_1) slope downwards from left to right. The proportion of workers attending college has increased in recent decades, so the supply curve for high-skilled labour has shifted to the right, from S_0 to S_1. If the demand for high-skilled labour had remained at D_0, then this shift in supply would have led to lower wages for high-skilled labour. However, the wages for high-skilled labour, especially if there is a large global demand, have increased even with the shift in supply to the right. The explanation must lie in a shift to the right in demand for high-skilled labour, from D_0 to D_1. The figure shows how a combination of the shift in supply, from S_0 to S_1, and the shift in demand, from D_0 to D_1, led to both an increase in the quantity of high-skilled labour hired and also to a rise in the wage for such labour, from W_0 to W_1. The original supply curve (S_0) and original demand curve (D_0) intersect at E, at

point W_0 and Q_0. The new supply curve (S_1) and new demand curve (D_1) intersect at E_1, at point W_1 and Q_1.

What factors would cause the demand for high-skilled labour to rise? The most plausible explanation is that while the explosion in new information and communications technologies over the last several decades has helped many workers to become more productive, the benefits have been especially great for high-skilled workers like top business managers, consultants, and design professionals. The new technologies have also helped to encourage globalization, the remarkable increase in international trade over the last few decades, by making it more possible to learn about and coordinate economic interactions all around the world. In turn, the rising impact of foreign trade in the U.S. economy has opened up greater opportunities for high-skilled workers to sell their services around the world, and lower-skilled workers have to compete with a larger supply of similarly skilled workers around the globe.

We can view the market for high-skilled labour as a race between forces of supply and demand. Additional education and on-the-job training will tend to increase the high-skilled labour supply and to hold down its relative wage. Conversely, new technology and other economic trends like globalization tend to increase the demand for high-skilled labour and push up its relative wage. We can view the greater inequality of wages as a sign that demand for skilled labour is increasing faster than supply. Alternatively, if the supply of lower skilled workers exceeds the demand, then average wages in the lower quintiles of the income distribution will decrease. The combination of forces in the high-skilled and low-skilled labour markets leads to increased income disparity.

Key Concepts and Summary

Measuring inequality involves making comparisons across the entire distribution of income, not just the poor. One way of doing this is to divide the population into groups, like quintiles, and then calculate what share of income each group receives. An alternative approach is to draw Lorenz curves, which compare the cumulative income actually received to a perfectly equal distribution of income. Income inequality in the United States increased substantially from the late 1970s and early 1980s into the 2000s. The two most common explanations that economists cite are changes in

household structures that have led to more two-earner couples and single-parent families, and the effect of new information and communications technology on wages.

Attribution

Except where otherwise noted, this chapter is adapted from "Income Inequality: Measurement and Causes (https://openstax.org/books/principles-economics-2e/pages/15-4-income-inequality-measurement-and-causes)" In *Principles of Economics 2e (https://openstax.org/books/principles-economics-2e/pages/1-introduction)* by Steven A. Greenlaw & David Shapiro, licensed under CC BY 4.0.

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9.6 - GOVERNMENT POLICIES TO REDUCE INCOME INEQUALITY

Learning Objectives

- Explain the arguments for and against government intervention in a market economy
- Identify beneficial ways to reduce the economic inequality in a society
- Show the tradeoff between incentives and income equality

No society should expect or desire complete equality of income at a given point in time, for a number of reasons. First, most workers receive relatively low earnings in their first few jobs, higher earnings as they reach middle age, and then lower earnings after retirement. Thus, a society with people of varying ages will have a certain amount of income inequality. Second, people's preferences and desires differ. Some are willing to work long hours to have income for large houses, fast cars and computers, luxury vacations, and the ability to support children and grandchildren.

These factors all imply that a snapshot of inequality in a given year does not provide an accurate picture of how people's incomes rise and fall over time. Even if we expect some degree of economic inequality at any point in time, how much inequality should there be? There is also the difference between **income** and **wealth**, as the following Clear It Up feature explains.

Clear It Up

How do you measure wealth versus income inequality?

Income is a flow of money received, often measured on a monthly or an annual basis. Wealth is the

sum of the value of all assets, including money in bank accounts, financial investments, a pension fund, and the value of a home. In calculating wealth, one must subtract all debts, such as debt owed on a home mortgage and on credit cards. A retired person, for example, may have relatively little income in a given year, other than a pension or Social Security. However, if that person has saved and invested over time, the person's accumulated wealth can be quite substantial.

In the United States, the wealth distribution is more unequal than the income distribution, because differences in income can accumulate over time to make even larger differences in wealth. However, we can measure the degree of inequality in the wealth distribution with the same tools we use to measure the inequality in the income distribution, like quintile measurements. Once every three years the Federal Reserve Bank publishes the Survey of Consumer Finance which reports a collection of data on wealth.

Even if they cannot answer the question of how much inequality is too much, economists can still play an important role in spelling out policy options and tradeoffs. If a society decides to reduce the level of economic inequality, it has three main sets of tools: redistribution from those with high incomes to those with low incomes; trying to assure that a ladder of opportunity is widely available; and a tax on inheritance.

Redistribution

Redistribution means taking income from those with higher incomes and providing income to those with lower incomes. Earlier in this chapter, we considered some of the key government policies that provide support for the poor: the welfare program TANF, the earned income tax credit, SNAP, and Medicaid. If a reduction in inequality is desired, these programs could receive additional funding.

The federal income tax, which is a **progressive tax system** designed in such a way that the rich pay a higher percent in income taxes than the poor funds the programs. Data from household income tax returns in 2009 shows that the top 1% of households had an average income of $1,219,700 per year in pre-tax income and paid an average federal tax rate of 28.9%. The **effective income tax**, which is total taxes paid divided by total income (all sources of income such as wages, profits, interest, rental income, and government transfers such as veterans' benefits), was much lower. The effective tax paid by that top 1% of householders paid was 20.4%, while the bottom two **quintiles** actually paid negative effective income taxes, because of provisions like the earned income tax credit. News stories occasionally report on a high-income person who has managed to pay very little in taxes, but while such individual cases exist, according to the Congressional Budget Office, the typical pattern is that people with higher incomes pay a higher average share of their income in federal income taxes.

Of course, the fact that some degree of redistribution occurs now through the federal income tax and government antipoverty programs does not settle the questions of how much redistribution is appropriate, and whether more redistribution should occur.

The Ladder of Opportunity

Economic inequality is perhaps most troubling when it is not the result of effort or talent, but instead is determined by the circumstances under which a child grows up. One child attends a well-run grade school and high school and heads on to college, while parents help out by supporting education and other interests, paying for college, a first car, and a first house, and offering work connections that lead to internships and jobs. Another child attends a poorly run grade school, barely makes it through a low-quality high school, does not go to college, and lacks family and peer support. These two children may be similar in their underlying talents and in the effort they put forth, but their economic outcomes are likely to be quite different.

Public policy can attempt to build a ladder of opportunities so that, even though all children will never come from identical families and attend identical schools, each child has a reasonable opportunity to attain an economic niche in society based on their interests, desires, talents, and efforts. Table 9.6a shows some of those initiatives.

Table 9.6a Public Policy Initiatives

Children	College Level	Adults
• Improved day care	• Widespread loans and grants for those in financial need	• Opportunities for retraining and acquiring new skills
• Enrichment programs for preschoolers	• Public support for a range of institutions from two-year community colleges to large research universities	• Prohibiting discrimination in job markets and housing on the basis of race, gender, age, and disability
• Improved public schools	–	–
• After school and community activities	–	–
• Internships and apprenticeships	–	–

Some have called the United States a land of opportunity. Although the general idea of a ladder of opportunity for all citizens continues to exert a powerful attraction, specifics are often quite controversial. Society can experiment with a wide variety of proposals for building a ladder of opportunity, especially for those who otherwise seem likely to start their lives in a disadvantaged position. The government needs to carry

out such policy experiments in a spirit of open-mindedness, because some will succeed while others will not show positive results or will cost too much to enact on a widespread basis.

Inheritance Taxes

There is always a debate about inheritance taxes. It goes like this: Why should people who have worked hard all their lives and saved up a substantial nest egg not be able to give their money and possessions to their children and grandchildren? In particular, it would seem un-American if children were unable to inherit a family business or a family home. Alternatively, many Americans are far more comfortable with inequality resulting from high-income people who earned their money by starting innovative new companies than they are with inequality resulting from high-income people who have inherited money from rich parents.

The United States does have an **estate tax** that is, a tax imposed on the value of an inheritance—which suggests a willingness to limit how much wealth one can pass on as an inheritance. However, according to the Center on Budget and Policy Priorities, in 2015 the estate tax applied only to those leaving inheritances of more than $5.43 million and thus applies to only a tiny percentage of those with high levels of wealth.

The Tradeoff between Incentives and Income Equality

Government policies to reduce poverty or to encourage economic equality, if carried to extremes, can injure incentives for economic output. The poverty trap, for example, defines a situation where guaranteeing a certain level of income can eliminate or reduce the incentive to work. An extremely high degree of redistribution, with very high taxes on the rich, would be likely to discourage work and entrepreneurship. Thus, it is common to draw the tradeoff between economic output and equality, as Figure 9.6a (a) shows. In this formulation, if society wishes a high level of economic output, like point A, it must also accept a high degree of inequality. Conversely, if society wants a high level of equality, like point B, it must accept a lower level of economic output because of reduced incentives for production.

This view of the tradeoff between economic output and equality may be too pessimistic, and Figure 9.6a (b) presents an alternate vision. Here, the tradeoff between economic output and equality first slopes up, in the vicinity of choice C, suggesting that certain programs might increase both output and economic equality. For example, the policy of providing free public education has an element of redistribution, since the value of the public schooling received by children of low-income families is clearly higher than what low-income families pay in taxes. A well-educated population, however, is also an enormously powerful factor in providing the skilled workers of tomorrow and helping the economy to grow and expand. In this case, equality and economic growth may complement each other.

Moreover, policies to diminish inequality and soften the hardship of poverty may sustain political support for a market economy. After all, if society does not make some effort toward reducing inequality and poverty, the alternative might be that people would rebel against market forces. Citizens might seek economic security by demanding that their legislators pass laws forbidding employers from ever laying off workers or reducing wages, or laws that would impose price floors and price ceilings and shut off international trade. From this viewpoint, policies to reduce inequality may help economic output by building social support for allowing markets to operate.

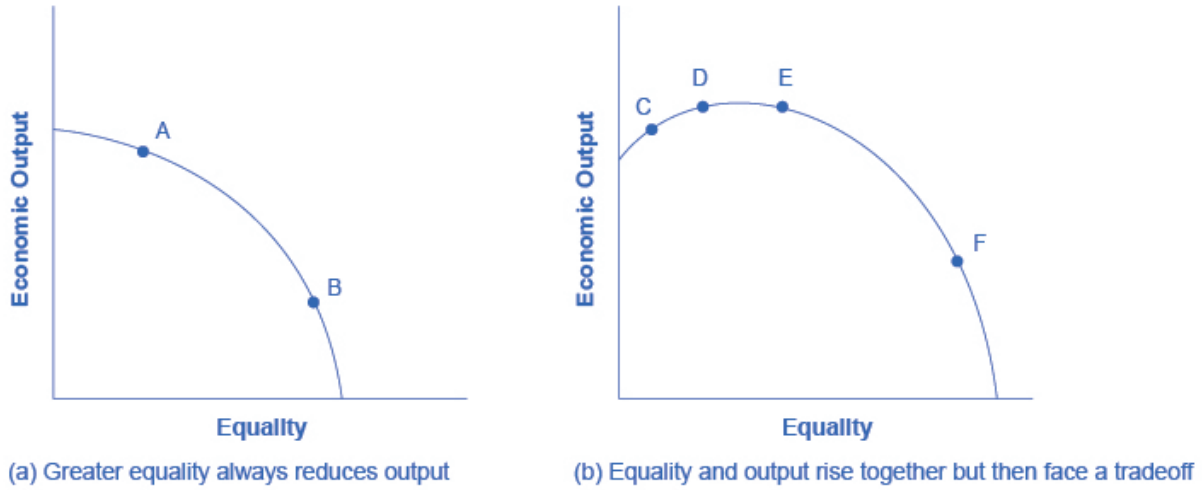

Figure 9.6a The Tradeoff between Incentives and Economic Equality. (a) Society faces a trade-off where any attempt to move toward greater equality, like moving from choice A to B, involves a reduction in economic output. (b) Situations can arise like point C, where it is possible both to increase equality and also to increase economic output, to a choice like D. It may also be possible to increase equality with little impact on economic output, like the movement from choice D to E. However, at some point, too aggressive a push for equality will tend to reduce economic output, as in the shift from E to F.Figure by Steven A. Greenlaw & David Shapiro (OpenStax), licensed under CC BY 4.0. – Norm noted this for removal , but the full section is on this graph, do you want it removed?

The tradeoff in Figure 9.6a (b) then flattens out in the area between points D and E, which reflects the pattern that a number of countries that provide similar levels of income to their citizens—the United States, Canada, European Union nations, Japan, and Australia—have different levels of inequality. The pattern suggests that countries in this range could choose a greater or a lesser degree of inequality without much impact on economic output. Only if these countries push for a much higher level of equality, like at point F, will they experience the diminished incentives that lead to lower levels of economic output. In this view, while a danger always exists that an agenda to reduce poverty or inequality can be poorly designed or pushed too far, it is also possible to discover and design policies that improve equality and do not injure incentives for economic output by very much—or even improve such incentives.

Bring It Home

Occupy Wall Street

The Occupy movement took on a life of its own over the last few months of 2011, bringing to light issues that many people faced on the lower end of the income distribution. The contents of this chapter indicate that there is a significant amount of income inequality in the United States. The question is: What should be done about it?

The 2008-2009 Great Recession caused unemployment to rise and incomes to fall. Many people attribute the recession to mismanagement of the financial system by bankers and financial managers—those in the 1% of the income distribution—but those in lower quintiles bore the greater burden of the recession through unemployment. This seemed to present the picture of inequality in a different light: the group that seemed responsible for the recession was not the group that seemed to bear the burden of the decline in output. A burden shared can bring a society closer together. A burden pushed off onto others can polarize it.

On one level, the problem with trying to reduce income inequality comes down to whether you still believe in the American Dream. If you believe that one day you will have your American Dream—a large income, large house, happy family, or whatever else you would like to have in life—then you do not necessarily want to prevent anyone else from living out their dream. You certainly would not want to run the risk that someone would want to take part of your dream away from you. Thus, there is some reluctance to engage in a redistributive policy to reduce inequality.

However, when those for whom the likelihood of living the American Dream is very small are considered, there are sound arguments in favor of trying to create greater balance. As the text indicated, a little more income equality, gained through long-term programs like increased education and job training, can increase overall economic output. Then everyone is made better off, and the 1% will not seem like such a small group any more.

Key Concepts and Summary

Policies that can affect the level of economic inequality include redistribution between rich and poor, making it easier for people to climb the ladder of opportunity; and estate taxes, which are taxes on inheritances. Pushing too aggressively for economic equality can run the risk of decreasing economic incentives. However, a moderate push for economic equality can increase economic output, both through methods like improved education and by building a base of political support for market forces.

Attribution

Except where otherwise noted, this chapter is adapted from "Government Policies to Reduce Income Inequality (https://openstax.org/books/principles-economics-2e/pages/15-5-government-policies-to-reduce-income-inequality)" and "Key Concepts and Summary" In *Principles of Economics 2e (https://openstax.org/books/principles-economics-2e/pages/1-introduction)* by Steven A. Greenlaw & David Shapiro, licensed under CC BY 4.0./ Adaptations include addition of chapter ley concepts and summary.

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9.7 - SELF-CHECK, CRITICAL THINKING & REVIEW QUESTIONS

Self-Check Questions

1. Describe how each of these changes is likely to affect poverty and inequality:
    1. Incomes rise for low-income and high-income workers, but rise more for the high-income earners.
    2. Incomes fall for low-income and high-income workers, but fall more for high-income earners.
2. Jonathon is a single father with one child. He can work as a server for $6 per hour for up to 1,500 hours per year. He is eligible for welfare, and so if he does not earn any income, he will receive a total of $10,000 per year. He can work and still receive government benefits, but for every $1 of income, his welfare stipend is $1 less. Create a table similar to Table 15.4 that shows Jonathan's options. Use four columns, the first showing number of hours to work, the second showing his earnings from work, the third showing the government benefits he will receive, and the fourth column showing his total income (earnings + government support). Sketch a labour-leisure diagram of Jonathan's opportunity set with and without government support.
3. Imagine that the government reworks the welfare policy that was affecting Jonathan in question 1, so that for each dollar someone like Jonathan earns at work, his government benefits diminish by only 30 cents. Reconstruct the table from question 1 to account for this change in policy. Draw Jonathan's labour-leisure opportunity sets, both for before this welfare program is enacted and after it is enacted.
4. We have discovered that the welfare system discourages recipients from working because the more income they earn, the less welfare benefits they receive. How does the earned income tax credit attempt to loosen the poverty trap?

