Introduction to the Principles of Economics

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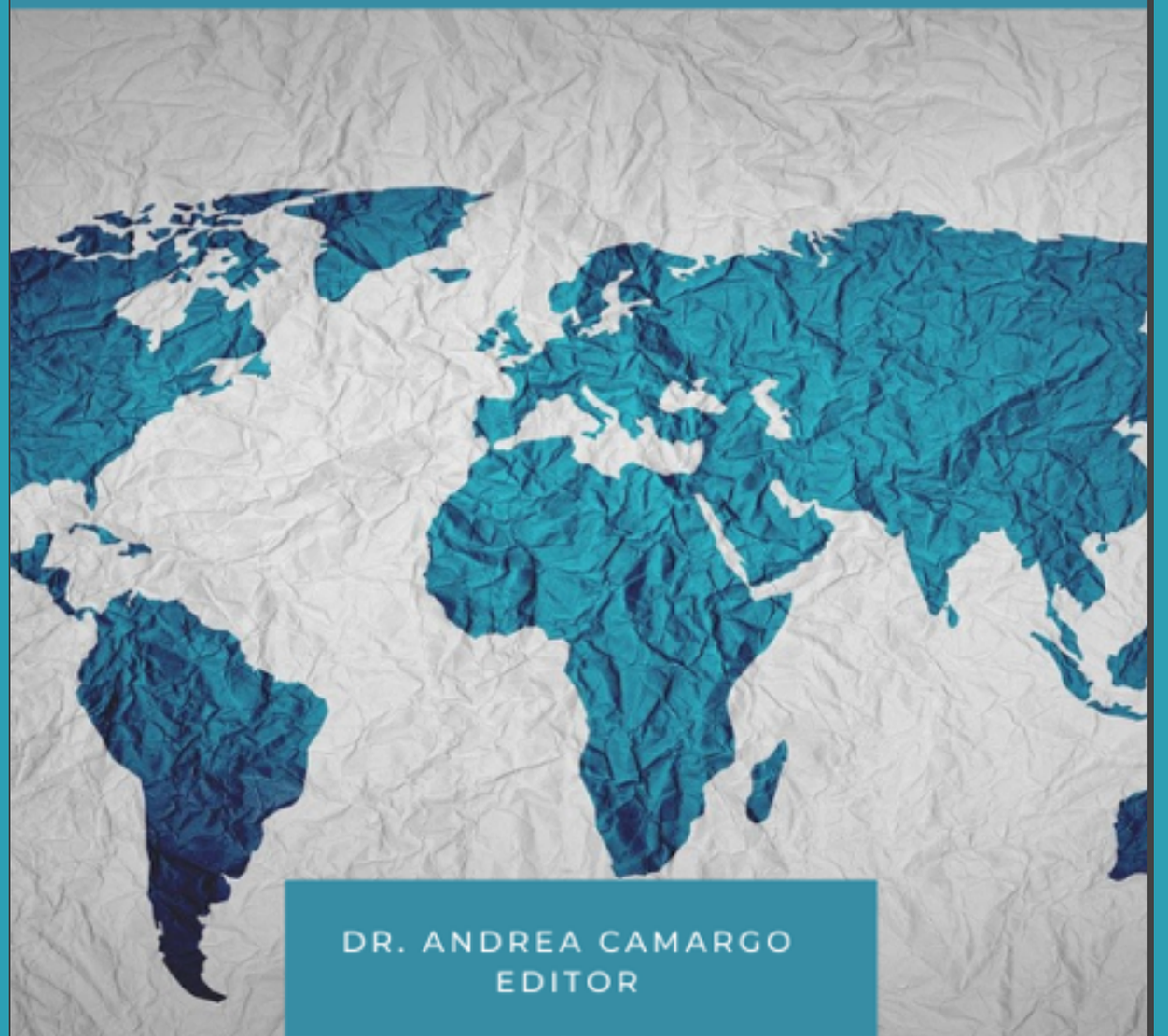

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Part I: Introduction to Economics

Chapter 1

Economics in the news

After reading this chapter, students should be able to do the following:

- Define economics.
- Explain scarcity and opportunity cost, and how they relate to economics.
- Distinguish between microeconomics and macroeconomics.
- Define the three factors of production: labor, capital, and natural resources.
- Summarize the concept of the production possibilities curve.

In this chapter:

Section 1

Start up: Economics in the news

From the economic impact of COVID-19, the financial crisis of 2008, the Great Depression of the 1930s, to gyrating gasoline and food prices, and to plunging housing prices, economic issues influences our daily life.

What causes the prices of some goods to rise while the prices of some other goods fall?

Price determination is one of the things that we will study in this book. We will also consider factors that lead an economy to fall into a recession—and the attempts to limit it.

While the investigation of these problems surely falls within the province of economics, economics encompasses a far broader range of issues.

Ultimately, economics is the study of the best use of scarce resources. Economics is about the best allocation of resources to reach efficiency in production and consumption. It is about making the best choices in allocation, production, and distribution to maximize individual and social well-being. Because choices range over every imaginable aspect of human experience, so does economics. Economists have investigated the nature of family life, the arts, education, crime, sports, job creation—the list is virtually endless because so much of our lives involves making choices.

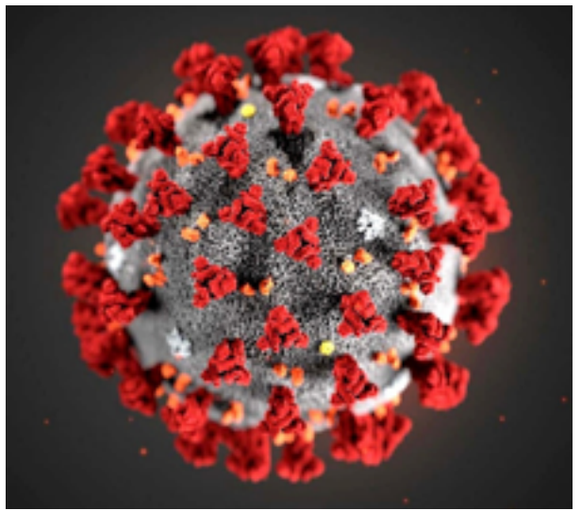

***Image 1.1*:** Illustration of SARS-CoV-2 virion and spike proteins

How do individuals make choices: Would you like better grades? More time to relax? More time watching movies? Getting better grades probably requires more time studying, and perhaps less relaxation and entertainment. Not only must we make choices as individuals, we must make choices as a society. Do we want a cleaner environment? Faster economic growth? Both may be desirable, but efforts to clean up the environment may conflict with faster economic growth. Society must make choices.

Economics is about the efficient management of resources to raise standards of living for people; this chapter is an introduction to the economic way of management of resources.

Section 2

Defining economics

Economics is about the best use of scarce resources. The study of economics focuses on making the best choices to maximize individual and social well-being.

Therefore, given the scarcity of resources the following three fundamental questions arise: What should be produces? How should goods and services be produced? For whom should goods and services be produced?

Economics is about the best use of scarce resources. Economics is a social science that examines how people choose among the alternatives available to them. It is social because it involves people and their behavior. It is a science because it uses, as much as possible, a scientific approach in its investigation of choices.

Individual wants are unlimited, but the resources to fulfill the desires are limited. The limitations of resources lead to choosing among alternatives where and how to use the limited resources.

All choices mean that one alternative is selected over another. Selecting among alternatives involves three ideas central to economics: scarcity, choice, and opportunity cost.

Scarcity

***Image 1.2*:** Scarcity

Our resources are limited. At any one time, we have only so much land, so many factories, so much oil, so many people. But our wants, our desires for the things that we can produce with those resources, are unlimited. We would always like more and better housing, more and better education—more and better of practically everything.

If our resources were also unlimited, we could say yes to each of our wants—and there would be no economics. Because our resources are limited, we cannot say yes to everything. To say yes to one thing requires that we say no to another. Whether we like it or not, we must make choices. Our unlimited wants are continually colliding with the limits of our resources, forcing us to

pick some activities and to reject others. Scarcity is the condition of having to choose among alternatives.

A scarce good is one for which the choice of one alternative requires that another be given up. Consider a parcel of land. The parcel presents us with several alternative uses. We could build a house on it. We could put a gas station on it. We could create a small park on it. We could leave the land undeveloped in order to be able to make a decision later as to how it should be used.

Suppose we have decided the land should be used for housing. Should it be a large and expensive house or several modest ones? Suppose it is to be a large and expensive house. Who should live in the house? If the Lees live in it, the Nguyens cannot. There are alternative uses of the land both in the sense of the type of use and also in the sense of who gets to use it. The fact that land is scarce means that society must make choices concerning its use.

Virtually everything is scarce. Consider the air we breathe, which is available in huge quantity at no charge to us. Could it possibly be scarce? The test of whether air is scarce is whether it has alternative uses. What uses can we make of the air? We breathe it. We pollute it when we drive our cars, heat our houses, or operate our factories. In effect, one use of the air is as a garbage dump. We certainly need the air to breathe. But just as certainly, we choose to dump garbage in it. Those two uses are clearly alternatives to each other.

The more garbage we dump in the air, the less desirable—and healthy—it will be to breathe. If we decide we want to breathe cleaner air, we must limit the activities that generate pollution. Air is a scarce good because it has alternative uses. Not all goods, however, confront us with such choices. A free good is one for which the choice of one use does not require that we give up another. One example of a free good is gravity. The fact that gravity is holding you to the earth does not mean that your neighbor is forced to drift up into space! One person's use of gravity is not an alternative to another person's use.

There are not many free goods. Outer space, for example, was a free good when the only use we made of it was to gaze at it. But now, our use of space has reached the point where one use can be an alternative to another. Conflicts have already arisen over the allocation of orbital slots for communications satellites. Thus, even parts of outer space are scarce. Space will surely become scarcer as we find new ways to use it. Scarcity characterizes virtually everything. Consequently, the scope of economics is wide indeed.

Choice

The choices we confront as a result of scarcity raise three sets of issues. Every economy must answer the following questions:

1. **What should be produced?** Using the economy's scarce resources to produce one thing requires giving up another.

Producing better education, for example, may require cutting back on other services, such as health care. A decision to preserve a wilderness area requires giving up other uses of the land. Every society must decide what it will produce with its scarce resources.

2. **How should goods and services be produced?** There are all sorts of choices to be made in determining how goods and services should be produced. Should a firm employ a few skilled or a lot of unskilled workers? Should it produce in its own country or should it use foreign plants? Should manufacturing firms use new or recycled raw materials to make their products?

3. **For whom should goods and services be produced?** If a good or service is produced, a decision must be made about who will get it. A decision to have one person or group receive a good or service usually means it will not be available to someone else. For example, representatives of the poorest nations on earth often complain that energy consumption per person in the United States is 17 times greater than energy consumption per person in the world's 62 poorest countries. Critics argue that the world's energy should be more evenly allocated. Should it? That is a "for whom" question.

Every economy must determine what should be produced, how it should be produced, and for whom it should be produced. We shall return to these questions again and again.

Opportunity cost

It is within the context of scarcity that economists define what is perhaps the most important concept in all of economics, the concept of opportunity cost. Opportunity cost is the value of the best alternative forgone in making any choice.

The opportunity cost to you of reading the remainder of this chapter will be the value of the best other use to which you could have put your time. If you choose to spend $20 on a potted plant, you have simultaneously chosen to give up the benefits of spending the $20 on pizzas or a paperback book or a night at the movies. If the book is the most valuable of those alternatives, then the opportunity cost of the plant is the value of the enjoyment you otherwise expected to receive from the book. The concept of opportunity cost must not be confused with the purchase price of an item. Consider the cost of a

college or university education. That includes the value of the best alternative use of money spent for tuition, fees, and books. But the most important cost of a college education is the value of the forgone alternative uses of time spent studying and attending class instead of using the time in some other endeavor. Students sacrifice that time in hopes of even greater earnings in the future or because they place a value on the opportunity to learn. Or consider the cost of going to the doctor.

Part of that cost is the value of the best alternative use of the money required to see the doctor. But, the cost also includes the value of the best alternative use of the time required to see the doctor. The essential thing to see in the concept of opportunity cost is found in the name of the concept. Opportunity cost is the value of the best opportunity forgone in a particular choice.

It is not simply the amount spent on that choice. Concepts of scarcity, choice, and opportunity cost are at the heart of economics. A good is scarce if the choice of one alternative forces us to make choices.

The opportunity cost of any choice is the value of the best alternative forgone in making it (Saylor Academy, n.d.).

The field of economics

Adam Smith

Adam Smith (1723-1790) was a Scottish philosopher and economist. Although best remembered as an economist, Smith was a polymath, and an eminent social theorist and moral philosopher. Born in Kirkcaldy, he was educated at Glasgow university and Balliol College, Oxford.

An Inquiry into the Nature and Causes of the Wealth of Nations was published in 1776. The 'invisible hand' for which Smith is famous first appears as a phrase in an essay he wrote on the history of astronomy. It recurs in *The Theory of Moral Sentiments*. In spite of their insatiable greed and rapacity, the rich are unable actually to consume much more than anyone else, and so are led by the invisible hand to make 'nearly the same distribution of the necessaries of life, which would have been made, had the earth been divided into equal portions among all its inhabitants.' In *The Wealth of Nations*, the emphasis is less on equal distribution and more on the promotion of the common good that arises from the pursuit of self-interest. In economics, Smith gives the pioneering analysis of the structure of a functioning economy, and the first discussion of the benefits of the 'division of labour.'