5. How does the TANF attempt to loosen the poverty trap?
6. A group of 10 people have the following annual incomes: $24,000, $18,000, $50,000, $100,000, $12,000, $36,000, $80,000, $10,000, $24,000, $16,000. Calculate the share of total income that each quintile receives from this income distribution. Do the top and bottom quintiles in this distribution have a greater or larger share of total income than the top and bottom quintiles of the U.S. income distribution?
7. Table 9.7a shows the share of income going to each quintile of the income distribution for the United Kingdom in 1979 and 1991. Use this data to calculate what the points on a Lorenz curve would be, and sketch the Lorenz curve. How did inequality in the United Kingdom shift over this time period? How can you see the patterns in the quintiles in the Lorenz curves?

Table 9.7a Income Distribution in the United Kingdom, 1979 and 1991

Share of Income	1979	1991
Top quintile	39.7%	42.9%
Fourth quintile	24.8%	22.7%
Middle quintile	17.0%	16.3%
Second quintile	11.5%	11.5%
Bottom quintile	7.0%	6.6%

8. Using two demand and supply diagrams, one for the low-wage labour market and one for the high-wage labour market, explain how information technology can increase income inequality if it is a complement to high-income workers like salespeople and managers, but a substitute for low-income workers like file clerks and telephone receptionists.
9. Using two demand and supply diagrams, one for the low-wage labour market and one for the high-wage labour market, explain how a program that increased educational levels for a substantial number of low-skill workers could reduce income inequality.
10. Here is one hypothesis: A well-funded social safety net can increase economic equality but will reduce economic output. Explain why this might be so, and sketch a production possibility curve that shows this tradeoff.
11. Here is a second hypothesis: A well-funded social safety net may lead to less regulation of the market economy. Explain why this might be so, and sketch a production possibility curve that shows this tradeoff.
12. Which set of policies is more likely to cause a tradeoff between economic output and equality: policies of redistribution or policies aimed at the ladder of opportunity? Explain how the production possibility frontier tradeoff between economic equality and output might look

in each case.

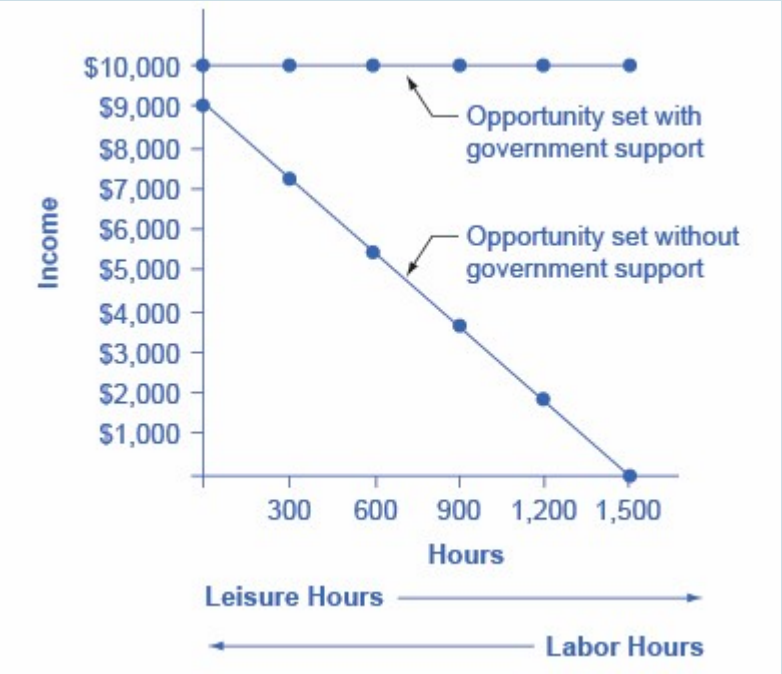
13. Why is there reluctance on the part of some in the United States to redistribute income so that greater equality can be achieved?

Check your answers

1. a)Poverty falls, inequality rises. b)Poverty rises, inequality falls.
2. Jonathon's options for working and total income are shown in the following table. His labour-leisure diagram is shown in the figure following the table.

Table 9.7b Question 2 Table Data

Number of Work Hours	Earnings from Work	Government Benefits	Total Income
1,500	$9,000	$1,000	$10,000
1,200	$7,200	$2,800	$10,000
900	$5,400	$4,600	$10,000
600	$3,600	$6,400	$10,000
300	$1,800	$8,200	$10,000
0	$0	$10,000	$10,000



Question 2 Figure 9.7a. Figure by Steven A. Greenlaw & David Shapiro (OpenStax), licensed under CC BY 4.0.

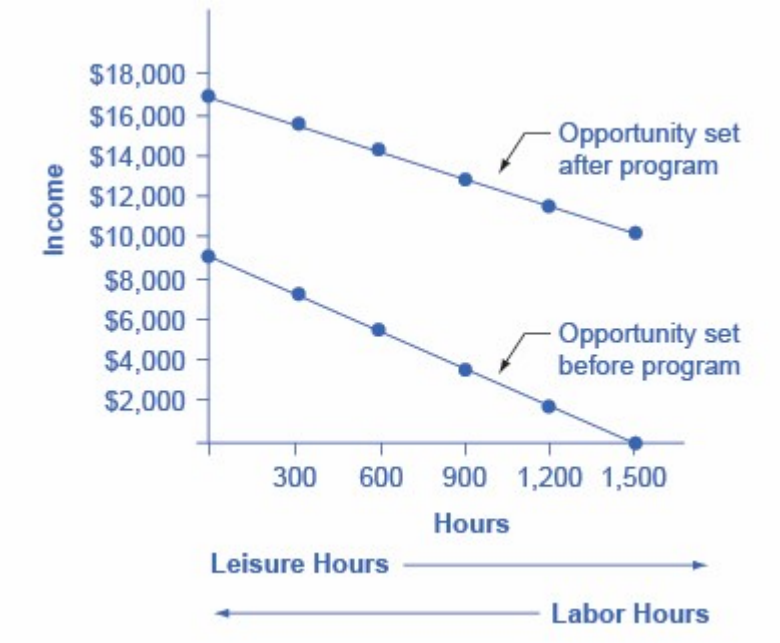
Question 2 Figure 9.7a (Text Version)

The vertical axis is Income (thousands of dollars) and the horizontal axis is leisure in hours.
Line 1: "Opportunity set without government support" line slopes downward from left to right at points listed in Question 2 Table Data above in columns Number of Work Hours and Earnings from Work (Line 1).
Line 2: "Opportunity set with government support" is a horizontal line at $10,000. Points listed in Question 2 Table Data above in columns Government Benefits and Total Income (Line 2).

3. The following table shows a policy where only 30 cents in government support is pulled right back for every $1 of income earned. Jonathon's labour-leisure diagram is shown in the figure following the Question 3 Table Data. "Opportunity set after program" extends from (0 hours, $16,300) to (1,500 hours, $10,000). "Opportunity set before program" slopes downward from (0 hours, $9,000) to (1,500 hours, $0).

Table 9.7c Question 3 Table Data

Number of Work Hours	Earnings from Work	Government Benefits	Total Income
1,500	$9,000	$7,300	$16,300
1,200	$7,200	$7,840	$15,040
900	$5,400	$8,380	$13,780
600	$3,600	$8,920	$12,520
300	$1,800	$9,460	$22,260
0	$0	$10,000	$10,000



Question 3 Figure 9.7b. Figure by Steven A. Greenlaw & David Shapiro (OpenStax), licensed CC By 4.0.

4. The earned income tax credit works like this: a poor family receives a tax break that increases according to how much they work. Families that work more get more. In that sense it loosens the poverty trap by encouraging work. As families earn above the poverty level, the earned income tax credit is gradually reduced. For those near-poor families, the earned income tax credit is a partial disincentive to work.
5. TANF attempts to loosen the poverty trap by providing incentives to work in other ways. Specifically, it requires that people work (or complete their education) as a condition of receiving TANF benefits, and it places a time limit on benefits.

6. QA useful first step is to rank the households by income, from lowest to highest. Then, since there are 10 households total, the bottom quintile will be the bottom two households, the second quintile will be the third and fourth households, and so on up to the top quintile. The quintiles and percentage of total income for the data provided are shown in the following table. Comparing this distribution to the U.S. income distribution for 2005, the top quintile in the example has a smaller share of total income than in the U.S. distribution and the bottom quintile has a larger share. This pattern usually means that the income distribution in the example is more equal than the U.S. distribution.

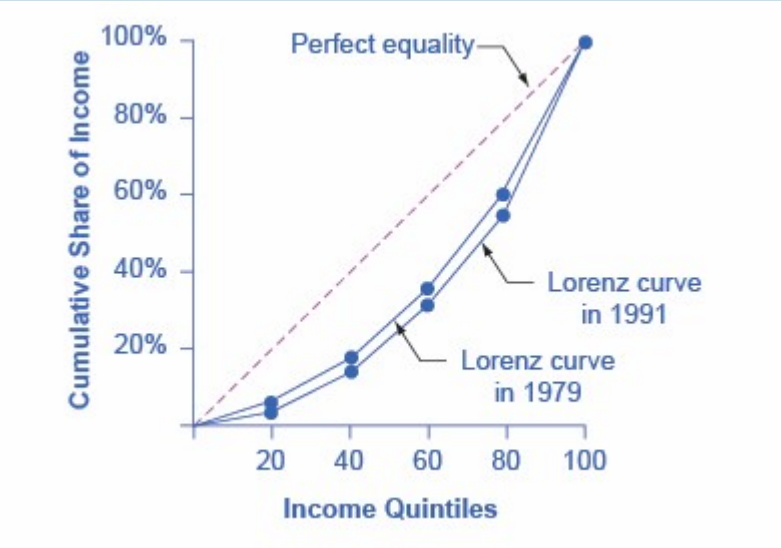
Table 9.7d Question 6 Table Data

Income	Quintile	% of Total Income
$10,000 $12,000	Total first quintile income: $22,000	6.0%
$16,000 $18,000	Total second quintile income: $34,000	9.2%
$24,000 $24,000	Total third quintile income: $48,000	13.0%
$36,000 $50,000	Total fourth quintile income: $86,000	23.2%
$80,000 $100,000	Total top quintile income: $180,000	48.6%
$370,000	**Total Income**	–

7. Just from glancing at the quintile information, it is fairly obvious that income inequality increased in the United Kingdom over this time: The top quintile is getting a lot more, and the lowest quintile is getting a bit less. Converting this information into a Lorenz curve, however, is a little trickier, because the Lorenz curve graphs the cumulative distribution, not the amount received by individual quintiles. Thus, as explained in the text, you have to add up the individual quintile data to convert the data to this form. The following table shows the actual calculations for the share of income in 1979 versus 1991. The figure following the table shows the perfect equality line and the Lorenz curves for 1979 and 1991. As shown, the income distribution in 1979 was closer to the perfect equality line than the income distribution in 1991—that is, the United Kingdom income distribution became more unequal over time.

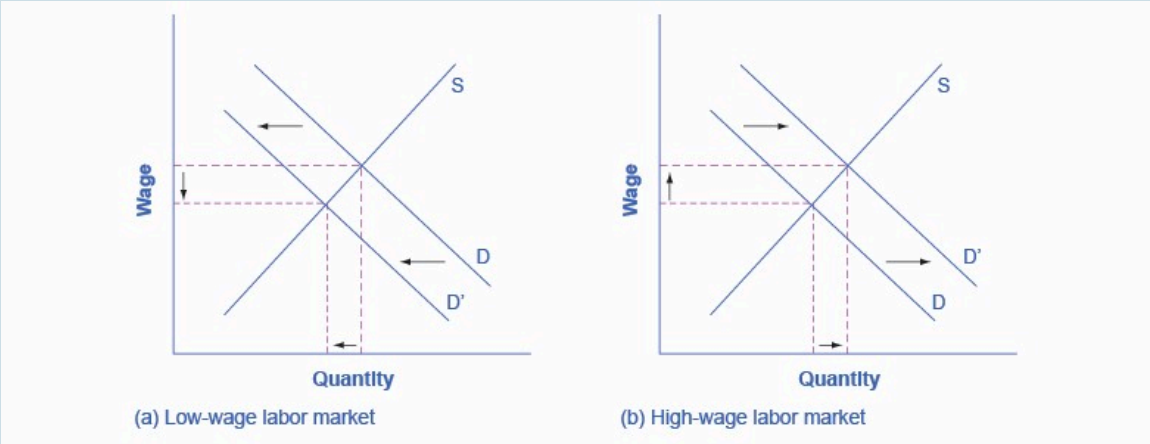
Table 9.7e Question 7 Data Table

Share of income received	1979	1991
Bottom 20%	7.0%	6.6%
Bottom 40%	18.5%	18.1%
Bottom 60%	35.5%	34.4%
Bottom 80%	60.3%	57.1%
All 100%	100.0%	100.0%



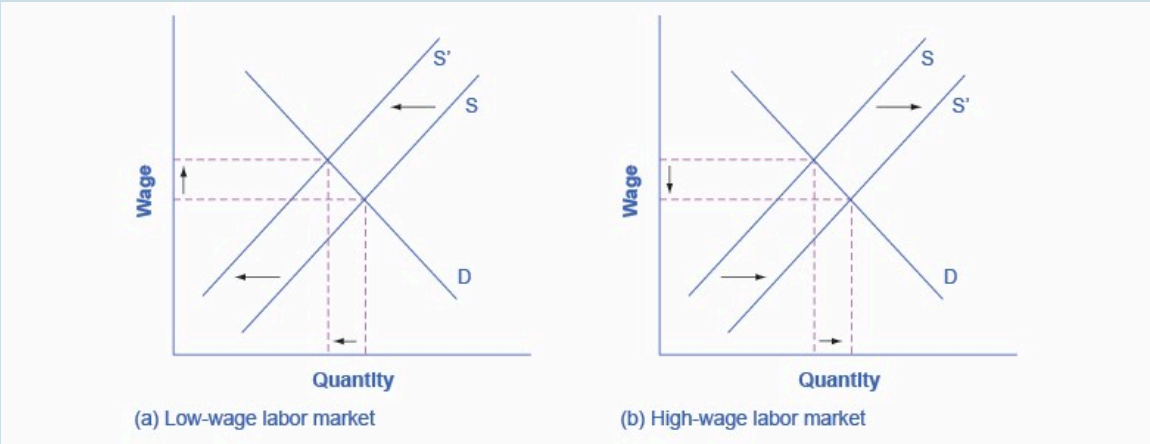
Question 7 Figure 9.7c. Figure by Steven A. Greenlaw & David Shapiro (OpenStax), licensed under CC BY 4.0.

8. In the market for low-wage labour, information technology shifts the demand for low-wage labour to the left. One reason is that technology can often substitute for low-wage labour in certain kinds of telephone or bookkeeping jobs. In addition, information technology makes it easier for companies to manage connections with low-wage workers in other countries, thus reducing the demand for low-wage workers in the United States. In the market for high-wage labour, information technology shifts the demand for high-wage labour to the right. By using the new information and communications technologies, high-wage labour can become more productive and can oversee more tasks than before. The following figure illustrates these two labour markets. The combination of lower wages for low-wage labour and higher wages for high-wage labour means greater inequality.



Question 8 Figure 9.7d. Figure by Steven A. Greenlaw & David Shapiro (OpenStax), licensed under CC BY 4.0.

9. In the market for low-wage labour, a skills program will shift supply to the left, which will tend to drive up wages for the remaining low-skill workers. In the market for high-wage labour, a skills program will shift supply to the right (because after the training program there are now more high-skilled workers at every wage), which will tend to drive down wages for high-skill workers. The combination of these two programs will result in a lesser degree of inequality. The following figure illustrates these two labour markets. In the market for high-wage labour, a skills program will shift supply to the right, which will tend to drive down wages for high-skill workers.



Question 9 Figure 9.7e. Figure by Steven A. Greenlaw & David Shapiro (OpenStax), licensed under CC BY 4.0.

10. >A very strong push for economic equality might include extremely high taxes on high-wage

earners to pay for extremely large government social payments for the poor. Such a policy could limit incentives for the high-wage workers, lock the poor into a poverty trap, and thus reduce output. The PPF in this case will have the standard appearance: it will be downward sloping.