His general optimism about the economic results of free markets has given his name a lustre in libertarian political circles that he might not have entirely welcomed, given his low opinion of the motives that lead to economic activity.

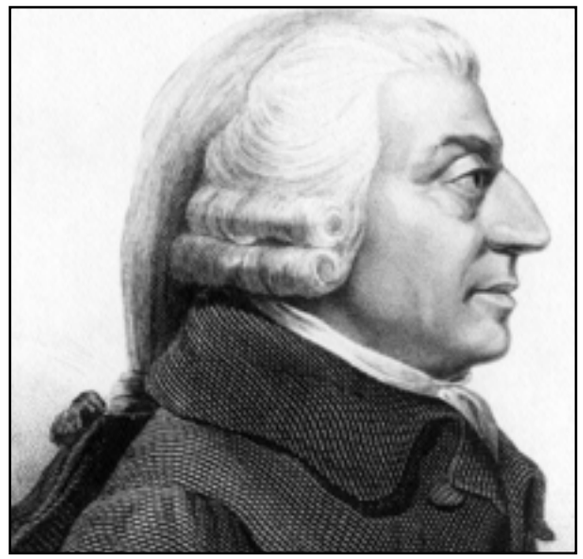

***Image 1.3*:** Adam Smith

In fact, in Pt. V of the book he allows for the provision of public services out of general taxation where market mechanisms fail and argues that the state has a vital role in providing educational services for the poor, both to ward off the 'mental mutilation' consequent upon industrial working conditions, and to enable them to become better workers and citizens (Blackburn, 2008).

Inquiry into *The Wealth of Nations*

We have examined the basic concepts of scarcity, choice, and opportunity cost in economics. In this section, we will look at economics as a field of study. We begin with the characteristics that distinguish economics from other social sciences.

The emphasis economists place on opportunity cost, the idea that people make choices that maximize the value of objectives that serve their self-interest, and a focus on the effects of small changes are ideas of great power. They constitute the core of economic thinking. The next three sections examine these ideas in greater detail.

Opportunity costs are important

If doing one thing requires giving up another, then the expected benefits of the alternatives we face will affect the ones we choose. Economists argue that an understanding of opportunity cost is crucial to the examination of choices.

As the set of available alternatives changes, we expect that the choices individuals make will change. A rainy day could change the opportunity cost of reading a good book; we might expect more reading to get done in bad than in good weather. A high income can make it very costly to take a day off; we might expect highly paid individuals to work more hours than those who are not paid as well. If individuals are maximizing their level of satisfaction and firms are maximizing profits, then a change in the set of alternatives they face may affect their choices in a predictable way.

The emphasis on opportunity costs is an emphasis on the examination of alternatives. One benefit of the economic way of thinking is that it pushes us to think about the value of alternatives in each problem involving choice.

Individuals maximize in pursuing self-interest

What motivates people as they make choices? Perhaps more than anything else, it is the economist's answer to this question that distinguishes economics from other fields.

Economists assume that individuals make choices that they expect will create the maximum value of some objective, given the constraints they face.

Furthermore, economists assume that people's objectives will be those that serve their own self- interest. Economists assume, for example, that the owners of business firms seek to maximize profit. Given the assumed goal of profit maximization, economists can predict how firms in an industry will respond to changes in the markets in which they operate. As labor costs in the United States rise, for example, economists are not surprised to see firms moving some of their manufacturing operations overseas. Similarly, economists assume that maximizing behavior is at work when they examine the behavior of consumers. In studying

consumers, economists assume that individual consumers make choices aimed at maximizing their level of satisfaction. In the next chapter, we will look at the results of the shift from skiing to snowboarding; that is a shift that reflects the pursuit of self-interest by consumers and by manufacturers.

In assuming that people pursue their self-interest, economists are not assuming people are selfish.

People clearly gain satisfaction by helping others, as suggested by the large charitable contributions people make. Pursuing one's own self-interest means pursuing the things that give one satisfaction. It need not imply greed or selfishness.

Choices are made at the margin

Economists argue that most choices are made "at the margin." The margin is the current level of an activity. Think of it as the edge from which a choice is to be made. A choice at the margin is a decision to do a little more or a little less of something.

Assessing choices at the margin can lead to extremely useful insights. Consider, for example, the problem of curtailing water consumption when the amount of water available falls short of the amount people now use. Economists argue that one way to induce people to conserve water is to raise its price. A common response to this recommendation is that a higher price would have no effect on water consumption, because water is a necessity.

Many people assert that prices do not affect water consumption because people "need" water.

But choices in water consumption, like virtually all choices, are made at the margin. Individuals do not make choices about whether they should or should not consume water.

Rather, they decide whether to consume a little more or a little less water. Household water consumption in the United States totals about 105 gallons per person per day.

Think of that starting point as the edge from which a choice at the margin in water consumption is made. Could a higher price cause you to use less water brushing your teeth, take shorter showers, or water your lawn less? Could a higher price cause people to reduce their use, say, to 104 gallons per person per day? To 103? When we examine the choice to consume water at the margin, the notion that a higher price would reduce consumption seems much more plausible. Prices affect our consumption of water because choices in water consumption, like other choices, are made at the margin.

The elements of opportunity cost, maximization, and choices at the margin can be found in each of two broad areas of economic analysis: microeconomics and macroeconomics. Your economics course, for example, may be designated as a "micro" or as a "macro" course. We will look at these two areas of economic thought now, but in greater detail in Part II and Part III of this textbook.

Microeconomics & macroeconomics

The field of economics is typically divided into two broad realms: microeconomics and macroeconomics. It is important to see the distinctions between these broad areas of study.

Microeconomics is the branch of economics that focuses on the choices made by individual decision-making units in the economy —typically consumers and firms—and the impacts those choices have on individual markets. Macroeconomics is the branch of economics that focuses on the impact of choices on the total, or aggregate, level of economic activity.

Why do tickets to the best concerts cost so much? How does the threat of global warming affect real estate prices in coastal areas? Why do women end up doing most of the housework? Why do senior citizens get discounts on public transit systems? These questions are generally regarded as microeconomic because they focus on individual units or markets in the economy.

Is the total level of economic activity rising or falling? Is the rate of inflation increasing or decreasing? What is happening to the unemployment rate? These are questions that deal with aggregates, or totals, in the economy; they are problems of macroeconomics. The question about the level of economic activity, for example, refers to the total value of all goods and services produced in the economy.

Inflation is a measure of the rate of change in the average price level for the entire economy; it is a macroeconomic problem. The total levels of employment and unemployment in the economy represent the aggregate of all labor markets; unemployment is also a topic of macroeconomics.

Both microeconomics and macroeconomics give attention to individual markets. But in microeconomics that attention is an end in itself; in macroeconomics it is aimed at explaining the movement of major economic aggregates—the level of total output, the level of employment, and the price level (Principles of Macroeconomics, 2011).

Section 4

Production possibilities

The objective of any nation is to raise the standards of living for the constituents. Increase in the availability of goods and services brings prosperity and improves the well-being of people. Investment in infra-structure, education, research and development and industries result in economic development and improves social welfare. This chapter discusses the production possibilities of any economy and the ways to improve those possibilities.

Choices concerning what goods and services to produce are choices about an economy's use of its factors of production, i.e., 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.

Factors of production

The factors of production in an economy are its labor, capital, and natural resources. Labor is the human effort that can be applied to the production of goods and services. People who are employed or who would like to be are considered part of the labor 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 labor, 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.

Labor

Labor 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 labor. People who would like to work but have not found employment—who are unemployed—are also considered part of the labor available to the economy.

In some contexts, it is useful to distinguish two forms of labor. 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 e acquiring human capital.

The amount of labor available to an economy can be increased in two ways. One is to increase the total quantity of labor, 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.

Money is not considered capital. 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. One of the forms of financial capital is money. 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.

Land & 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 18th 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.

***Image 1.4*:** An oil pumpjack near wind turbines

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 & 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, but we cannot dispute is that they have made our lives better. What we cannot dispute is that they have made our lives different (Ballingrud, 2005).

Production possibilities frontier

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).

Production possibilities

Because society has limited resources (e.g., labor, land, capital, technology) 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 1.1* illustrates this situation.

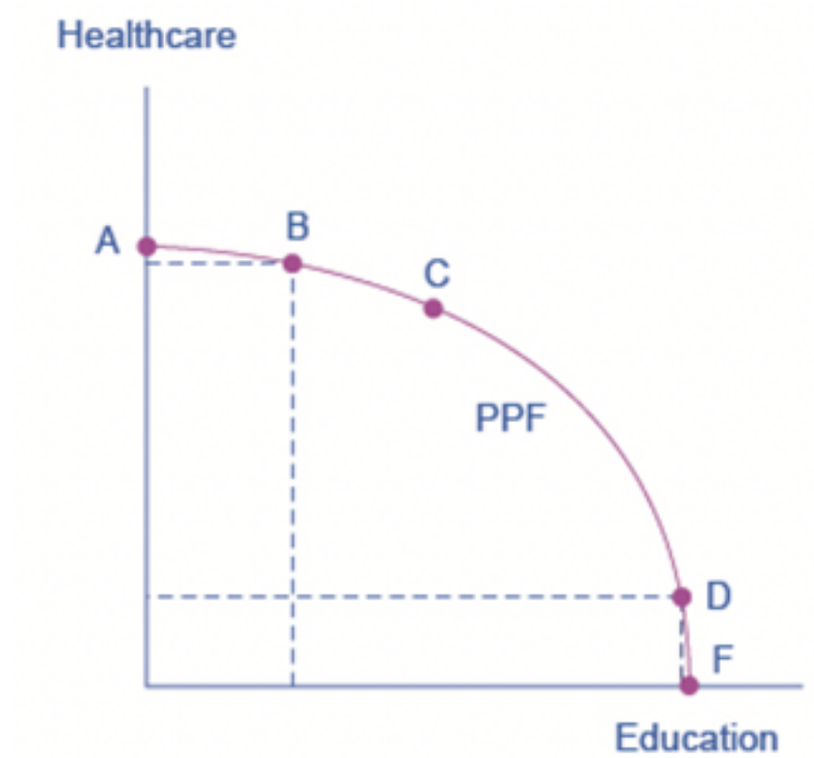

***Figure 1.1*:** Healthcare vs. education production possibilities frontier. This PPF shows a tradeoff between devoting social resources to healthcare and devoting them to education.

Figure 1.1 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*. 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*.

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 a person. 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.

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.

Why the PPF is curved?

To understand why the PPF is curved, start by considering point A at the top left-hand side of the PPF. Considering the situation in *Figure 1.1* (shown again below), suppose we have only two types of resources: doctors and teachers. At point *A*, all available resources (i.e., all the doctors and all the teachers) are devoted to providing health care and none is left for education. Say the doctors are practicing medicine and the teachers are helping as best they can. This situation would be extreme and even ridiculous. For example, children are seeing a doctor every day, whether they're 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!

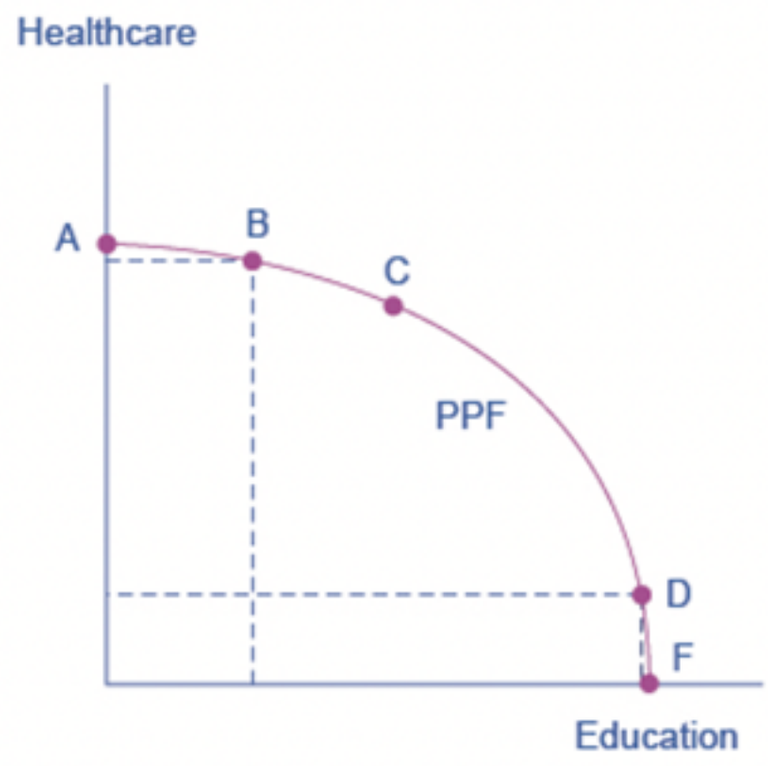

***Figure 1.1*:** PPF showing health care and education

Efficiency

In a market-oriented economy with a democratic government, the choice of what combination of goods and services to produce, and thus where to operate along the production possibilities curve, will involve a mixture of decisions by individuals, firms, and government, expressing supplies and demands. However, economics can point out that some choices are unambiguously better than others. This observation is based on the idea of efficiency. In everyday parlance, efficiency refers to lack of waste. An inefficient washing machine operates at high cost, while an efficient washing machine operates at lower cost, because it's not wasting water or energy. An inefficient organization operates with long delays and high costs, while an efficient organization is focused, meets deadlines, and performs within budget (Lumen Learning. (n.d.).