11. For the second hypothesis, a well-funded social safety net might make people feel that even if their company goes bankrupt or they need to change jobs or industries, they will have some degree of protection. As a result, people may be more willing to allow markets to work without interference, and not to lobby as hard for rules that would prevent layoffs, set price controls, or block foreign trade. In this case, safety net programs that increase equality could also allow the market to work more freely in a way that could increase output. In this case, at least some portion of the PPF between equality and economic output would slope up.
12. Pure redistribution is more likely to cause a sharp tradeoff between economic output and equality than policies aimed at the ladder of opportunity. A production possibility frontier showing a strict tradeoff between economic output and equality will be downward sloping. A PPF showing that it is possible to increase equality, at least to some extent, while either increasing output or at least not diminishing it would have a PPF that first rises, perhaps has a flat area, and then falls.

Critical Thinking Questions

1. What goods and services would you include in an estimate of the basic necessities for a family of four?
2. If a family of three earned $20,000, would they be able to make ends meet given the official poverty threshold?
3. Exercise 15.2 and Exercise 15.3 asked you to describe the labour-leisure tradeoff for Jonathon. Since, in the first example, there is no monetary incentive for Jonathon to work, explain why he may choose to work anyway. Explain what the opportunity costs of working and not working might be for Jonathon in each example. Using your tables and graphs from Exercise

15.2 and Exercise 15.3, analyze how the government welfare system affects Jonathan's incentive to work.

4. Explain how you would create a government program that would give an incentive for labour to increase hours and keep labour from falling into the poverty trap.
5. Many critics of government programs to help low-income individuals argue that these programs create a poverty trap. Explain how programs such as TANF, EITC, SNAP, and Medicaid will affect low-income individuals and whether or not you think these programs will benefit families and children.
6. Think about the business cycle: during a recession, unemployment increases; it decreases in an expansionary phase. Explain what happens to TANF, SNAP, and Medicaid programs at each phase of the business cycle (recession, trough, expansion, and peak).
7. Explain how a country may experience greater equality in the distribution of income, yet still experience high rates of poverty. *Hint*: Look at the Clear It Up (15-1-drawing-the-poverty-line) "How do governments measure poverty in low-income countries?" and compare to Table 15.5. Share of Aggregate Income Received by Each Fifth and Top 5% of Households, 1967–2013 (Source: U.S. Census Bureau, Table 2)
8. The demand for skilled workers in the United States has been increasing. To increase the supply of skilled workers, many argue that immigration reform to allow more skilled labour into the United States is needed. Explain whether you agree or disagree.
9. Explain a situation using the supply and demand for skilled labour in which the increased number of college graduates leads to depressed wages. Given the rising cost of going to college, explain why a college education will or will not increase income inequality.
10. What do you think is more important to focus on when considering inequality: income inequality or wealth inequality?
11. To reduce income inequality, should the marginal tax rates on the top 1% be increased?
12. Redistribution of income occurs through the federal income tax and government antipoverty programs. Explain whether or not this level of redistribution is appropriate and whether more redistribution should occur.
13. How does a society or a country make the decision about the tradeoff between equality and economic output? *Hint*: Think about the political system.
14. Explain what the long- and short-term consequences are of not promoting equality or working to reduce poverty.

Review Questions

1. How is the poverty rate calculated?
2. What is the poverty line?
3. What is the difference between poverty and income inequality?
4. How does the poverty trap discourage people from working?
5. How can the effect of the poverty trap be reduced?
6. Who are the near-poor?
7. What is the safety net?
8. Briefly explain the differences between TANF, the earned income tax credit, SNAP, and Medicaid.
9. Who is included in the top income quintile?
10. What is measured on the two axes of a Lorenz curve?
11. If a country had perfect income equality what would the Lorenz curve look like?
12. How has the inequality of income changed in the U.S. economy since the late 1970s?
13. What are some reasons why a certain degree of inequality of income would be expected in a market economy?
14. What are the main reasons economists give for the increase in inequality of incomes?
15. Identify some public policies that can reduce the level of economic inequality.
16. Describe how a push for economic equality might reduce incentives to work and produce output. Then describe how a push for economic inequality might not have such effects.

Problems

1. In country A, the population is 300 million and 50 million people are living below the poverty

line. What is the poverty rate?

2. In country B, the population is 900 million and 100 million people are living below the poverty line. What is the poverty rate?
3. Susan is a single mother with three children. She can earn $8 per hour and works up to 1,800 hours per year. However, if she does not earn any income at all, she will receive government benefits totaling $16,000 per year. For every $1 of income she earns, her level of government support will be reduced by $1. Create a table, patterned after Self Check Question 3 Table Data. The table should have columns: number of work hours, earnings from work, government benefits, and total income. The first column should show Susan's choices of how many hours to work per year, up to 1,800 hours. The second column should show her earnings from work. The third column should show her level of government support, given her earnings. The final column should show her total income, combining earnings and government support. Based on the table you created, what are the likely impacts of this kind of assistance program on Susan's incentive to work? Are there additional opportunity costs that may reduce her incentive to work?
4. A group of 10 people have the following annual incomes: $55,000, $30,000, $15,000, $20,000, $35,000, $80,000, $40,000, $45,000, $30,000, $50,000. Calculate the share of total income each quintile of this income distribution received. Do the top and bottom quintiles in this distribution have a greater or larger share of total income than the top and bottom quintiles of the U.S. income distribution for 2005?

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9.8 - READINGS LIST

1. Canadian Income Inequality: Is Canada becoming more unequal? [New Tab] (https://www.conferenceboard.ca/hcp/hot-topics/canInequality.aspx)
2. Payroll employment, earnings and hours, and job vacancies, October 2021 [New Tab] (https://www150-statcan-gc-ca.georgian.idm.oclc.org/n1/daily-quotidien/211223/dq211223b-eng.htm)

Reading List compiled by Norm Smith.

CHAPTER 10: LEGISLATION IN LABOUR MARKETS

Introduction to Discrimination in Labour Markets

What you'll learn to do: analyze the economic implications of discrimination and immigration policies

Discrimination occurs in a labour market when employers pay workers with the same economic characteristics, such as education, experience, and skill, are paid different amounts because of race, gender, religion, age, or disability status. In the United States, female workers on average earn less than male workers, and black workers on average earn less than white workers. There is controversy over the extent to which pay differences are caused by differences in factors like education and job experience, or by pure discrimination.

Free markets can allow discrimination to occur, but the threat of a loss of sales or a loss of productive workers can also create incentives for a firm not to discriminate. A range of public policies can be used to reduce earnings gaps between men and women or between white and other racial/ethnic groups: requiring equal pay for equal work, and attaining more equal educational outcomes.

In this section, we will examine these policies as well as the economic take on immigration.

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10.1 - TAXES AND TAX PLANNING

Learning Objectives

Sources of Taxation and Kinds of Taxes

- Identify the levels of government that impose taxes.
- Define the different kinds of incomes, assets, and transactions that may be taxed.
- Compare and contrast progressive and regressive taxes.

The Canadian Federal Income Tax Process

- Identify the taxes most relevant for personal financial planning.
- Identify taxable incomes and the schedules used to report them.
- Calculate deductions and credits.
- Compare methods of tax payment.

Record Keeping, Preparation, and Filing

- Identify sources of tax information.
- Explain the importance of verifiable records and record keeping.
- Compare sources of tax preparation assistance.
- Trace the tax review process and its implications.

Taxes and Financial Planning

- Trace the tax effects of life stages and life changes.
- Identify goals and strategies that provide tax advantages.
- Identify tax advantages that may be useful in pursuing your goals.

- Discuss the relationship of tax considerations to financial planning.

Introduction

The design of a tax system reflects the society's view of both the government's responsibilities toward its citizens and of its citizens toward their government. It is an important source of revenue for all governments, and it is largely used to pay for public programs and services.

The federal and provincial governments were granted the authority to make laws under the Constitution Act, 1867. Provinces and territories may assign some law-making authority to municipalities. Since federal, provincial or territorial, and municipal governments can all enact different tax laws, "this leads to a complex and diverse system of taxation in Canada" (Wadden, 2016, p. 128).

The authority of the federal government to make laws pertaining to "Indians, and lands reserved for Indians" has been questioned by Indigenous peoples, many of whom argue that there is no foundation for this in the treaties (Wadden, 2016, p. 128). This brings into question the Indian Act itself and its authority to define the rights of Indigenous peoples. Section 35 of the Constitution Act, 1982 recognizes the inherent Aboriginal right of self-government. The Indian Act will become less relevant as more Indigenous communities move toward self-government (Wadden, 2016).

Link It Up

Visit the Financial Consumer Agency of Canada's webpage 8.1.3 What taxes you pay [New Tab] (https://www.canada.ca/en/financial-consumer-agency/services/financial-toolkit/taxes/taxes-1/4.html) for an illustration of the total amount of revenue that governments in Canada collect from each type of tax.

According to the CBC, in the 2013–2014 fiscal year, the Canadian government spent $276.8 billion, "and 80 per cent of it, or $219.9 billion, came from tax revenue" (CBC, 2015).

Many people tend to focus on taxes only in the lead-up to the April 30 deadline to file personal income tax.

But successful financial planning requires an effective tax strategy throughout the whole year, as well as a basic understanding of the tax rules and regulations. As Kapoor et al. (2015) point out, there are common goals related to tax planning:

- knowing the current tax laws and regulations that affect you,
- maintaining complete and appropriate tax records, and
- making employment, purchase, and investment decisions that leave you with the greatest after tax cash flows and net wealth (p. 172).

Manny Jules, the chief commissioner and one of the creators of the First Nations Tax Commission, an institution that helps securitize property tax revenues and oversee the bylaw approval process, suggests that "taxation is a mechanism to promote the economic independence, and stability of Aboriginal communities" (Wadden, 2016, p. 126). Jules believes that taxation is a fundamental government power that can help bands advance by creating a better, more accountable system, one that helps them to generate their own revenue; "otherwise, you're always depending on someone else to do something for you" (Gerson, 2012). Taxation is an important means for Indigenous governments to generate their own independent revenues instead of relying on federal transfer funds or "Indian monies" under the Indian Act. Indigenous governments have wide discretion to apply tax revenues to their own priorities. During the past twenty-five years, many Indigenous governments in Canada "have enacted laws imposing direct taxes within their reserves or settlement lands. Aboriginal government taxes may include real property tax, sales tax, income tax and certain provincial-type commodity taxes" (INAC, 2014).

We will review the different types of taxes utilized by Indigenous, federal, provincial or territorial, and municipal governments throughout this chapter.

Sources of Taxation and Kinds of Taxes

Any government that needs to raise revenue and has the legal authority to do so may tax. Tax jurisdictions reflect government authorities. Taxation is used by governing bodies to fund public services such as "water, sewer, roads, garbage collection, education, and health care" (Wadden, 2016, p. 125).

In Canada, federal, provincial or territorial, and municipal governments impose taxes. Many Indigenous governments also impose taxes. Individuals and businesses in Canada must pay the following taxes: property tax, income tax, and sales tax. Similarly, in many countries there are national, provincial or state, county, and municipal taxes. Regional economic alliances, such as the European Union, may also levy taxes. The following are common taxes paid by people in Canada every year:

- Income taxes on employment and other income that you receive

- Sales taxes such as the Goods and Services Tax (GST) or Harmonized Sales Tax (HST) and the Provincial Sales Taxes (PST)
- Property taxes, usually charged by local governments on the value of land and buildings
- Customs duties or tariffs on certain imported and exported products
- Contributions by employers and employees to social security plans such as the Employment Insurance (EI) system, the Canada Pension Plan (CPP), the Québec Pension Plan (QPP), or the Québec Parental Insurance Plan
- Health services taxes charged in some provinces for access to the provincial health-care system
- Other taxes such as motor vehicle licences and natural resource taxes. (FCAC, 2017)

Governments tax income because it is a way to tax broadly based on the ability to pay. Most adults have an income from some source, even if it is a government distribution. Those with higher incomes should be able to pay more taxes, and, in theory, they should be willing to do so, for they have been more successful in or have benefited more from the economy that the government protects.

According to the Financial Consumer Agency of Canada, the following are definitions of different types of taxes:

Tax: A compulsory financial contribution imposed by law to raise government revenue.
Tariff: A charge (or list of charges) imposed by a government on imports or exports.
Duty: A specific tax imposed by law on imports or exports (same as tariffs).
Fee: A payment for services or for a particular privilege. (FCAC, 2017)

Income tax is usually a **progressive tax**: the higher the income or the more to be taxed, the greater the tax rate. The percentage of income that is paid in tax increases as income rises. Those income categories are called **tax brackets**.

Income tax is the main source of revenue for the federal government and is a direct tax on the income of individuals and businesses. Income tax can be levied by the federal, provincial or territorial, and Indigenous governments. The Income Tax Act provides the federal government with the authority to collect income tax. Through tax-collection agreements with most of the provinces and territories, the federal government has the authority to collect provincial or territorial income taxes on their behalf. **First Nations Personal Income Tax Administration agreements** have been entered into by a number of First Nations with the Government of Canada. According to Wadden (2016), these agreements allow self-governing First Nations "to exercise their power of direct taxation, to impose taxes on the income of individuals, and to enter into tax-collection agreements with Canada to collect taxes payable under the First Nations Tax Act" and remit them back to the applicable First Nation (p. 134).

With regard to the federal and provincial or territorial governments, your income, minus the deductions for

which you qualify, must be calculated in order to arrive at a taxable income. You are taxed first by the federal government and then by your provincial or territorial government.

In Canada, we operate under a marginal tax rate system. **Marginal tax** is the amount of tax paid on an additional dollar of income. Unlike the flat tax rate, where you pay the same rate of tax no matter what your income, a marginal tax rate system increases the tax rate as income rises. Knowing one's marginal tax rate can help you make effective long-term financial decisions.

For example, if you know you will be taxed at a much higher rate because you will be earning significantly more income in the coming year, you might want to consider investing in an RRSP. However, this strategy only makes sense if you can reasonably assume that you will be earning a much lower income in retirement and therefore paying a lower income tax in retirement. (Please see Chapter 11 for more information on RRSPs.)

The rate at which you are taxed is categorized into tax brackets and is determined by the government. Table 10.1a shows an overview of 2018 federal tax brackets.

Table 10.1a Canadian Income Tax Brackets in 2018
Data Source: Canada Revenue Agency, 2018. Table created by Bettina Schneider, 2018.

If your taxable income was between	Federal Marginal Tax Rate
$0-$46,605	15%
$46,606 up to $93,208	20.5%
$93,208 up to $144,489	26%
$144,489 up to $205,842	29%
$205,842 and up	33%

Federal tax and tax for all provinces and territories (except Quebec) is calculated the same way. Marginal tax rates calculate the amount of combined federal and provincial taxes payable on the next dollar of income. To calculate your combined federal and provincial tax bill in each province and territory as of June 15, 2018, you can use the 2018 Personal tax calculator [New Tab] (https://www.ey.com/ca/en/services/tax/tax-calculators-2018-personal-tax)found on Ernst & Young's website.

Link It Up

For a list of provincial and territorial tax rates, visit the Government of Canada's Provincial and

territorial tax rates for individuals [New Tab] (https://www.canada.ca/en/revenue-agency/services/tax/individuals/frequently-asked-questions-individuals/canadian-income-tax-rates-individuals-current-previous-years.html#provincial) webpage.

Tax is levied on income from many sources:

- wages (selling labour),
- interest, dividends, and gains from investment (selling capital),
- self-employment (operating a business or selling a good or service),
- property rental,
- royalties (rental of intellectual property), and
- "other" income such as alimony, gambling winnings, or prizes.

A **sales tax** or **consumption tax** taxes the consumption financed by income. In Canada, sales taxes are imposed by the federal and provincial governments. Sales taxes are said to be more efficient and fair in that consumption reflects income (income determines one's ability to consume and therefore one's level of consumption). Consumption is also hard to hide, making sales tax a good way to collect taxes based on one's ability to pay. Consumption taxes typically tax all consumption, including nondiscretionary items such as food, clothing, and housing. Opponents of sales tax argue that it is a **regressive tax**, because those with lower incomes must use a higher percentage of their incomes on nondiscretionary purchases than higher-income people do. In Canada, there are three types of sales taxes:

1. **Provincial Sales Tax (PST)**: currently collected in British Columbia, Saskatchewan, Manitoba, and Quebec.
2. **Goods and Services Tax (GST)**: a value-added tax (general consumption tax) levied by the federal government on most products except for essentials such as groceries, rent, and medical services. GST is an example of an excise tax, an indirect tax imposed on the sale of a particular product.
3. **Harmonized Sales Tax (HST)**: also a value-added tax that is a single, blended combination of PST and GST, collected by Ontario, New Brunswick, Newfoundland and Labrador, Nova Scotia, and Prince Edward Island.