Any point on a PPF, such as points *A* and *B*, is said to be efficient and indicates that an economy's scarce resources are being fully employed:

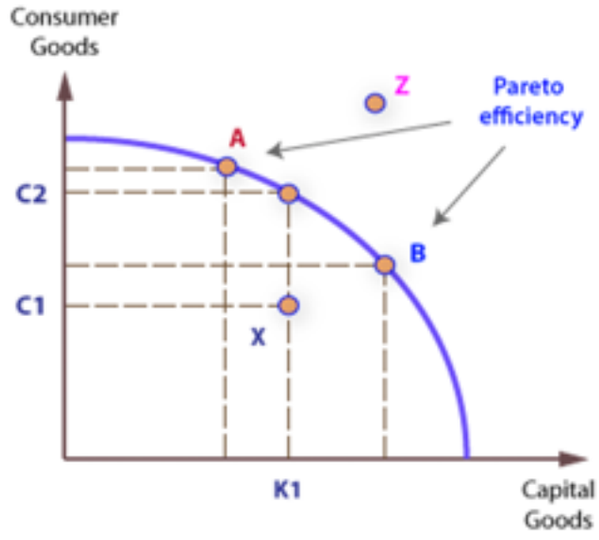

***Figure 1.2*:** PPF of consumer goods and capital goods

Inefficiency

Efficiency is unlikely to be achieved in the real world because of various rigidities and imperfections. For example, it is unlikely that all resources can be fully employed at any given point in time because some workers may be in the process of training, or in the process of searching for a new job. While searching for work, or being trained, they are unproductive. Similarly, an entrepreneur may have wound-up one business venture, and be in the process of setting-up a new one, but during this period, they are unproductive. Despite this, efficiency is still an extremely useful concept.

It is a useful concept for two reasons:

1. It can be an objective for an economy because it can set a direction towards which an economy can move.
2. It can help highlight the imperfections and rigidities that exist in an economy and prevent Pareto efficiency being achieved.

Any point inside the PPF, such as point *X* is said to be inefficient because output could be greater from the economy's existing resources.

Impossibility

Any point outside the PPF, such as point *Z*, is impossible with the economy's current scarce resources, but it may be an objective for the future. Efficiency can be looked at in another way—when

the only way to make someone better off is to make someone else worse off. In other words, efficiency means an economy is operating at its full potential, and no more output can be produced from its existing resources.

Economic growth

Increase in factors of production or/and technological progress cause the production capacity of the economy to expand. Expansion of the production capacity is called economic growth and shown by shift of the production possibilities curve (Economics Online, n.d.).

Economic growth has two meanings:

1. Firstly, and most commonly, growth is defined as an increase in the output that an economy produces over a period of time, the minimum being two consecutive quarters.

2. The second meaning of economic growth is an increase in what an economy can produce if it is using all its scarce resources. An increase in an economy's productive potential can be shown by an outward shift in the economy's production possibility frontier (PPF).

The simplest way to show economic growth is to bundle all goods into two basic categories, consumer and capital goods. An outward shift of a PPF means that an economy has increased its capacity to produce.

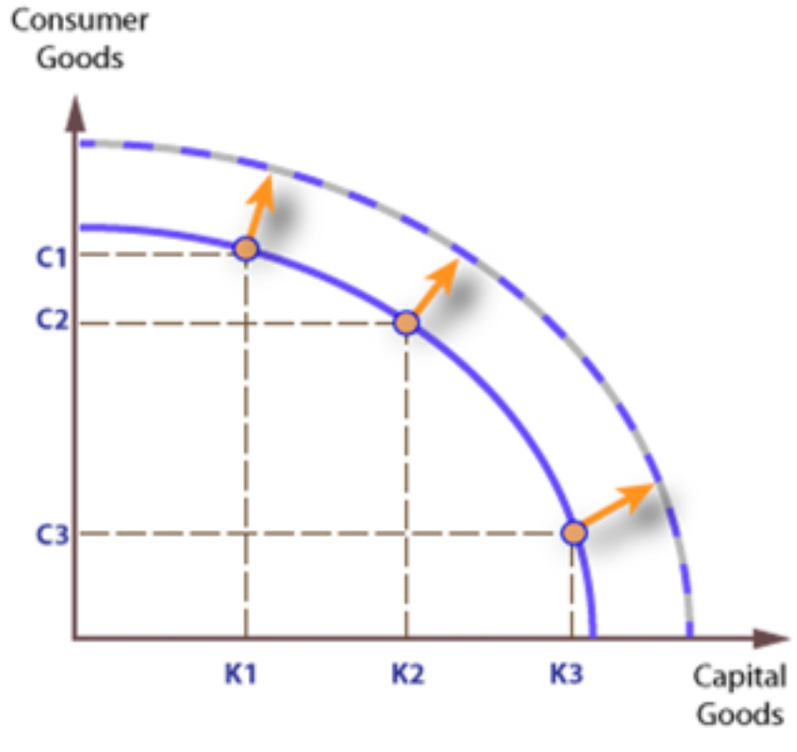

***Figure 1.3*:** PPF demonstrating economic growth

What creates growth?

When using a PPF, growth is defined as an increase in potential output over time, and illustrated by an outward shift in the curve. An outward shift of a PPF means that an economy has increased its capacity to produce all goods. This can occur when the economy undertakes some or all of the factors of production.

- Employs new technology
- Employs a division of labour, allowing specialization
- Employs new production methods

- Increases its labour force
- Discovers new raw materials

An inward shift of a PPF

A PPF will shift inwards when an economy has suffered a loss or exhaustion of some of its scarce resources. This reduces an economy's productive potential.

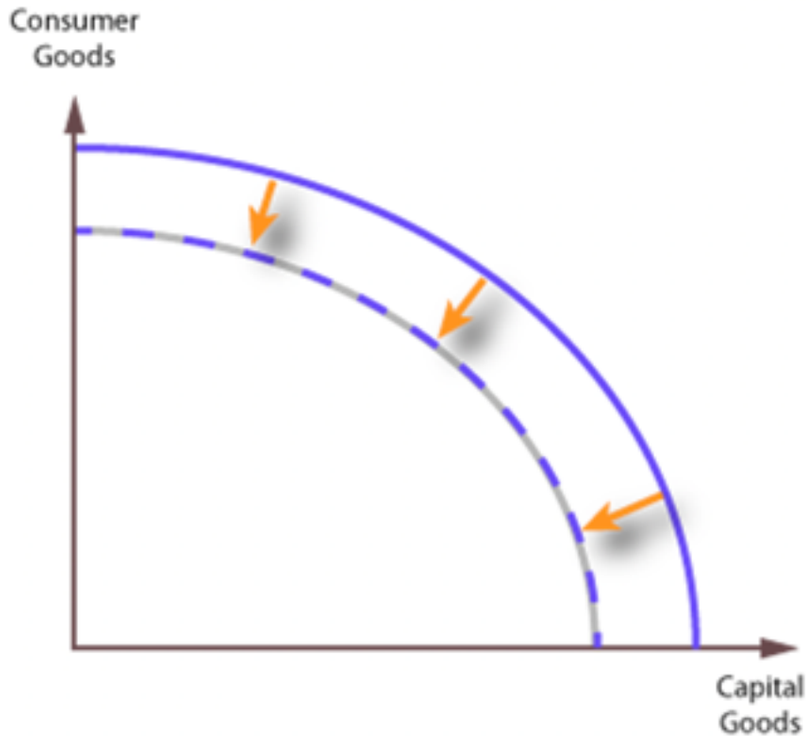

***Figure 1.4*: PPF demonstrating inward shift**

Investment & economic growth

Allocating scarce funds to capital goods, such as machinery, is referred to as real investment. If an economy chooses to produce more capital goods than consumer goods, at point A in the diagram, then it will grow by more than if it allocated more resources to consumer goods, at point *B*, seen below in *Figure 1.5*.

To achieve long run growth the economy must use more of its capital resources to produce capital rather than consumer goods. As a result, standards of living are reduced in the short run, as resources are diverted away from private consumption. However, the increased investment in capital goods enables more output of consumer goods to be produced in the long run. This means that standards of living can increase in the future by more than they would have if the economy had not made such as short-term

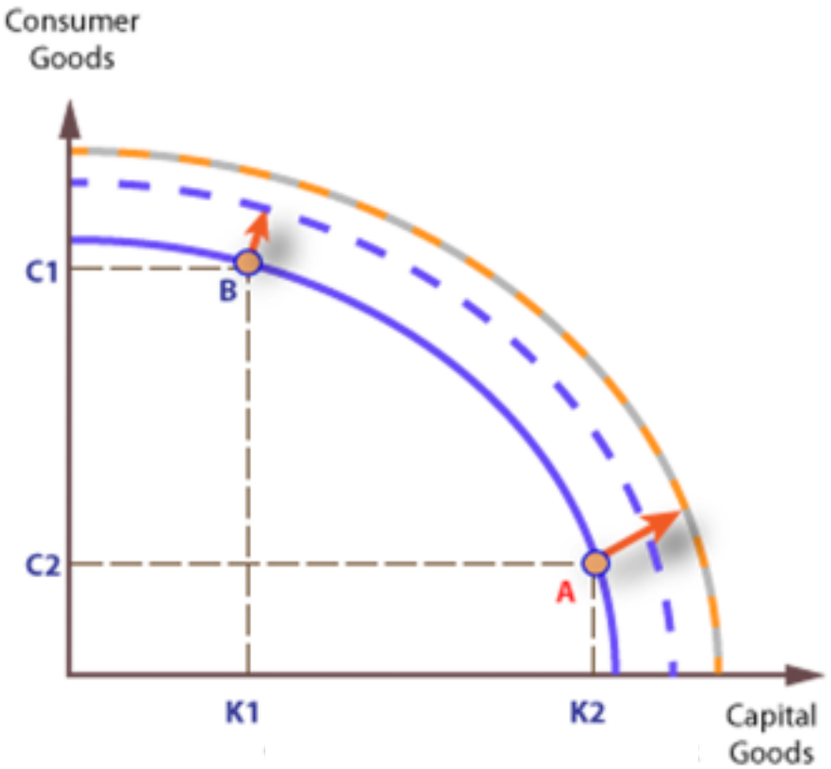

***Figure 1.5*: PPF demonstrating outward shift**

sacrifice. Hence economies face a choice between high levels of consumption in the short run and the long run.

Asymmetric growth

An economy can grow because of an increase in productivity in one sector of the economy—this is called asymmetric growth. For example, an improvement in technology applied to industry *Y*, such as motor vehicles, but not to *X*, such as food production, would be illustrated by a shift of the PPF from the *Y*-axis only.