Sales tax is an example of an indirect tax because it involves an intermediary that collects tax from a person or organization and remits it to the entity that is imposing it (Wadden, 2016, p. 128). The seller (the taxation body) collects the tax from the buyer.

The **value-added tax (VAT)** or GST is a consumption tax, but it differs from the sales tax, which is paid only by the consumer as an end user. With a VAT or GST, the value added to the product is taxed at each stage of production. Governments use a VAT or GST instead of a sales tax to spread the tax burden among producers and consumers, and thus to reduce incentive to evade the tax. A consumption tax is a regressive tax. When travelling abroad, you should be aware that a VAT may add substantially to the cost of a purchase (i.e. a meal, accommodations, etc.).

Excise taxes are taxes on specific consumption items such as alcohol, cigarettes, motor vehicles, fuel, or highway use. In some provinces, excise taxes are justified by the discretionary nature of the purchases and may be criticized as exercises in "social engineering"—using the tax code to dictate social behaviours. For example, people addicted to nicotine or alcohol tend to purchase cigarettes or liquor even if an excise tax increases their cost and are therefore a reliable source of tax revenue.

Property taxes are used primarily by local—municipal, provincial or territorial, state, and county—governments, and are most commonly imposed on real property (land and buildings), but also on personal assets such as vehicles and boats. Property values theoretically reflect wealth (accrued income) and thus one's ability to pay taxes. Property values are also a matter of public record (real property is deeded, whereas boats or automobiles are licensed), which allows more efficient tax collection. First Nations property may be taxed under bylaws passed by band councils, which may have authority under section 83 of the Indian Act or the 2005 First Nations Fiscal and Statistical Management Act. Most of these bylaws exempt property that is owned by band members (Wadden, 2016).

First Nations and Tax Exemptions

First Nations individuals and businesses are subject to the same tax rules as other Canadian residents unless income is eligible for tax exemption under section 87 of the Indian Act and paragraph 81(1)(a) of the Income Tax Act. As of 2011, 55 per cent of the 1.4 million Indigenous people in Canada followed the same tax rules as other Canadians (Sagan, 2015). Exemption is meant to protect the property of those living on reserves. Those who have moved off reserve do not qualify for section 87 tax exemptions. EI premiums are mandatory deductions that on-reserve employers must make while CPP contributions are not. On-reserve employers can provide their employees with optional CPP coverage; however, they are not required to deduct CPP from non-taxable income (CRA, 2018). If goods are bought on, or delivered to, a reserve, they are also tax exempt. Section 87 of the Indian Act does not apply to First Nations that have self-government agreements.

The following factors are considered by the Canada Revenue Agency (CRA) with regard to employment income tax exemption:

- Name

- Address
- Whether address is located on reserve
- Whether the individual is registered or entitled to be registered under the Indian Act
- Proportion of duties that are performed on reserve
- Residence is also a factor (CRA, 2017)

Furthermore, according to Sagan (2015), businesses and self-employed individuals can be tax exempt if they meet several factors outlined by the CRA, including:

- Where the business or person carries out revenue-generating activities
- Where its customers are located
- Whether or not an office or books and records are kept on a reserve (Sagan, 2015)
- The interest of an Indian or a band in reserve lands or surrendered lands; and
- The personal property of an Indian or a band situated on reserve (Indian Act, 1985).

According to section 90, "certain items of personal property are protected from taxation or seizure by deeming that the property is situated on the reserve" (Wadden, 2016, p. 135). Currently, Métis and Inuit are not eligible to use the tax exemptions noted in the Indian Act. Tax exemptions are granted only to those individuals who meet the definition of "Indian" under the Act. Section 2 defines an Indian as "a person who pursuant to this Act is registered as an Indian or is entitled to be registered as an Indian" (Wadden, 2016, pp. 136–137). Those who have been removed from the Indian Register, or from a band list, may apply to be added. According to the CBC, "tax exemption for First Nations serves in part to protect aboriginal land and 'to make sure tax does not erode the use of Indian property on reserves' " (Sagan, 2015).

Whitecap Dakota First Nation levies a variety of different taxes on reserve that status and non-status First Nations must pay. Chief Darcy Bear believes First Nations communities that levy their own taxes "are following in the tradition of the 'sharing model' that's always been a part of First Nations culture" (Sagan, 2015). According to Chief Bear, "If your best hunter killed 10 buffalo, he doesn't eat 10 buffalo himself. He shares with the whole community" (Sagan, 2015). Chief Bear believes it is important to generate income through taxation so a First Nation can invest in its people (Sagan, 2015).

The following information, taken directly from the Indigenous and Northern Affairs Canada webpage Facts Sheet—Taxation by Aboriginal Governments, highlights the different types of First Nations government taxes currently in place:

- **First Nations Sales Tax (FNST)** (levied only by Indian Act bands): A tax that applies to on-reserve sales of alcoholic beverages, motor fuels or tobacco products.
- **First Nations Goods and Services Tax (FNGST)** (levied by Indian Act bands or Aboriginal self-

governments): A tax on the consumption that occurs within reserve or settlement lands.

- **First Nations Personal Income Tax (FNPIT)** (levied only by Aboriginal self-governments): To date, fourteen self-governing Aboriginal groups have enacted personal income tax laws and concluded related tax administration agreements with Canada.
- **Real Property Tax** under the Indian Act or the First Nations Fiscal Management Act: section 83 of the Indian Act provides a power for Indian Act bands to make bylaws for the taxation of land or interest in land in the reserve.
- **Self-Government Agreements**: The area of tax powers is also generally one of the subject matters addressed in self-government negotiations. Following the conclusion of self-government negotiations, many final agreements provide the Aboriginal government with the authority to impose direct taxes (e.g., real property tax, sales tax) on their citizens/members within their reserves or settlement lands.
- **Provincial-Type Taxes** (Indian Act bands or Aboriginal Self-Governments): The federal government has repeatedly expressed its willingness to facilitate tax administration agreements between *Indian Act* bands and provinces or territories. In 2006, the *First Nations Goods and Services Tax Act* was amended to enable the council of an *Indian Act* band that is listed in Schedule II to that Act to enact a law that imposes a direct tax like a particular provincial tax, if that province agrees and is also listed in the Schedule. A number of *Indian Act* bands and provinces have concluded such agreements. (INAC, 2016)

In August 2017, the Prime Minister announced that Indigenous and Northern Affairs Canada (INAC) would be dissolved and two new departments—Crown-Indigenous Relations and Northern Affairs Canada, and Indigenous Services Canada—would take INAC's place over time, after engagement with Indigenous peoples and others.

As you can see, there are a number of different taxes that exist in Canada. It is critical to understand which taxes apply to you so you can develop a taxation strategy that will help you to be successful in your financial planning.

Exercises

1. The T1 tax form is what individual Canadians use to complete their personal income tax

return. Please review the video Preparing T1 Returns – Reporting income and inputting T-slips on the T1 tax return (Part 2 of 5) [New Tab] (https://www.youtube.com/watch?v=x2N9D-jwnvA) (12:47) by CanadianTaxAcademy.com on how to complete a T1 General form. After watching this video, try completing the T1 General form [New Tab] (https://www.canada.ca/en/revenue-agency/services/forms-publications/tax-packages-years/general-income-tax-benefit-package.html).

2. Examine the tax returns that you filed last year. Alternatively, estimate your tax return based on your present financial situation. On what incomes were you (or would you be) taxed? What tax bracket were you (or would you be) in? How did (or would) your provincial, federal, and other tax liabilities differ? What other types of taxes did you (or would you) pay, and to which government jurisdictions?
3. There are six types of tax: property, consumption, value-added or goods and services tax, income tax, excise tax, and sales tax. Match the type of tax to the description below:
   - Tax on the use of vehicles, gasoline, alcohol, cigarettes, highways, etc.
   - Tax on purchases of both discretionary and nondiscretionary items
   - Tax on wages, earned interest, capital gain, and the like
   - Tax on home and land ownership
   - Tax on purchases of discretionary items
   - Tax on items during their production as well as upon consumption
4. In your financial planning journal, record all the types of taxes you will be paying next year and to whom. How will you plan for paying these taxes? How will your tax liabilities affect your budget?

The Canadian Federal Income Tax Process

The Canadian government relies most on income tax to provide for various types of government services. Income tax is the most relevant tax to consider for personal financial planning, as everyone has some sort of income over a lifetime. Most provinces and territories model their tax systems on the federal model or base their tax rates on federally defined income.

Taxable Entities

There are three taxable entities in the federal system: the individual or family unit, the corporation, and the trust. Personal financial planning focuses on your decisions as an individual or family unit, but other tax

entities can affect individual income. Corporate profit may be distributed to individuals as a **dividend**, for example, which then becomes the individual's taxable income. Likewise, funds established for a specific purpose may distribute money to an individual that is taxable as individual income. A **trust**, for example, is a legal arrangement whereby control over property is transferred to a person or organization (the trustee) for the benefit of someone else (the beneficiary). In Canada, the estate pays the taxes owed to the government, not the beneficiaries.

Peace Hills Trust (PHT) is considered Canada's first and largest First Nation trust company. It is owned by the Samson Cree Nation of Maskwacis, Alberta, and has its head office in Maskwacis, Alberta. PHT was established in 1980 in order to serve "the financial needs of First Nations and their members, corporations, institutions and associations both on and off reserve" (PHT, 2017). It currently offers a wide range of financial and retail banking to more than twenty thousand personal and business customers, from both Indigenous and non-Indigenous backgrounds, in most regions of Canada through a network of eight regional offices and electronic services (PHT, 2017). As PHT states, "First Nation trusts have evolved a great deal over recent years. Now they may include impact benefit arrangements and economic development structures that provide growth and educational opportunities for First Nations" (PHT, n.d.).

While Canadian tax rules do not allow spouses to file joint income tax returns, couples in Canada can reduce the total amount of taxes they have to pay. If you choose to use tax preparation software, it may include an option to prepare a "coupled" return that maximizes your benefits while still generating two separate returns.

All taxable entities, including non-residents who receive income from sources in Canada, have to file a declaration of incomes and pay any tax obligations annually. Under Canada's tax system, what you pay in income tax is based on your residency status.

But not everyone who files a tax return actually pays taxes. For example, individuals with low incomes and tax exempt, non-profit corporations typically do not. All potential taxpayers nevertheless must declare income and show their obligations to the government. For the individual, that declaration is filed on the T1 General form, which can be accessed on the Canada Revenue Agency website.

Income

For individuals, the first step in the process is to calculate total income. Income may come from many sources, and each income must be calculated and declared. Some kinds of income have a separate form or schedule to show their more detailed calculations. The following schedules are the most common for reporting incomes separately by source.

Interest and Dividend Income

Interest income is income from selling liquidity. For example, the interest that your savings account, guaranteed investment certificate, and bonds earn in a year is income. You essentially are earning interest from lending cash to a bank, a government, or a corporation (though not all your interest income may be taxable). Dividend income, on the other hand, is income from investing in the stock market. Dividends are your share of corporate profits as a shareholder, distributed in proportion to the number of shares of corporate stock you own.

Employment Income

Employment income is payment received for personal effort, including salaries, wages, commissions, tips, bonuses, and taxable employee benefits.

Business Income

Business income is income from any sole proprietorship, partnership, corporation, or profession. For sole proprietors and partners in a partnership, business income is the primary source of income. Many other individuals rely on wages, but have a small business on the side for extra income. Business expenses can be deducted from business income, including, for example, business use of your car and home. If expenses are greater than income, the business is operating at a loss. Business losses can be deducted from total income, just as business income adds to total income.

The tax laws distinguish between a business and a hobby that earns or loses money. The CRA defines a business as "any activity that you do for profit," and any profit from your hobby is considered business income (Ward, 2017). In addition, the self-employed must pay estimated income taxes in quarterly installments based on expected income depending on your earnings. According to the CRA, quarterly income tax installments are required if your net tax owing will be above the threshold for your province or territory and/or if your net tax owing in previous years was above the threshold for your province or territory.

Adam is thinking about turning his hobby into a business. He has been successful at selling his artwork at different tradeshows and online. He thinks he has found a large enough market to support a business enterprise. As a business, he would be able to deduct the costs of website promotion, his art sales trips, his home office, and shipping, which would reduce the taxes he would have to pay on his business income. Adam decides to enroll in online courses on becoming an entrepreneur, how to write a business plan, and how to find capital for a new venture.

Capital Gains (or Losses)

Gains or losses from investments derive from changes in asset value during ownership between the asset's original cost and its market value at the time of sale. If you sell an asset for more than you paid for it, you have a gain. If you sell an asset for less than you paid for it, you have a loss. Capital losses are subtracted from capital gains in the same calendar year, and 50 per cent of the resulting amount is taxable, which means less tax is paid on capital gains than on income. Recurring gains or losses from investment are from returns on financial instruments such as stocks and bonds. One-time gains or losses, such as the sale of a home, are also reported.

When you invest in financial assets, such as stocks, bonds, mutual funds, property, or equipment, be sure to keep good records by noting the date when you bought them and the original price. These records establish the **cost basis** of your investments, which is used to calculate your gain or loss when you sell them.

Rental and Royalty Income; Income from Partnerships and Trusts

Rental or royalty income is income earned from renting an asset, either real property or a creative work such as a book or a song. This can be a primary source of income, although many individuals rely on wages and have some rental or royalty income on the side. Home ownership may be made more affordable, for example, if the second half of a duplex can be rented for extra income. Rental expenses can also be deducted from rental income, which can create a loss from rental activity rather than a gain. Unlike a business, which must become profitable to remain a business for tax purposes, rental activities may generate losses year after year. Such losses are a tax advantage, as they reduce total income. In Canada, any capital gained on a home (house, condominium, or a share in a co-operative housing corporation) is tax exempt as long as it is your primary residence. The revenue sale of a rental home is subject to capital gains tax.

Partnerships are alternative business structures for a business with more than one owner. For example, partnerships are commonly used by professional practices, such as accounting firms, law firms, medical practices, and the like, as well as by family businesses.

The partnership is not a taxable entity, but the share of its profits distributed to each owner is taxable income for the owner and must be declared.

Other Taxable and Non-Taxable Income

Other taxable income includes spousal support, retirement fund distributions from pension plans and RRSPs, as well as payments from government plans such as the Canada Pension Plan, Employment Insurance, or Old Age Security.

According to the CRA, income that is not taxed by the Canadian government and does not have to be reported as income includes the following:

- any GST/HST credit, Canada child benefit, or Canada child tax benefit payments, including those from related provincial and territorial programs;
- child assistance payments and the supplement for handicapped children paid by the province of Quebec;
- compensation received from a province or territory if you were a victim of a criminal act or a motor vehicle accident;
- most lottery winnings;
- most gifts and inheritances;
- amounts paid by Canada or an ally (if the amount is not taxable in that country) for disability or death due to war service;
- most amounts received from a life insurance policy following someone's death;
- most payments of the type commonly referred to as strike pay you received from your union, even if you perform picketing duties as a requirement of membership;
- elementary and secondary school scholarships and bursaries;
- post-secondary school scholarships, fellowships, and bursaries are not taxable if you received them in 2016 for your enrollment in a program that entitles you to claim the full-time education amount in 2015 or 2016, or if you will be considered a full-time qualifying student for 2017. (CRA, 2018)

Note, however, that income earned on any of the above amounts (such as interest you earn when you invest lottery winnings) is taxable.

Any amount contributed to a Tax-Free Savings Account (TSFA) as well as any income earned in the TSFA (for example, investment income and capital gains) is generally tax-free, even when it is withdrawn. For more information, see RC4466 Tax-Free Savings Account (TFSA), Guide for Individuals [New Tab] (https://www.canada.ca/en/revenue-agency/services/forms-publications/publications/rc4466.html) (CRA, 2018).

Deductions and Credits

Deductions are tax breaks created by government that allow individuals to reduce their overall taxable income by deducting certain expenditures.

Other deductions involve financial choices that the government encourages by providing an extra incentive in the form of a tax break. For example, one can deduct investment interest on borrowed money for the purpose of earning income from a business or property; this deduction is meant to encourage investment.

Deductions are also created for expenditures that may be considered nondiscretionary, such as court-ordered

child support, spousal support, or medical expenses that you are required to pay. You have to read the instructions carefully in order to know what expenditures qualify as deductions. The following list provides examples of common deductions permitted in the calculation of net income:

- Contributions to deferred income plans such as registered pension plans, individual pension plans, and RRSPs are deductible. Income from these plans is taxed later down the road when withdrawals are made. Contributions to a tax-free savings account or a registered education savings plan (RESP) are not tax-deductible.
- Union and profession dues
- Child-care expenses
- Disability supports
- Moving expenses
- Other deductions include deductible business investment losses, spousal and child support payments, interest paid on loans (excluding loans for RRSP and RESP contributions), and employment expenses if, for example, one's employer requires the employee to pay for travel or other costs of employment.