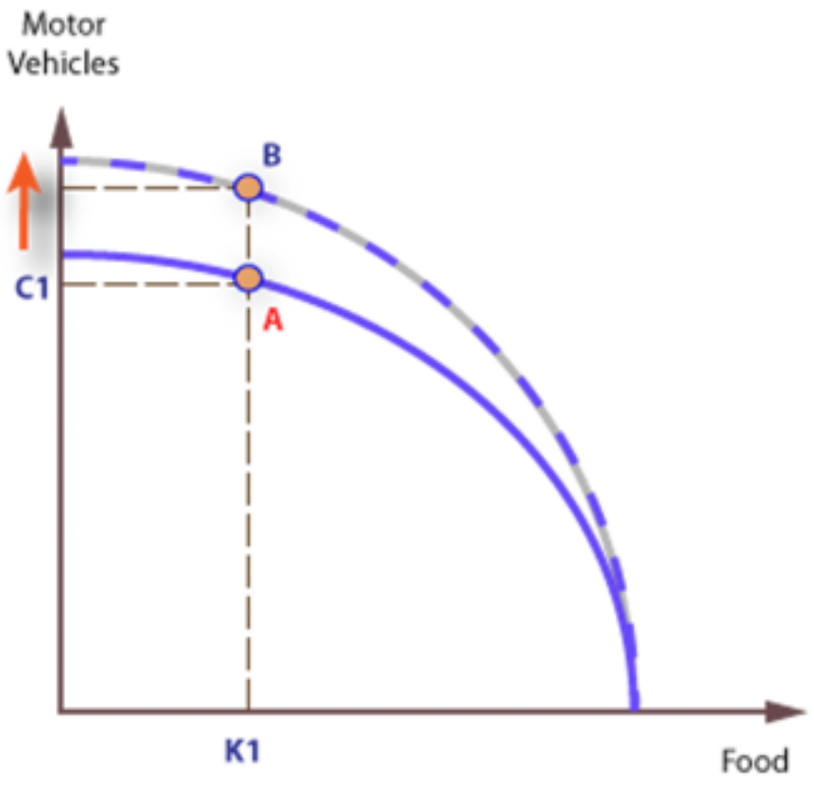

***Figure 1.6*:** PPF asymmetric growth

Absolute & comparative advantage

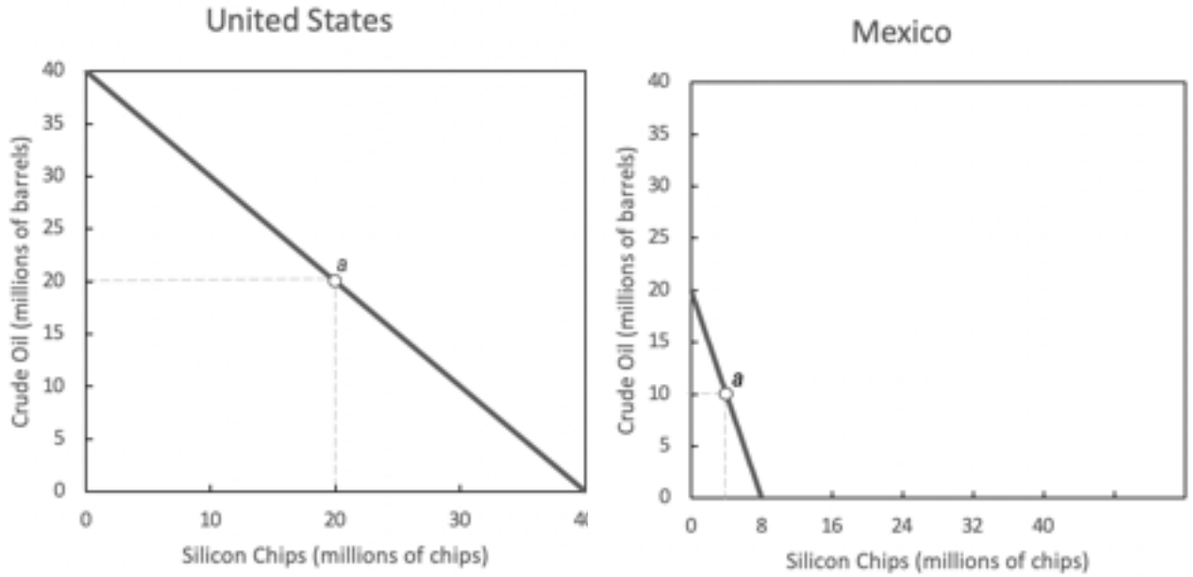

***Figure 1.7*:** Hypothetical PPFs for the United States and Mexico

Figure 1.7 shows hypothetical production possibilities frontiers for the United States and Mexico. To simplify the analysis, we assume that opportunity costs are constant (PPFs are straight lines); however, the same analysis applies to PPFs with increasing opportunity costs. Both countries are assumed to produce only crude oil and silicon chips. Given the PPFs in *Figure 1.7*, the United States has an absolute advantage over Mexico in producing both products. An absolute advantage exists when one country can produce more of a good than another country. In this instance, the United States can produce 2 times more oil (40 million versus 20 million barrels) and 5 times as many silicon chips (40 million versus 8 million chips) as Mexico.

At first glance, you might wonder why the United States would even consider trading with Mexico. The United States has so much more production capacity than Mexico, so why wouldn't it just produce all of its own crude oil and silicon chips? The answer lies in comparative advantage.

One country has a comparative advantage in producing a good if its opportunity cost to produce that good is lower than the other countries. We can calculate each country's opportunity cost for each good using the production possibility frontiers in *Figure 1.7*.

If the United States uses all of its resources efficiently, it can produce a maximum of 40 million barrels of oil or 40 million silicon chips. It can also produce some of both goods, though clearly not 40 million of each, because in order to produce more of one good, it must reduce production of another (its opportunity cost). Because the PPF is linear, the tradeoff between oil and chips is constant. For the United States, it can substitute 1 million barrels of oil for 1 million silicon chips, which means it can produce 20 million barrels of oil and 20 million silicon chips. The opportunity cost for each good is summarized as follows:

- For every barrel of oil the United States produces, it must give up producing one silicon chip.
- For every silicon chip the United States produces, it must give up producing one barrel of oil.

Now let's look at Mexico. If it uses its resources efficiently, it can produce a maximum of 20 million of barrels of oil or 8 million silicon chips. For Mexico, although the tradeoff between goods is also constant, the tradeoff is not one-for-one as in the United States. Because Mexico is better is better at producing oil than silicon chips, its opportunity cost for each good is as follows:

- For every very barrel of oil Mexico produces, it must give up producing 0.4 silicon chips.
- For every silicon chip Mexico produces, it must give up producing 2.5 barrels of oil.

Note that the values of 0.4 and 2.5 are reciprocals of one another. In other words, 1/0.4 = 2.5, and 1/2.5 = 0.4. This relationship exists when calculating opportunity costs in a two-product economy.

Now that we have determined the opportunity cost of each good in both countries, we can conclude that Mexico has a comparative advantage over the United States in producing oil. This is because Mexico gives up only 0.4 chips for every barrel of oil it produces, while the United States must give up 1 chip. Thus, Mexico's opportunity cost of producing oil is less than that of the United States, giving Mexico a comparative advantage.

Conversely, the United States has a comparative advantage over Mexico in producing silicon chips: Producing a silicon chip in the United States costs one barrel of oil, whereas the same chip in

Mexico costs two-and-a-half barrels of oil. *Table 1.1* summarizes the opportunity costs of each good and which country has the comparative advantage.

***Table 1.1*: Comparing opportunity costs for oil and chip production**

	United States	**Mexico**	
	Opportunity	Opportunity cost	Comparative advantage
Oil production	1 chip	0.4 chip	Mexico
Chip production	1 barrel	2.5 barrels	United States

Note that each country has a comparative advantage in one good, even though the United States has an absolute advantage in both goods. However, it is comparative advantage that generates gains from trade. These relative costs suggest that the United States should pour its resources into producing silicon chips, while Mexico specializes in crude oil. The two countries can then engage in trade to their mutual benefit. As long as opportunity cost differ between countries, specialization and trade can be mutually beneficial, allowing all countries to consume more.

The same idea applies to individuals. Although we have focused on trade between countries, the concept of comparative advantage explains why individuals specialize in a few tasks and then trade with one another. For example, if you are relatively better at understanding economics than your roommate who is on the golf team, you might offer to tutor him in economics in exchange for golf lessons. Comparative advantage explains all trade: between individual as well as between countries.

Gains from trade

To see how specialization and trade can benefit all trading partners, let's return to our example in which the United States has the ability to produce more of both goods than Mexico. Assume that each countries at first (before trade) operating at point a in *Figure 1.7*. At this point, both countries are producing and consuming only their own output; the United States produces and consumes 20 million barrels of oil and 20 million silicon chips; Mexico, 10 million barrels of oil and 4 million chips. *Table 1.2* on the following page summarizes these initial conditions.

Now assume that Mexico focuses on oil, producing the maximum it can: 20 million barrel. We also assume both countries want to continue consuming 30 million barrels of oil between them. Therefore, the United States only needs to produce 10 million barrels of oil because Mexico is now producing 20 million barrels.

For the United States, this frees up some resources that can be diverted to producing silicon chips. Because each barrel of oil in the United States costs one chip, reducing oil output by 10 million barrels means that 10 million more chips can be produced.