For a list of medical expenses that are tax-deductible, visit the CRA Lines 330 and 331 – Eligible medical expenses you can claim on your tax return [New Tab] (https://www.canada.ca/en/revenue-agency/services/tax/individuals/topics/about-your-tax-return/tax-return/completing-a-tax-return/deductions-credits-expenses/lines-330-331-eligible-medical-expenses-you-claim-on-your-tax-return.html).

Some deductions require an additional form to calculate specifics, such as unreimbursed employee or job-related expenses and investment interest. Once deductions are subtracted from total income, **net income** can be determined. Additional deductions and losses from previous years can be carried forward to determine taxable income once net income has been calculated. The final step in determining your taxable income is to factor in tax rates and tax credits.

A **tax credit** directly reduces the amount of tax you'll pay versus a deduction which reduces your overall taxable income. A tax credit can be viewed as a deduction from the tax that is owed. Each taxpayer receives the same tax relief with a tax credit no matter the tax bracket one falls into as long as the credit can be used. Credits can be in the form of refundable credits or non-refundable credits. Refundable credits can be fully refunded if used. Even if you don't owe any tax, you will still receive what is owed through the tax credit. An example of a refundable tax credit is the Working Income Tax Credit which provides tax relief for eligible working low-income individuals and families. In terms of nonrefundable tax credits, all taxpayers can claim a basic non-refundable tax credit, known as the **personal amount,** which can reduce your tax liability. If any portion from the non-refundable tax credit remains after your taxable income reaches zero, it is automatically forfeited by the taxpayer. Each province and territory also sets a personal amount for provincial or territorial

taxes. A tax credit is applied to the amount of tax owed by the taxpayer after all deductions are made from his or her taxable income, and reduces the total tax bill of an individual.

Deductions reduce taxable income, while credits reduce taxes owed.

Deductions and credits are some of the more disputed areas of the tax code. Because of the depth of dispute about them, they tend to change more frequently than other areas of the tax code. As a taxpayer, you want to stay alert to changes that may be to your advantage or disadvantage. Usually, such changes are phased in and out gradually so you can include them in your financial planning process. Learn more about deductions and credits [New Tab] (https://www.canada.ca/en/revenue-agency/services/tax/individuals/topics/about-your-tax-return/tax-return/completing-a-tax-return/deductions-credits-expenses.html).

Payments and Refunds

Once you have calculated your tax obligation for the year, you can compare that to any taxes you have paid during the year and calculate the amount still owed or the amount to be refunded to you.

You pay taxes during the tax year by having them withheld from your paycheque if you earn income through wages, or by making quarterly estimated tax payments if you have other kinds of income. When you begin employment, you fill out a form (Form TD1) that determines the taxes to be withheld from your regular pay. You may adjust this amount, within limits, at any time. If you have both wages and other incomes, but your wage income is your primary source of income, you may be able to increase the taxes withheld from your wages to cover the taxes on your other income, and thus avoid having to make estimated payments. However, if your non-wage income is substantial, you will have to make estimated payments to avoid a penalty and/or interest. The self-employed must pay estimated income taxes in quarterly installments based on expected income depending on your earnings. According to the CRA, quarterly income tax installments are required if your net tax owing will be above the threshold for your province or territory and/or if your net tax owing in previous years was above the threshold for your province or territory (CRA, 2017).

The government requires that taxes are withheld or paid quarterly during the tax year because it uses tax revenues to finance its expenditures, so it needs a steady and predictable cash flow. Steady payments also greatly decrease the risk of taxes being uncollectible. Provincial, territorial, and local income taxes must also be paid during the tax year and are similarly withheld from wages or paid quarterly.

If you have paid more during the tax year than your actual obligation, then you are due a refund of the difference. You may have that amount directly deposited to a bank account, or the government will send you a cheque.

If you have paid less during the tax year than your actual obligation, then you will have to pay the difference, and you may have to pay a penalty and/or interest, depending on the size of your payment.

The deadline for filing income tax returns and for paying any necessary amounts is April 30, following the end of the tax year on December 31. If you are self-employed, or the spouse or common-law partner of someone who is, the deadline to file your income tax and benefit return is June 15, although any balance owing is due April 30. You may file to request an extension of that deadline. Should you miss a deadline without filing for an extension, you will owe penalties and interest, even if your actual tax obligation results in a refund. It really pays to get your return in on time.

Exercises

1. Do you have to file a tax return for the current year? Why or why not? (Identify all the factors that apply.) Which tax form(s) should you use?
2. Go to the Government of Canada webpage Income Tax Folio S1-F2-C3, Scholarships, Research Grants and Other Education Assistance [New Tab] (https://www.canada.ca/en/revenue-agency/services/tax/technical-information/income-tax/income-tax-folios-index/series-1-individuals/folio-2-students/income-tax-folio-s1-f2-c3-scholarships-research-grants-other-education-assistance.html) to find answers to the following questions:
   - Is financial aid for university subject to federal income tax?
   - Can federal and provincial or territorial education grants be taxed as income?
   - Are student loans taxable?
   - When is a scholarship tax exempt?
   - Do you have to be in a degree program to qualify for tax exemption?
   - Can the amount of a scholarship used for tuition be deducted?
   - Can living expenses while on scholarship be deducted?
   - Is the income and stipend from a teaching fellowship or research assistantship tax exempt?

Record Keeping, Preparation, and Filing

The CRA is responsible for the collection of tax revenues. To collect revenues, the CRA must inform the public of tax obligations and devise data collection systems that will allow for collection and verification of tax information so that collectible revenues can be verified. In other words, the CRA has to determine how to

inform the public and collect taxes while also collecting enough information to be able to check that those taxes are correct.

To inform the public, the CRA has published numerous publications covering various aspects of the tax code. In addition, the CRA provides website and telephone support to answer questions and assist in preparing tax filings.

By far, most income taxes from wages are collected through withholdings as earned. For most taxpayers, wages represent the primary form of income, and thus most of their tax payments are withheld or paid as wages are earned. Still, everyone has to file to summarize the details of the year's incomes for the CRA and to calculate the final tax obligation. It is important that everyone file a tax return, even if an individual owes no money. Everyone needs to file a return in order to get, for example, the GST rebate, the Canada child benefit, or Old Age Security. For further information on the benefits of filing a return [New Tab] (https://www.canada.ca/en/revenue-agency/services/tax/individuals/topics/about-your-tax-return/you-have-file-a-return.html) through the CRA.

Keeping Records

The individual filer must collect and report the information on tax forms and schedules. Fortunately, this is not as difficult as the volume of data would suggest. Employers are required to send Form T4 to each employee at the end of the year, detailing the total wages earned and taxes and contributions withheld. Depending on your tax situation, you may need to refer to other guides, or complete some schedules and other forms that have more detailed information. You can find this information on other guides, schedules and forms you may need to complete your income tax and benefit return [New Tab] (https://www.canada.ca/en/revenue-agency/services/tax/individuals/topics/about-your-tax-return/tax-return/completing-a-tax-return/other-guides-schedules-forms-you-may-need-complete-your-income-tax-benefit-return.html).

The system for filing tax information has purposeful redundancies. Where possible, information is collected independently from at least two sources so it can be verified. For example, your wage data is collected both from you and from your employer; your interest and dividend incomes are reported by both you and the bank or brokerage that paid them, and so on. Those redundancies, wherever practical, allow for a system of cross-references so that the CRA can check the validity of the data it receives.

Incomes may be summarized and reported to you, but only you know your expenses. Expenditures are important if they are allowed as deductions, such as job-related expenses, and so on, so data should be collected throughout the tax year. If you do nothing more than keep a chequebook, then you will have to go

through it and identify the deductible expenses for the tax year. Financial software applications will make that task easier; most allow you to flag deductible expenses in your initial setup.

You should also keep receipts of purchases that may be deductible; credit or debit card statements and bank statements provide convenient backup proof of expenditures. Proof is needed in the event the CRA questions the accuracy of your return.

Tax Preparation and Filing

After you have collected the information you need, you fill out the forms. The tax code is based on the idea that citizens should create revenues for the government based on their ability to pay—and the tax forms follow that logic. Most taxpayers need to complete only a few schedules and forms to supplement their Form T1. Most taxpayers have the same kinds of taxable events, incomes, and deductions year after year, and file the same kinds of schedules and forms.

Many taxpayers prefer to consult a professional tax preparer. Professional help is useful if you have a relatively complicated tax situation: unusual sources of income or expenditures that may be deductible under unusual circumstances. Some taxpayers use a tax preparer simply to protect against making a mistake and having the error, however innocent, prove costly to fix. Fees for tax preparers depend on how complex your return is, the number of forms that need to be completed, and the type of professional you consult.

Professional tax preparers may be lawyers, accountants, personal financial planners, or tax consultants. You may have an ongoing relationship with your tax preparer, who may also be your accountant or financial planner working with you on other financial decisions. Or you may consult a tax preparer simply on tax issues. You may want your tax preparer to fill out and file the forms for you, or you may be looking for advice about future financial decisions that have tax consequences. Tax preparers may be independent practitioners who work during tax season, or employees of a national chain that provide year-round tax services.

There is no standard certification to be a professional tax preparer. A **chartered public accountant (CPA)** has specific training and experience in accounting. When looking for a tax preparer, your lawyer, accountant, or financial planner may be appropriate, or they may be able to make a recommendation. If your information is fairly straightforward, you may minimize costs by using a preparer who simply does taxes. If your situation involves more complications—especially involving other entities such as businesses or trusts, or unusual circumstances such as a gain—you may want to consult a professional with a range of expertise, such as an accountant or a lawyer who specializes in taxes. Many professionals also offer a "guarantee" that they will also help you if the information on your return is later questioned by the CRA.

Whether you prepare your tax return by yourself or with a professional, it is you who must sign the return and assume responsibility for its details. You should be sure to review your return with your tax preparer so

that you understand and can explain any of the information found on it. You should question anything that you cannot understand or that seems contrary to your original information. You should also know your tax return because understanding how and why tax obligations are created or avoided can help you plan for tax consequences in future financial decisions.

You may choose to prepare the return yourself using a tax preparation software application. There are many available, and several are compatible with personal financial software applications, enabling you to download or transfer data from your financial software directly into the tax software. Software applications are usually designed as a series of questions that guide you through Form T1 and the supplemental schedules, filling in the data from your answers. Once you have been through the "questionnaire," it tells you the forms it has completed for you, and you can simply print them out to submit by mail or "e-file" them directly to the CRA. Most programs also allow you to enter data into the individual forms directly.

Link It Up

Many tax preparation software packages are reviewed in the business press or online. Some popular programs are listed in the article Top Canadian Tax Software Programs [New Tab] (https://www.thebalancesmb.com/top-canadian-tax-software-programs-2948660).

Software can be useful in that it automatically calculates unusual circumstances, limitations, or exceptions to rules using your complete data. Some programs even prompt you for additional information based on the data you submit. Overlooking exceptions is a common error that software programs can help you avoid. The programs have all the forms and schedules, but if you choose to file hard-copy versions, you can download them directly from the CRA website, or you can call the CRA and request that they be sent to you. Once your return is completed, you must file it with the CRA, either by mail or by e-file, which has become increasingly popular.

Following Up

After you file your tax return it will be processed and reviewed by the CRA. If you are owed a refund, it will be sent; if you paid a payment, it will be deposited. The CRA reviews returns for accuracy, based on redundant reporting and its "sense" of your data. For example, the CRA may investigate any discrepancies between the wages you report and the wages your employer reports. As another example, if your total wages

are $23,000 and you show a charitable contribution of $20,000, that contribution seems too high for your income—although there may be an explanation.

The CRA may follow up by mail or by a personal interview. It may just ask for verification of one or two items, or it may conduct a full **audit**—a thorough financial investigation of your return. In any case, you will be asked to produce records or receipts that will verify your reported data. Therefore, it is important to save a copy of your return and the records and receipts that you used to prepare it. The CRA recommends saving your tax data for six years in case the CRA decides to review your tax returns and/or audit your small business. The best protection against a possible audit is to have verification—a receipt or a bill or a cancelled cheque—for all the incomes and expenses that you report.

If you have a personal interview, your tax preparer may accompany you to help explain and verify your return. Ultimately, however, you are responsible for it. If you have made errors, and if those errors result in a larger tax obligation (if you owe more), you may have to pay penalties and interest in addition to the tax you owe. You may be able to negotiate a payment schedule with the CRA.

The CRA randomly chooses a certain number of returns each year for review and possible audit even where no discrepancies or unusual items are noticed. The threat of a random audit may deter taxpayers from cheating or taking shortcuts on their tax returns. Computerized record keeping has made it easier for both taxpayers and the CRA to collect, report, and verify tax data.

Filing Strategies

Most citizens recognize the need to contribute to the government's revenues but want to avoid paying more than they need to. **Tax avoidance** is the practice of ensuring that you have no excess tax obligations. Strategies for minimizing or avoiding tax obligations are perfectly legal. However, **tax evasion**—fraudulently reporting tax obligations, for example, by understating incomes and gains or overstating expenses and losses—is illegal.

Timing can affect the value of taxable incomes. If you anticipate a significant increase in income—and therefore in your tax rate—in the next tax year, you may try to defer a deductible expense. Likewise, if you anticipate a decrease in income that will decrease your tax rate, you may want to defer receipt of income until the next year, when it will be taxed at a lower rate. In addition, some kinds of incomes are taxed at different rates than others, so how your income is created may have a bearing on how much tax it creates. The definition of expenses and the way you claim them can affect the tax one saves. For example, suppose you are a high school Cree or French teacher. You also tutor students privately. You buy Cree or French books to improve your own language skills and to keep current with the published literature. Are the costs of those books an unreimbursed employee expense related to your job as a teacher? Or are they an expense of your

private tutoring business? They may be both, but you can only claim the expense once or in one place on your tax return.

Exercises

1. Gather a current sample of the kind of records you will use to calculate your tax liability this year and to verify your tax return. List each type of record and identify exactly what information it will give you, your tax preparer, and the CRA about your tax situation. What additional records will you need that are not yet in your possession?
2. Use your spreadsheet program, or download a free one, to develop a document showing monthly cash flows for income and expenses to date for which you have written records. If you continue to develop this document for the remaining months, how will it help you prepare your tax returns?
3. Research how you can reduce your tax liability and/or avoid paying taxes when you file this year. Work with classmates to develop a tip sheet for students on tax avoidance.

Taxes and Financial Planning

You may anticipate significant changes in income or expenses based on a change of job or career, or a change of life stage or lifestyle. Not only may the amounts of income or expenses change, but the kinds of incomes or expenses may change as well. Planning for those changes in relation to tax obligations is part of personal financial planning.

Tax Strategies and Life Stages

Tax obligations change more broadly as your stage of life changes. Although everyone is different, there is a typical pattern to aging, earning, and taxes, as shown in the following table.

Table 10.1b Life Stages and Tax Implications

	Young Adulthood	Middle Adulthood	Older Adulthood	Retirement
Source of Income	Wages	Wages/ Investments	Wages/ Investments	Investments
Asset Base	None/Low	Accumulating	Growing	Depleting
Taxable Income	Low	Higher	Highest	Lower
Deductions, Credits	Low	Higher	High	Low

In young adulthood, you rely on income from wages, and you usually have yet to acquire an asset base, so you have little income from interest, dividends, or capital gains. Your family structure does not include dependents, so you have few deductions but also low taxable income.

As you progress in your career, you can expect wages, expenses, and dependents to increase. You are building an asset base by buying a home, possibly saving for your children's education, or saving for retirement. Because those are the kinds of assets encouraged by the government, they not only build wealth, but also create tax advantages—for example, an RRSP or an RESP.

In older adulthood, you may begin to build an asset base that can no longer provide those tax advantages that are limited or may create taxable income such as interest, dividends, or rental income. In retirement, most people can anticipate a significant decrease in income from wages and a significant increase in reliance on incomes from investments, such as interest, dividends, and gains. Some of those assets may be retirement savings accounts, such as an RRSP, that created tax advantages while growing, but will create tax obligations as income is drawn from them.

Generally, you can expect your income to increase during the middle years of adult life, but that is when many people typically have dependents and deductions such as job-related expenses to offset increased tax obligations. As you age, and especially when you retire, you can expect less income and also fewer deductions.

The bigger picture is that at the stages of your life when income is increasing, so are your deductions and tax credits, which tend to decrease as your income decreases. Although your incomes change over your lifetime, your tax obligations change proportionally, so they remain relative to your ability to pay.

The tax consequences of such changes should be anticipated and considered as you evaluate choices for financial strategies. Because the tax code is a matter of law it does change, but because it is also a matter of politics, it changes slowly and only after much public discussion. You can usually be aware of any tax code changes far enough in advance to incorporate them into your planning.

Tax Strategies and Personal Financial Planning

Tax advantages are sometimes created for personal financial strategies as a way of encouraging certain personal

goals. In Canada, for example, home ownership, retirement savings, and education are seen as personal goals that benefit society as well as the individual. In most cases, tax advantages are created to encourage progress toward those goals.

Retirement saving is encouraged, so some savings plans such as a **registered retirement savings plan (RRSP)** or a **registered pension plan (RPP)** create tax advantages. For example, an RPP is a pension plan that has been set up by your employer, and registered by the CRA, in order to provide you with a pension upon retirement. You can deduct the total of your RPP contributions to reduce your taxable income. Income from this plan will be taxed at a later date.

There are also retirement savings strategies that do not create tax advantages, such as saving outside of a tax-advantaged account. A **tax-free savings account (TFSA)** is a flexible investment account that can help you meet both your short- and long-term goals. Your investment income in a TFSA—interest, dividends, or capital gains—is not taxed, even when withdrawn. This tax-free compound growth means that your money grows more quickly inside a TFSA than in a taxable account. In addition to the investment income earned, any amount contributed to the TFSA is not taxed when it is withdrawn. However, initial contributions to a TFSA are not deductible for income tax purposes. The following are important facts about contributions to your TFSA:

- The current contribution limit is $5,500 per year; contributions to your RRSP/RPP do not limit your TFSA contribution.
- Any unused room can be carried forward.
- You can contribute up to your TFSA contribution limit. A tax applies to all contributions exceeding your TFSA contribution limit.
- Withdrawals will be added to your TFSA contribution room at the beginning of the following year.
- You can replace the amount of the withdrawal in the same year only if you have available TFSA contribution room.
- Direct transfers must be completed by your financial institution. (Government of Canada, 2016)

A **registered education savings plan (RESP)** is an education savings account registered with the Government of Canada. It is an investment vehicle used by parents to save for their children's post-secondary education in Canada. The key advantage of an RESP is the access it provides to the Canada Education Savings Grant (CESG) no matter what your family income. This grant is 20 per cent of any eligible contributions in an RESP account; the maximum annual grant by the government is $500. There are currently no annual contribution limits; however, you can receive the grant only on the first $2,500 in contributions per year, and the lifetime contribution limit is $50,000 (Government of Canada, 2017).

Although contributions are not tax-deductible, all investment income generated in the RESP is tax-free as

long as it remains in the plan (Government of Canada, 2016). Once the recipient withdraws the money from the plan, he or she will be taxed. However, many students have little or no income and therefore the student would pay little to no tax on the withdrawal.

RESPs also provide access to the Canada Learning Bond, which is an important benefit for low-income families. The Canada Learning Bond is money that the Government of Canada deposits into an RESP for Canadian residents born on or after January 1, 2004, in order to help low-income families save for a child's education after high school. The government deposits can be up to a maximum of $2,000 and will not affect any other benefits that you or an eligible child receives (Government of Canada, 2018).

Planning Your Strategy

Where you have a choice, it makes sense to use a strategy that will allow you to make progress toward your goal and realize a tax advantage. Your enthusiasm for the tax advantage should not define your goals, however. Taxes affect the value of your alternatives, so recognizing tax implications should inform your choices without defining your goals.

Unanticipated events such as lottery winnings, casualty and theft losses, or medical expenses can also have tax consequences. They are often unusual events (and therefore unanticipated) and may be unfamiliar and financially complicated. In those circumstances, it may be wise to consult an expert.

Your financial plans should reflect your vision for your life. You will want to be aware of tax advantages or disadvantages so that you can make the most tax-advantageous decisions. Like any costs, you want to minimize your tax costs of living and of life events, but tax avoidance is only a means to an end. You should make your life choices for better reasons than avoiding taxes.

Exercises

1. Review your list of personal financial goals. For each goal, how does the Canadian tax code help or hinder you in achieving it?
2. Investigate tax strategies that would benefit you in your present life stage. What tax strategies would benefit you in your next life stage? Share your findings and strategies with

others in your life stage.

Key Takeaways

Sources of Taxation and Kinds of Taxes

- Governments at all levels use taxes as a source of financing.
- Taxes may be imposed on the following:
  - Incomes from wages, interest, dividends, and gains (losses), and rental of real or intellectual property.
  - Consumption of discretionary and nondiscretionary goods and services.
  - Wealth from asset ownership.
- Taxes may be progressive, such as the income tax, in which you pay proportionally more taxes the more income you have, or regressive, such as a sales tax, in which you pay proportionally more taxes the less income you have.

The Canadian Federal Income Tax Process

- The most relevant tax for financial planning is the income tax, as it affects the taxpayer over an entire lifetime.
- Different kinds of income must be defined and declared on specific income schedules and are subject to tax.
- Deductions reduce taxable income.
- Credits reduce tax obligations.
- Payments are made throughout the tax year through withholdings from wages or quarterly payments.

Record Keeping, Preparation, and Filing

- Information about the tax code is available from the CRA.
- Verifiable records must be kept for all taxable incomes and expenses or other taxable events and activities.
- Professional tax assistance and tax preparation software are readily available.
- The CRA reviews tax returns for errors and may follow up through an informal or formal audit process.
- Tax avoidance is the legal practice of minimizing tax obligations.
- Tax evasion is the illegal process of fraudulently presenting information used in calculating tax obligations.
- Tax-avoidance strategies can involve the timing of incomes and/or expenses to take advantage of changing tax circumstances.

Taxes and Financial Planning

- Tax strategies may change as life stages and family structure changes.
- Some personal finance goals may be pursued in a more or less tax-advantaged way, so you should evaluate the tax effects on your alternatives.
- Tax strategies are a means to an end—that is, to achieving your personal finance goals with a minimum of cost.

Attribution

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10.2 - EMPLOYMENT DISCRIMINATION

Learning Objectives

- Analyze earnings gaps based on race and gender
- Explain the impact of discrimination in a competitive market
- Identify U.S. public policies designed to reduce discrimination

Discrimination involves acting on the belief that members of a certain group are inferior solely because of a factor such as race, gender, or religion. There are many types of discrimination but the focus here will be on discrimination in labour markets, which arises if workers with the same skill levels—as measured by education, experience, and expertise—receive different pay receive different pay or have different job opportunities because of their race or gender.

Earnings Gaps by Race and Gender

A possible signal of labour market discrimination is when an employer pays one group less than another. Figure 14.15 shows the average wage of Black workers as a ratio of the average wage of White workers and the average wage of female workers as a ratio of the average wage of male workers. Research by the economists Francine Blau and Laurence Kahn shows that the gap between the earnings of women and men did not move much in the 1970s, but has declined since the 1980s. According to the U.S. Census, the gap between the earnings of Blacks and Whites diminished in the 1970s, but has not changed in 50 years. In both gender and race, an earnings gap remains.

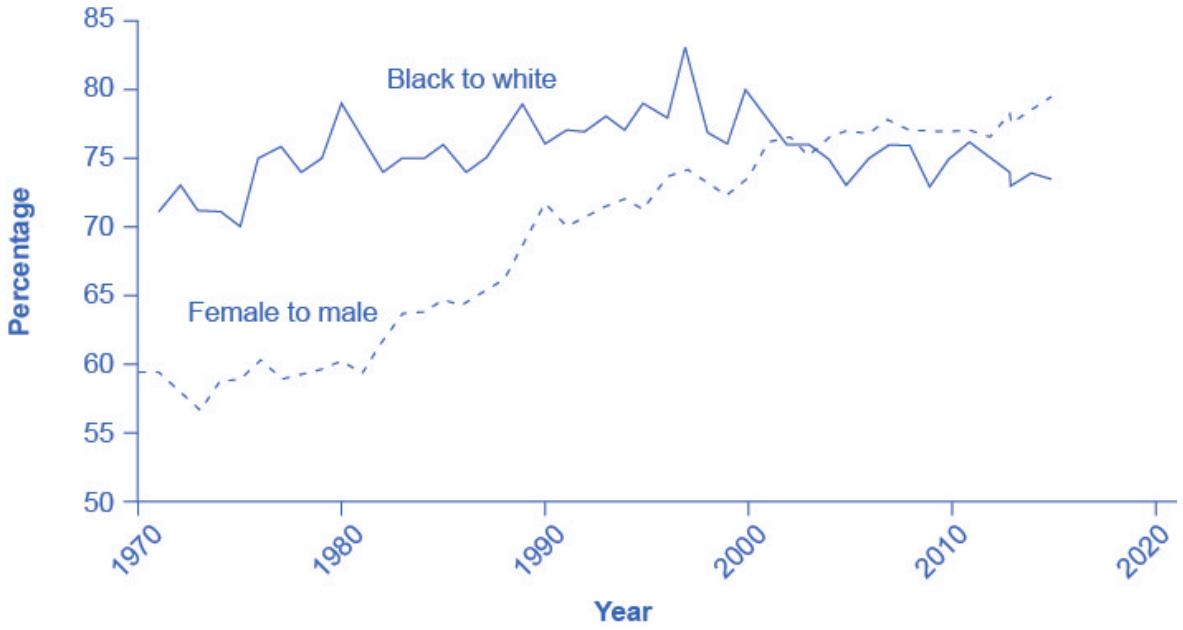

Figure 10.2a. Wage Ratios by Sex and Race. The ratio of wages for Black workers to White workers rose substantially in the late 1960s and through the 1970s, but has not changed much since then. The ratio of wages for female to male workers changed little through the 1970s, but has risen substantially since the 1980s. In both cases, a gap remains between the average wages of Black and White workers and between the average wages of female and male workers. Figure by Steven A. Greenlaw & David Shapiro, licensed under CC BY 4.0. Data Source: U.S. Department of Labor, Bureau of Labor Statistics.

An earnings gap between average wages, in and of itself, does not prove that discrimination is occurring in the labour market. We need to apply the same productivity characteristics to all parties (employees) involved. Gender discrimination in the labour market occurs when employers pay women less than men despite having comparable levels of education, experience, and expertise. (Read the Clear It Up about the sex-discrimination suit brought against Wal-Mart.) Similarly, racial discrimination in the labour market exists when employers pay racially diverse employees less than their coworkers of the majority race despite having comparable levels of education, experience, and expertise. To bring a successful gender discrimination lawsuit, a female employee must prove the employer is paying her less than a male employee who holds a similar job, with similar educational attainment, and with similar expertise. Likewise, someone who wants to sue on the grounds of racial discrimination must prove that the employer pays him or her less than an employee of another race who holds a similar job, with similar educational attainment, and with similar expertise.

The FRED database includes earnings by earnings by age, gender and race/ethnicity [New Tab] (https://fred.stlouisfed.org/categories/33501).

Clear It Up

What was the sex-discrimination case against Wal-Mart?

In one of the largest class-action sex-discrimination cases in U.S. history, 1.2 million female employees of Wal-Mart claimed that the company engaged in wage and promotion discrimination. In 2011, the Supreme Court threw out the case on the grounds that the group was too large and too diverse to consider the case a class action suit. Lawyers for the women regrouped and are now suing in smaller groups. Part of the difficulty for the female employees is that the court said that local managers made pay and promotion decisions that were not necessarily the company's policies as a whole. Consequently, female Wal-Mart employees in Texas are arguing that their new suit will challenge the management of a "discrete group of regional district and store managers." They claim these managers made biased pay and promotion decisions. However, in 2013, a federal district court rejected a smaller California class action suit against the company.

On other issues, Wal-Mart made the news again in 2013 when the National Labor Relations Board found Wal-Mart guilty of illegally penalizing and firing workers who took part in labour protests and strikes. Wal-Mart has already paid $11.7 million in back wages and compensation damages to women in Kentucky who were denied jobs due to their sex.

Investigating the Female/Male Earnings Gap

As a result of changes in law and culture, women began to enter the paid workforce in substantial numbers in the mid- to late-twentieth century. By 2014, 58.1% of adult women held jobs while 72.0% of adult men did. Moreover, along with entering the workforce, women began to ratchet up their education levels. In 1971, 44% of undergraduate college degrees went to women. By 2014, women received 56% of bachelor's degrees. In 1970, women received 5.4% of the degrees from law schools and 8.4% of the degrees from medical schools. By 2014, women were receiving 47% of the law degrees and 48.0% of the medical degrees. These gains in education and experience have reduced the female/male wage gap over time. However, concerns remain about the extent to which women have not yet assumed a substantial share of the positions at the top of the largest companies or in the U.S. Congress.

There are factors that can lower women's average wages. Women are likely to bear a disproportionately large share of household responsibilities. A mother of young children is more likely to drop out of the labour force for several years or work on a reduced schedule than is the father. As a result, women in their 30s and 40s are likely, on average, to have less job experience than men. In the United States, childless women with the same

education and experience levels as men are typically paid comparably. However, women with families and children are typically paid about 7% to 14% less than other women of similar education and work experience. (Meanwhile, married men earn about 10% to 15% more than single men with comparable education and work experience.)

We possibly could call the different patterns of family responsibilities discrimination, but it is primarily rooted in America's social patterns of discrimination, which involve the roles that fathers and mothers play in child-rearing, rather than discrimination by employers in hiring and salary decisions.

Link it up

Visit Catlyst Inc. [New Tab] (http://www.catalyst.org/) to read more about the persistently low numbers of women in executive roles in business and in the U.S. Congress.

Investigating the Black/White Earnings Gap

Blacks experienced blatant labour market discrimination during much of the twentieth century. Until the passage of the Civil Rights Act of 1964, it was legal in many states to refuse to hire a Black worker, regardless of the credentials or experience of that worker. Moreover, Blacks were often denied access to educational opportunities, which in turn meant that they had lower levels of qualifications for many jobs. At least one economic study has shown that the 1964 law is partially responsible for the narrowing of the gap in Black–White earnings in the late 1960s and into the 1970s. For example, the ratio of total earnings of Black male workers to White male workers rose from 62% in 1964 to 75.3% in 2013, according to the Bureau of Labor Statistics.

However, the earnings gap between Black and White workers has not changed as much as the earnings gap between men and women has in the last half century. The remaining racial gap seems related both to continuing differences in education levels and to the presence of discrimination. Table 10.2a shows that the percentage of Blacks who complete a four-year college degree remains substantially lower than the percentage of Whites who complete college. According to the U.S. Census, both Whites and Blacks have higher levels of educational attainment than Hispanics and lower levels than Asians. The lower average levels of education for Black workers surely explain part of the earnings gap. In fact, Black women who have the same levels of education and experience as White women receive, on average, about the same level of pay. One study shows that White and Black college graduates have identical salaries immediately after college; however, the racial wage gap widens over time, an outcome that suggests the possibility of continuing discrimination. Another study conducted a field experiment by responding to job advertisements with fictitious resumes with either

very African American sounding names or very W sounding names and found out that White names received 50 percent more callbacks for interviews. This is suggestive of discrimination in job opportunities. Further, as the following Clear It Up feature explains, there is evidence to support that discrimination in the housing market is connected to employment discrimination.

Table 10.2a Educational Attainment by Race and Ethnicity in 2015
(Source: http://www.census.gov/hhes/socdemo/education/data/cps/2014/tables.html)

	White	Hispanic	Black	Asian
Completed four years of high school or more	93.0%	66.7%	87.0%	89.1%
Completed four years of college or more	36.2%	15.5%	22.5%	53.9%

Clear It Up

How is discrimination in the housing market connected to employment discrimination?

In a recent study by the Housing and Urban Development (HUD) department, realtors show Black homebuyers 18 percent fewer homes compared to White homebuyers. Realtors show Asians are shown 19 percent fewer properties. Additionally, Hispanics experience more discrimination in renting apartments and undergo stiffer credit checks than White renters. In a 2012 U.S. Department of Housing and Urban Development and the nonprofit Urban Institute study, Hispanic testers who contacted agents about advertised rental units received information about 12 percent fewer units available and were shown seven percent fewer units than White renters. The $9 million study, based on research in 28 metropolitan areas, concluded that blatant "door slamming" forms of discrimination are on the decline but that the discrimination that does exist is harder to detect, and as a result, more difficult to remedy. According to the Chicago Tribune, HUD Secretary Shaun Donovan, who served in his role from 2009-2014, told reporters, "Just because it's taken on a hidden form doesn't make it any less harmful. You might not be able to move into that community with the good schools."

The lower levels of education for Black workers can also be a result of discrimination—although it may be pre-labour market discrimination, rather than direct discrimination by employers in the labour market. For example, if discrimination in housing markets causes Black families to live clustered together in certain poorer neighborhoods, then the Black children will continue to have lower educational attainment then their White counterparts and, consequently, not be able to obtain the higher paying jobs that require higher levels of education. Another element to consider is that in the past, when Blacks were effectively barred from many high-paying jobs, obtaining additional education could have seemed somewhat pointless, because the educational degrees would not pay off. Even

though the government has legally abolished labour market discrimination, it can take some time to establish a culture and a tradition of valuing education highly. Additionally, a legacy of past discrimination may contribute to an attitude that Blacks will have a difficult time succeeding in academic subjects. In any case, the impact of social discrimination in labour markets is more complicated than seeking to punish a few bigoted employers.

Competitive Markets and Discrimination

Gary Becker (b. 1930), who won the Nobel Prize in economics in 1992, was one of the first to analyze discrimination in economic terms. Becker pointed out that while competitive markets can allow some employers to practice discrimination, it can also provide profit-seeking firms with incentives not to discriminate. Given these incentives, Becker explored the question of why discrimination persists.

If a business is located in an area with a large minority population and refuses to sell to minorities, it will cut into its own profits. If some businesses run by bigoted employers refuse to pay women and/or minorities a wage based on their productivity, then other profit-seeking employers can hire these workers. In a competitive market, if the business owners care more about the color of money than about the color of skin, they will have an incentive to make buying, selling, hiring, and promotion decisions strictly based on economic factors.

Do not underestimate the power of markets to offer at least a degree of freedom to oppressed groups. In many countries, cohesive minority groups like Jews and emigrant Chinese have managed to carve out a space for themselves through their economic activities, despite legal and social discrimination against them. Many immigrants, including those who come to the United States, have taken advantage of economic freedom to make new lives for themselves. However, history teaches that market forces alone are unlikely to eliminate discrimination. After all, discrimination against African Americans persisted in the market-oriented U.S. economy during the century between President Abraham Lincoln's Emancipation Proclamation, which freed the slaves in 1863, and the passage of the Civil Rights Act of 1964—and has continued since then, too.

Therefore, why does discrimination persist in competitive markets? Gary Becker sought to explain this persistence. Discriminatory impulses can emerge at a number of levels: among managers, among workers, and among customers. Consider the situation of a manager who is not personally prejudiced, but who has many workers or customers who are prejudiced. If that manager treats minority groups or women fairly, the manager may find it hurts the morale of prejudiced co-workers or drives away prejudiced customers. In such a situation, a policy of nondiscrimination could reduce the firm's profits. After all, a business firm is part of society, and a firm that does not follow the societal norms is likely to suffer. Market forces alone are unlikely to overwhelm strong social attitudes about discrimination.

Link it up

Read the CNBC article, New Census data reveals no progress has been made on closing the overall gender pay gap [New Tab] (https://www.cnbc.com/2020/09/18/new-census-data-reveals-no-progress-has-been-made-closing-the-gender-pay-gap.html), to learn more about wage discrimination.

Public Policies to Reduce Discrimination

A first public policy step against discrimination in the labour market is to make it illegal. For example, the Equal Pay Act of 1963 said that employers must pay men and women who do equal work the same. The Civil Rights Act of 1964 prohibits employment discrimination based on race, color, religion, sex, or national origin. The Age Discrimination in Employment Act of 1967 prohibited discrimination on the basis of age against individuals who are 40 years of age or older. The Civil Rights Act of 1991 provides monetary damages in cases of intentional employment discrimination. The Pregnancy Discrimination Act of 1978 was aimed at prohibiting discrimination against women in the workplace who are planning to get pregnant, are pregnant, or are returning after pregnancy. Passing a law, however, is only part of the answer, since discrimination by prejudiced employers may be less important than broader social patterns.

These laws against discrimination have reduced the gender wage gap. A 2007 Department of Labor study compared salaries of men and women who have similar educational achievement, work experience, and occupation and found that the gender wage gap is only 5%.

In the case of the earnings gap between Blacks and Whites (and also between Hispanics and Whites), probably the single largest step that could be taken at this point in U.S. history to close the earnings gap would be to reduce the gap in educational achievement. Part of the answer to this issue involves finding ways to improve the performance of schools, which is a highly controversial topic in itself. In addition, the education gap is unlikely to close unless Black and Hispanic families and peer groups strengthen their culture of support for educational achievement.

Affirmative action is the name given to active efforts by government or businesses that give special rights to minorities in hiring and promotion to make up for past discrimination. Affirmative action, in its limited and not especially controversial form, means making an effort to reach out to a broader range of minority candidates for jobs. In its more aggressive and controversial form, affirmative action required government and companies to hire a specific number or percentage of minority employees. However, the U.S. Supreme Court has ruled against state affirmative action laws. Today, the government applies affirmative action policies only

to federal contractors who have lost a discrimination lawsuit. The federal Equal Employment Opportunity Commission (EEOC) enforces this type of redress.

An Increasingly Diverse Workforce

Racial and ethnic diversity is on the rise in the U.S. population and work force. As Figure 14.16 shows, while the White Americans comprised 78% of the population in 2012, the U.S. Bureau of the Census projects that Whites will comprise 69% of the U.S. population by 2060. Forecasters predict that the proportion of U.S. citizens who are of Hispanic background to rise substantially. Moreover, in addition to expected changes in the population, workforce diversity is increasing as the women who entered the workforce in the 1970s and 1980s are now moving up the promotion ladders within their organizations.

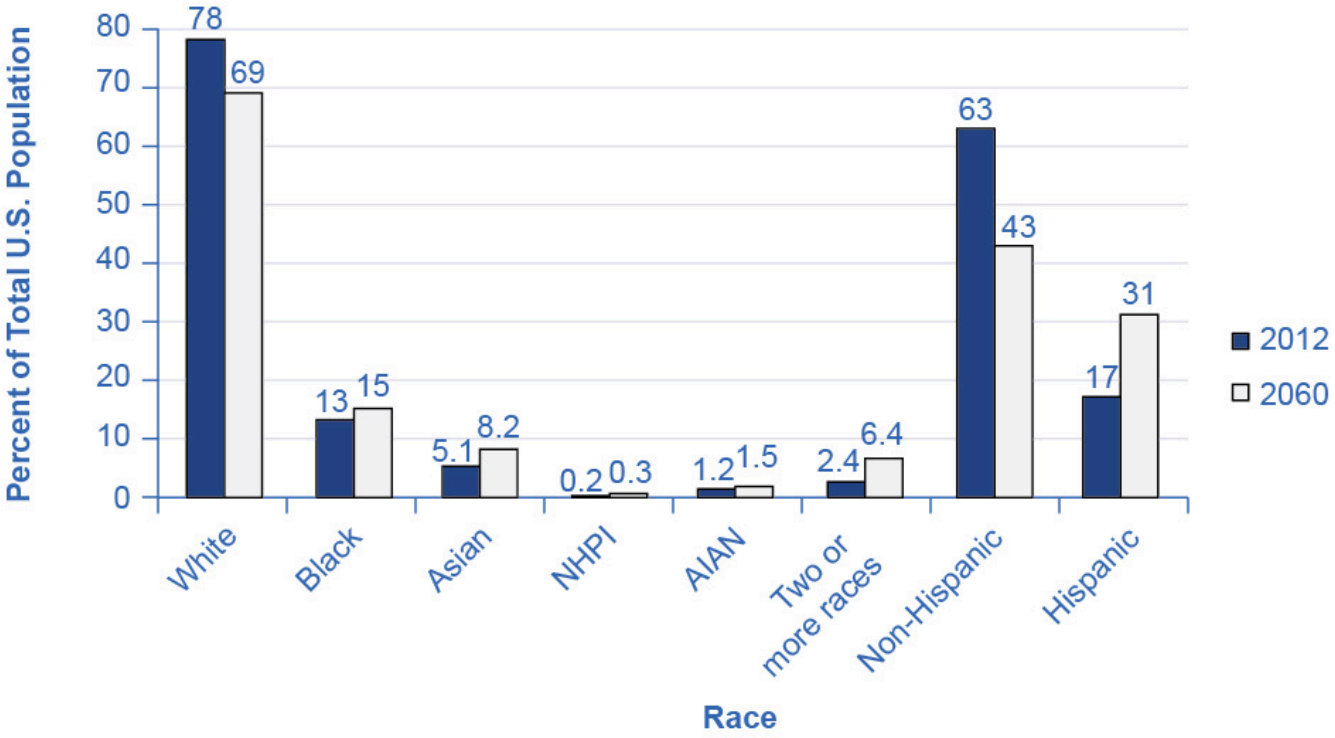

Figure 10.2b Projected Changes in America's Racial and Ethnic Diversity. This figure shows projected changes in the ethnic makeup of the U.S. population by 2060. Note that "NHPI" stands for Native Hawaiian and Other Pacific Islander. "AIAN" stands for American Indian and Alaska Native. Figure by Steven A. Greenlaw & David Shapiro, licensed under CC BY 4.0 Data Source: US Department of Commerce

Figure 10.2b Projected Changes in America's Racial and Ethnic Diversity

The vertical axis is Race and the horizontal axis is Percent of Total U.S. Population in 2012 and 2060 data is outlined in the graph below.

Table 10.2b Projected Changes in America's Racial and Ethnic Diversity. Based of Figure 10.2b Data Source: US Department of Commerce

Race	Percent of Total U.S. Population 2012	Percent of Total U.S. Population 2060
White	78	69
Black	13	15
Asian	5.1	8.2
NPHI	0.2	0.3
AIAN	1.2	1.5
Two or more races	2.4	6.4
Non-Hispanic	63	43
Hispanic	17	31

Regarding the future, optimists argue that the growing proportions of minority workers will break down remaining discriminatory barriers. The economy will benefit as an increasing proportion of workers from traditionally disadvantaged groups have a greater opportunity to fulfill their potential. Pessimists worry that the social tensions between men and women and between ethnic groups will rise and that workers will be less productive as a result. Anti-discrimination policy, at its best, seeks to help society move toward the more optimistic outcome.

The FRED database includes data on foreign and native born civilian population [New Tab] (https://fred.stlouisfed.org/categories/104) and labour force [New Tab].

Key Concepts and Summary

Discrimination occurs in a labour market when employers pay workers with the same economic characteristics, such as education, experience, and skill, are paid different amounts because of race, gender, religion, age, or disability status. In the United States, female workers on average earn less than male workers, and Black workers on average earn less than White workers. There is controversy over to which discrimination differences in factors like education and job experience

can explain these earnings gaps. Free markets can allow discrimination to occur, but the threat of a loss of sales or a loss of productive workers can also create incentives for a firm not to discriminate. A range of public policies can be used to reduce earnings gaps between men and women or between White and other racial/ethnic groups: requiring equal pay for equal work, and attaining more equal educational outcomes.

Attribution

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CHAPTER 11: EDUCATION, TRAINING AND EARNINGS DIFFERENTIALS

11.1 - STRUCTURAL CHANGES IN THE ECONOMY: THE GROWTH OF A KNOWLEDGE SOCIETY

The digital age

In a digital age, we are surrounded, indeed, immersed, in technology. Furthermore, the rate of technological change shows no sign of slowing down. Technology is leading to massive changes in the economy, in the way we communicate and relate to each other, and increasingly in the way we learn. Yet our educational institutions were built largely for another age, based around an industrial rather than a digital era.

Thus teachers and instructors are faced with a massive challenge of change. How can we ensure that we are developing the kinds of graduates from our courses and programs that are fit for an increasingly volatile, uncertain, complex and ambiguous future? What should we continue to protect in our teaching methods (and institutions), and what needs to change?

To answer these questions, this book:

- discusses the main changes that are leading to a re-examination of teaching and learning;
- identifies different understandings of knowledge and the different teaching methods associated with these understandings;
- analyses the key characteristics of technologies with regard to teaching and learning;
- recommends strategies for choosing between media and technologies;
- recommends strategies for high quality teaching in a digital age.

In this chapter I set out some of the main developments that are forcing a reconsideration of how we should be teaching.

The changing nature of work

Of the many challenges that institutions face, one is in essence a good one, and that is increased demand, particularly for post-secondary education. Figure 1.1.2 below represents the extent to which knowledge has become an increasingly important element of economic development, and above all in job creation.

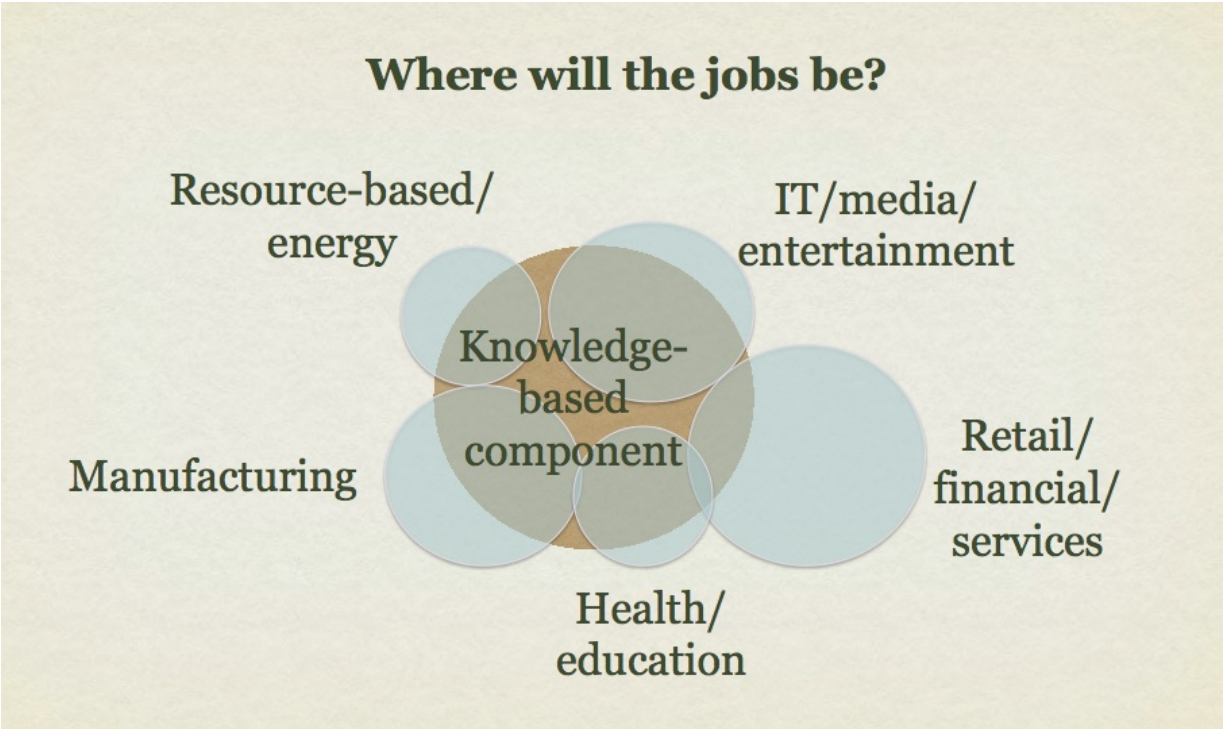

Figure 11.1a. The knowledge component in the workforce. Jobs: where will they be (https://pressbooks.bccampus.ca/teachinginadigitalagev2/chapter/structural-changes-in-the-economy-the-growth-of-a-knowledge-society/) by Anthony William (Tony) Bates licensed under CC BY-NC-4.0 International.

The **Figure 11.1a** is symbolic rather than literal. The pale blue circles representing the whole work force in each employment sector may be larger or smaller, depending on the country, as too will be the proportion of knowledge workers in that industry, but at least in developed countries and also increasingly in economically emerging countries, the knowledge component is growing rapidly: more brains and less brawn are required (see OECD, (https://www.oecd.org/skills/piaac/Skills%20volume%201%20(eng)--full%20v12--eBook%20(04%2011%202013).pdf)2013a). Economically, competitive advantage goes increasingly to those companies and industries that can leverage gains in knowledge (OECD, 2013b (https://www.oecd.org/competition/competitionpolicyandknowledge-basedcapital-2013.htm)). Indeed, knowledge workers often create their own jobs, starting up companies to provide new services or products that did not exist before they graduated.

From a teaching perspective the biggest impact is likely to be on technical and vocational instructors and students, where the knowledge component of formerly mainly manual skills is expanding rapidly. Particularly in the trades areas, plumbers, welders, electricians, car mechanics and other trade-related workers are needing to be problem-solvers, IT specialists and increasingly self-employed business people, as well as having the manual skills associated with their profession.

Artificial intelligence (AI) is another development that is already affecting the workforce. Routine work,

whether clerical or manual, is being increasingly replaced by automation. Although all kinds of jobs are likely to be affected by increased automation and applications of AI, those in the workforce with lower levels of education are likely to be the most impacted. Those with higher levels of education are likely to have a better chance of finding work that machines cannot do as well – or even creating new work for themselves.

Knowledge-based workers

There are certain common features of knowledge-based workers in a digital age:

- they usually work in small companies (less than 10 people);
- they sometimes own their own business, or are their own boss; sometimes they have created their own job, which didn't exist until they worked out there was a need and they could meet that need;
- they often work on contract or are self-employed, so they move around from one job to another fairly frequently (the gig economy);
- the nature of their work tends to change over time, in response to market and technological developments and thus the knowledge base of their work tends to change rapidly;
- they are digitally smart or at least competent digitally; digital technology is often a key component of their work;
- because they often work for themselves or in small companies, they play many roles: marketer, designer, salesperson, accountant/business manager, technical support, for example;
- they depend heavily on informal social networks to bring in business and to keep up to date with current trends in their area of work;
- they need to keep on learning to stay on top in their work, and they need to manage that learning for themselves;
- above all, they need to be flexible, to adapt to rapidly changing conditions around them.

It can be seen then that it is difficult to predict with any accuracy what many graduates will actually be doing ten or so years after graduation, except in very broad terms. Even in areas where there are clear professional tracks, such as medicine, nursing or engineering, the knowledge base and even the working conditions are likely to undergo rapid change and transformation over that period of time.

This is good news for the higher or post-secondary education sector overall (universities and colleges) as the knowledge and skill levels needed in the workforce increases. It has resulted in a major expansion of post-secondary education to meet the demand for knowledge-based work and higher levels of skill. The post-secondary enrolment rate of 19-year-olds across all Canadian provinces increased steadily from 53% in 2001 to 64% in 2014, equivalent to a 21% rise over the 13-year period (Frenette, 2017 (https://www150.statcan.gc.ca/

n1/pub/11-626-x/11-626-x2017070-eng.htm)). This means more students for universities and colleges, even where population trends are flat or even declining.

Activity 1.1 Thinking about skills

1. What kind of jobs are graduates in your subject discipline likely to get? Can you describe the kinds of skills they are likely to need in such a job? To what extent has the knowledge and skills component of such work changed over the last 20 years?

2. Look at the family members and friends outside your academic or educational field. What kind of knowledge and skills do they need now that they didn't need when they left school or college? (You may need to ask them this!)

3. Exactly how are you assisting your students develop such skills through your teaching? Is this centre or peripheral to your work? Is this part of your job – or someone else's?

There is no feedback on this activity.

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OECD (2013b) *Competition Policy and Knowledge-Based Capital* (https://www.oecd.org/competition/competitionpolicyandknowledge-basedcapital-2013.htm) Paris: OECD

Frenette, M. (2017) *Postsecondary Enrolment by Parental Income: Recent National and Provincial Trends* (https://www150.statcan.gc.ca/n1/pub/11-626-x/11-626-x2017070-eng.htm) Ottawa: Statistics Canada

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11.2 - PRODUCTIVITY AND EDUCATION

Human capital is the result of past investment that raises future incomes. A critical choice for individuals is to decide upon exactly how much additional human capital to accumulate. The cost of investing in another year of school is the *direct cost*, such as school fees, plus the *indirect*, or *opportunity*, *cost*, which can be measured by the foregone earnings during that extra year. The benefit of the additional investment is that the future flow of earnings is augmented. Consequently, wage differentials should reflect different degrees of education-dependent productivity.

Age-earnings profiles

Figure 11.2a illustrates two typical age-earnings profiles for individuals with different levels of education. These profiles define the typical pattern of earnings over time, and are usually derived by examining averages across individuals in surveys. Two aspects are clear: People with more education not only earn more, but the spread tends to grow with time. Less educated, healthy young individuals who work hard may earn a living wage but, unlike their more educated counterparts, they cannot look forward to a wage that rises substantially over time. More highly-educated individuals go into jobs and occupations that take a longer time to master: Lawyers, doctors and most professionals not only undertake more schooling than truck drivers, they also spend many years learning on the job, building up a clientele and accumulating expertise.

Age-earnings profiles define the pattern of earnings over time for individuals with different characteristics.

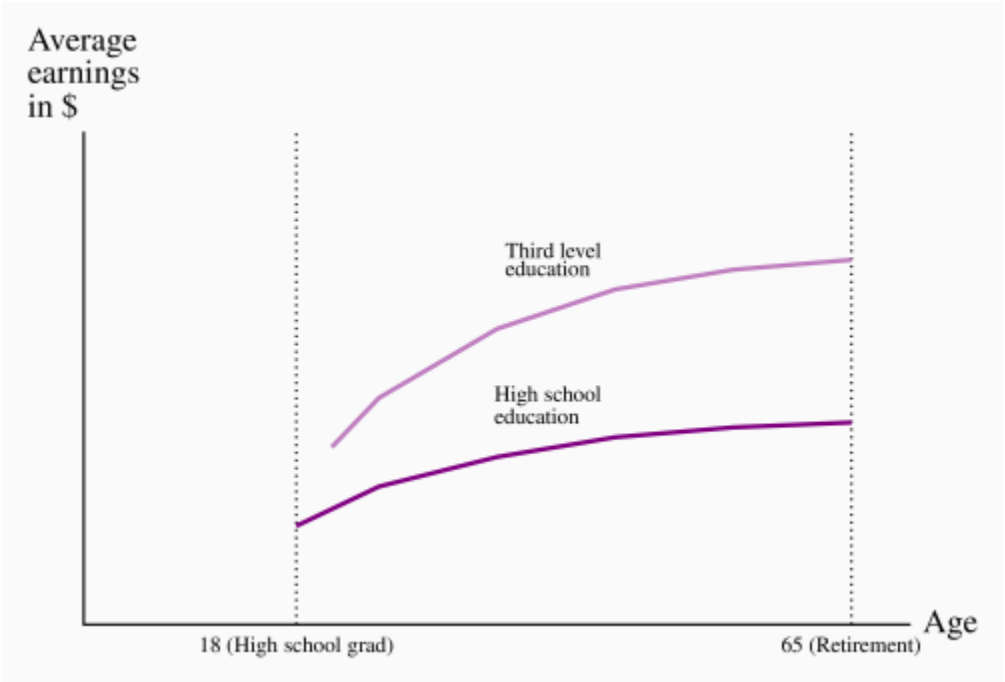

Figure 11.2a Age-Earnings profiles by education level: Individuals with a higher level of education earn more than individuals with a 'standard' level of education. In addition, the differential grows over time. Age-Earnings profiles by education level (https://socialsci.libretexts.org/Bookshelves/Economics/Principles_of_Microeconomics_(Curtis_and_Irvine)/05%3A_The_Factors_of_Production/13%3A_Human_capital_and_the_income_distribution/13.02%3A_Productivity_and_education) by Douglas Curtis and Ian Irvine under a CC BY-NC-SA 4.0.

The education premium

Individuals with different education levels earn different wages. The education premium is the difference in earnings between the more and less highly educated. Quantitatively, Professors Kelly Foley and David Green have recently proposed that the completion of a college or trade certification adds about 15% to one's income, relative to an individual who has completed high school. A Bachelor's degree brings a premium of 20-25%, and a graduate degree several percentage points more1. The failure to complete high school penalizes individuals to the extent of about 10%. These are average numbers, and they vary depending upon the province of residence, time period and gender. Nonetheless the findings underline that more human capital is associated with higher earnings. The earnings premium depends upon both the supply and demand of high HK individuals. *Ceteris paribus*, if high-skill workers are heavily in demand by employers, then the premium should be greater than if lower-skill workers are more in demand.

Education premium: the difference in earnings between the more and less highly educated.

The distribution of earnings has become more unequal in Canada and the US in recent decades, and one

reason that has been proposed for this development is that the modern economy demands more high-skill workers; in particular that technological change has a bigger impact on productivity when combined with high-skill workers than with low-skill workers. Consider Figure 11.2b which contains supply and demand functions with a twist. We imagine that there are two types of labour: One with a high level of human capital, the other with a lower level. The vertical axis measures the wage *premium* of the high-education group (which can be measured in dollars or percentage terms), and the horizontal axis measures the *fraction of the total labour force that is of the high-skill type*. *D* is the *relative* demand for the high skill workers, in this example for the economy as a whole. There is some degree of substitution between high and low-skill workers in the modern economy. We do not propose that several low-skill workers can perform the work of one neuro-surgeon; but several individual households (low-skill) could complete their income tax submissions in the same time as one skilled tax specialist. In this example there is a degree of substitutability. In a production environment, a high-skill manager, equipped with technology and capital, can perform the tasks of several line workers.

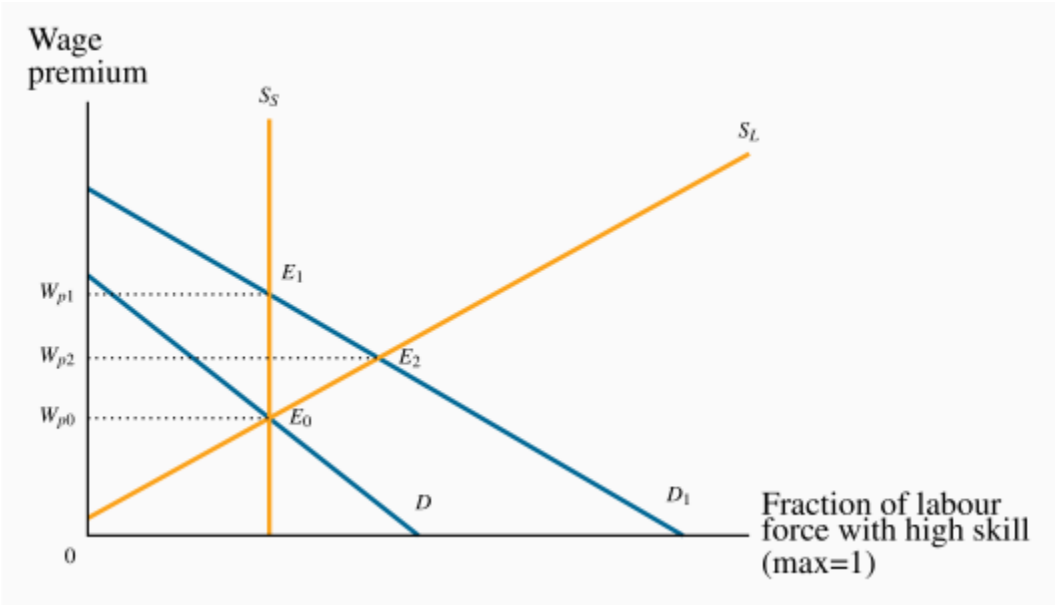

Figure 11.2b The education/skill premium: A shift in demand increases the wage premium in the short run (from E_0 to E_1) by more than in the long run (to E_2). In the short run, the percentage of the labour force (S_S) that is highly skilled is fixed. In the long run it (S_L) is variable and responds to the wage premium. The education/skill premium by Douglas Curtis and Ian Irvine licensed under CC BY-NC-SA.

The demand curve *D* defines the premium that employers (demanders) are willing to pay to the higher skill group. The negative slope indicates that if demanders were to employ a high proportion of skilled workers, the premium they would be willing to pay would be less than if they demanded a smaller share of high-skilled workers, and a larger share of lower-skilled workers. The wage premium for high HK individuals at any given time is determined by the intersection of supply and demand.

In the short run the make-up of the labour force is fixed, and this is reflected in the vertical supply curve S_s. The equilibrium is at E_0, andW_p^0 is the premium, or excess, paid to the higher-skill worker over the lower-skill worker. In the long run it is possible for the economy to change the composition of its labour supply: If the wage premium increases, more individuals will find it profitable to train as high-skill workers. That is to say, the fraction of the total that is high-skill increases. It follows that the long-run supply curve slopes upwards.

So what happens when there is an increase in the demand for high-skill workers relative to low-skill workers? The demand curve shifts upward to D_1 , and the new equilibrium is at E_1. The supply mix is fixed in the short run, so there is an increase in the wage premium. But over time, some individuals who might have been just indifferent between educating themselves more and going into the workplace with lower skill levels now find it worthwhile to pursue further education. Their higher anticipated returns to the additional human capital they invest in now exceed the additional costs of more schooling, whereas before the premium increase these additional costs and benefits were in balance. In Figure 13.2 the new short-run equilibrium at E_1 has a corresponding wage premium of W_p^1 . In the long run, after additional supply has reached the market, the increased premium is moderated to W_p^2 at the equilibrium E_2 .

This figure displays what many economists believe has happened in North America in recent decades: The demand for high HK individuals has increased, and the additional supply has not been as great. Consequently the wage premium for the high-skill workers has increased. As we describe later in this chapter, that is not the only perspective on what has happened.

Are students credit-constrained or culture-constrained?

The foregoing analysis assumes that students and potential students make rational decisions on the costs and benefits of further education and act accordingly. It also assumes implicitly that individuals can borrow the funds necessary to build their human capital: If the additional returns to further education are worthwhile, individuals should borrow the money to make the investment, just as entrepreneurs do with physical capital.

However, there is a key difference in the credit markets. If an entrepreneur fails in her business venture the lender will have a claim on the physical capital. But a bank cannot repossess a human being who drops out of school without having accumulated the intended human capital. Accordingly, the traditional lending institutions are frequently reluctant to lend the amount that students might like to borrow—students are credit constrained. The sons and daughters of affluent families therefore find it easier to attend university, because they are more likely to have a supply of funds domestically. Governments customarily step into the breach and supply loans and bursaries to students who have limited resources. While funding frequently presents an obstacle to attending a third-level institution, a stronger determinant of attendance is the education of the parents, as detailed in Application Box 13.1.

Application Box 13.1 Parental education and university attendance in Canada

The biggest single determinant of university attendance in the modern era is parental education. A recent study* of who goes to university examined the level of parental education of young people 'in transition' – at the end of their high school – for the years 1991 and 2000.

For the year 2000 they found that, if a parent had not completed high school, there was just a 12% chance that their son would attend university and an 18% chance that a daughter would attend. In contrast, for parents who themselves had completed a university degree, the probability that a son would also attend university was 53% and for a daughter 62%. Hence, the probability of a child attending university was roughly four times higher if the parent came from the top educational category rather than the bottom category! Furthermore the authors found that this probability gap opened wider between 1991 and 2000.

In the United States, Professor Sear Reardon of Stanford University has followed the performance of children from low-income households and compared their achievement with children from high-income households. He has found that the achievement gap between these groups of children has increased substantially over the last three decades. The reason for this growing separation is not because children from low-income households are performing worse in school, it is because high-income parents invest much more of their time and resources in educating their children, both formally in the school environment, and also in extra-school activities.

*Finnie, R., C. Laporte and E. Lascelles. "Family Background and Access to Post-Secondary Education: What Happened in the Nineties?" Statistics Canada Research Paper, Catalogue number 11F0019MIE-226, 2004

Reardon, Sean, "The Great Divide", New York Times, April 8, 2015.

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11.3 - PUTTING IT TOGETHER: LABOUR MARKETS

In this module, we learned about labour markets, wages, and other factors affecting employment, such as discrimination. Teachers and nurses are paid less than professional athletes because the market values the former less than the latter. In other words, our actions say that we are willing to pay professional athletes more than teachers and nurses. This may be because athletes are employed through the private sector while most teachers and nurses are employed by the public sector where the lack of market forces makes it harder for workers to be paid what they're worth. Either way, it's a statement about social values.

Urban sanitation engineers (i.e. garbage truck workers) get paid a decent wage, not because of the skills required for the job, but rather because of the difficult working conditions in summer and winter. Less "desirable" jobs have to pay more to attract workers.

Unionized workers earn more than non-union workers because unions are able to take advantage of monopoly power in the labour market. Just as a monopoly in the output market can charge a higher price than would be charged if the market were competitive, so unions can charge a higher wage.

Increasing Value of a College Degree

At the beginning of the module, we discussed how the cost of college has increased dramatically in recent decades, causing many college students to take student loans to afford it. Despite this, the value of a college degree has never been higher. How can we explain this?

We can estimate the value of a bachelor's degree as the difference in lifetime earnings between the average holder of a bachelor's degree and the average high school graduate. This difference can be nearly $1 million. College graduates also have a significantly lower unemployment rate than those with lower educational attainments.

While a college degree holder's wages have increased somewhat, the major reason for the increase in value of a bachelor's degree has been the plummeting value of a high school diploma. In the twenty-first century, the majority of jobs require at least some post-secondary education. This includes manufacturing jobs that in the past would have afforded workers a middle class income with only a high school diploma. Those jobs are increasingly scarce. This phenomenon has also no doubt contributed to the increasing inequality of income that we observe in the U.S. today.

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11.4 - READING LIST

1. The critical role of workforce training in the labor market recovery [New Tab] (https://www.brookings.edu/blog/up-front/2021/02/04/the-critical-role-of-workforce-training-in-the-labor-market-recovery/)

Reading List compiled by Norm Smith.