Table 1.2 Initial consumption-production pattern			
	United States	**Mexico**	**Total**
Oil	20	10	30
Chips	20	4	24

Table 1.3 shows each country's production after Mexico has begun specializing in oil production.

Table 1.3: Production after Mexico specializes in producing crude oil			
	United States	**Mexico**	**Total**
Oil	10	20	30
Chips	30	0	30

Notice that the combined production of crude oil has remained constant, but the total output of silicon chips has risen by 6 million chips. Assuming that the two countries agree to share the added 6 million chips between them equally, Mexico will now ship 10 million barrels of oil to the United States in exchange for 7 Million chips. From the 10 million additional chips the United States produces, Mexico will receive 4 million (its original production) plus 3 million for a total 7 million leaving 3 million additional chips for U.S. consumption. The resulting mix of products consumed in each country is shown in *Table 1.4*.

Clearly, both countries are better off, having engaged in specialized products and trade.

Table 1.4: Final consumption patterns after trade			
	United States	**Mexico**	**Total**
Oil	20	10	30
Chips	23	7	30

The important point to remember here is that even when one country has an absolute advantage over another, both countries still benefit from trading with one another. In our example, the gains were small, but such gains can grow. As two economies become more equal in size, the benefits of their comparative advantages grow.

Practical constraints on trade

Before leaving the subject of international trade and how it contributes to growth both countries, we should take a moment to note some practical constraints on trade.

First, every transaction involves costs, including transportation, communications, and the general costs of doing business. Even so, over the last several decades, transportation and communication costs have been declining all over the world, resulting in growing global trade.

Second, the production possibilities curves for nations are not linear, but rather governed by increasing costs and diminishing returns. Therefore, it is difficult for countries to specialize in producing one product. Complete specialization would be risky, more- over, because the market for a product can always decline, perhaps because the product becomes technologically obsolete. Alternatively, changing weather patterns can wreak havoc on specialized agricultural products, adding further instability to incomes and exports in developing countries.

Finally, although two countries may benefit from trading with one another, expanding this trade may well hurt some industries and individuals within each country. Notably, industries finding themselves at a comparative disadvantage may be forced to scale back production and lay off workers. In such instances, government may need to provide workers with retraining, relocation, and other help to ensure a smooth transition to the new production mix.

When the United States signed the North American Free Trade Agreement (NAFTA) with Canada and Mexico, many people experienced what have just been discussing Some U.S. jobs went south to Mexico because of low production cost. By opening up more markets for U.S. production, however, NAFTA dis stimulate economic growth, such that retrained workers ended up with new and better jobs (Chiang, 2016).

David Ricardo

***Image 1.5*:** David Ricardo

David Ricardo (1772–1823) was a British political economist who, with Adam Smith, founded British classical economics. In 1819-23, he was an MP, supporting Free Trade, a return to the gold standard, and the repeal of the Corn Laws. He is best remembered for his *Principles of Political Economy and Taxation* (1817), arguing that the value of a commodity is related to amount of labour required to make it—a premise later adopted by Karl Marx. He also formulated the law of comparative advantage in international trade (Wright, 2006).

Key takeaways

- Economics is a social science that examines how societies make choices about the best allocation of resources to maximize social welfare.
- Scarcity implies that we must give up one alternative in selecting another. A good that is not scarce is a free good.

- The three fundamental economic questions are: What should be produced? How should goods and services be produced? For whom should goods and services be produced?
- Every choice has an opportunity cost and opportunity costs affect the choices people make. The opportunity cost of any choice is the value of the best alternative that had to be forgone in making that choice.
- Economists assume that individuals make choices in a way that maximizes the value of an objective defined in terms of their own self-interest, and they assume that individuals make those choices at the margin.
- Economics is divided into two broad areas: microeconomics and macroeconomics.
- Factors of production are the resources the economy has available to produce goods and services.
- A production possibilities curve (PPC) shows the combinations of two goods an economy is capable of producing given the resources and technology. All points on the PPC reflect full employment and efficiency. Points below the PPC reflect inefficiency and unemployment (Saylor Academy, n.d.).

Chapter 2

Market: Supply & Demand

After reading this chapter, students should be able to do the following:

- Define the quantity demanded/supplied of a good or service and illustrate it using a demand schedule and a demand curve.
- Identify demand/supply shifters.
- Define a market.
- Explain how equilibrium price and quantity are determined in a market.
- Outline the circular flow model.
- Discuss market failure and the conditions that may lead to it.

In this chapter:

Section 1

Start up: Crazy for coffee

Starbucks Coffee Company revolutionized the coffee-drinking habits of millions of Americans. 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 2013 Starbucks has become the largest coffee house company in the world, with about 20,891 stores in 62 countries.

The change in American 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 market, and today there are thousands of coffee bars, carts, drive-through, 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 labor 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.

***Image 2.1*:** Starbucks Coffee

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 labor 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.

The purpose of this lesson is to reach an understanding of how markets operate, how prices are set and transactions occur. The two market forces of demand and supply are defined and explained. The equilibrium point is studied. Conclusions and applications are offered.

Section 2

Market

Market is a place which there is at least a buyer and a seller and an exchange takes place. Market participants include buyers, sellers, and government. The buyer side is called the demand side and the seller side is called the supply side of the market.

The buyer's objective is to maximize her(is) satisfaction. The seller's objective is to maximize her(is) profits. The government objective is to maximize social welfare.

There are many markets in an economy that have been divided in two groups: (1) product markets and (2) factor/resource markets:

1. Product markets are where goods and services are exchanged.
2. Resource markets are where labor, land, and capital are exchanges.

The circular flow of the economy shows the market participants and flow of resources, good and services in a market economy (Saylor Academy, n.d.).

Circular flow of the economy

The circular flow model illustrates the flows of money, resources, and products throughout an economy.

The markets

The circular flow diagram contains two distinct markets. The first is the product market. In the product market, goods and services are exchanged for money. In the product market, businesses are suppliers and households (consumers) are demanders.

The second market in the circular flow diagram is the factor market (also called resource market). There, factors of production are exchanged for money. In this market, households are the suppliers and businesses are demanders.

The economic actors

In the simplified circular flow diagram, there are just two economics actors: businesses and households. More detailed

circular flow diagrams include the government, foreign markets, banking systems, etc.

Households are the owners of resources in the circular flow model. Those resources include land, labor, capital, and entrepreneurship. Households exchange resources for monetary payments. The payments for land are generally called rent payments for labor are called wages. Payments for capital are referred to as interest. That is because physical capital is often financed through loans requiring interest payments. Payment for entrepreneurial talent is called profits. When a business makes a profit, that money goes to the owner of the business to pay for his or her entrepreneurship.

Businesses are the producers of goods and services in the circular flow model. They purchase resources in the factor market and sell goods and services in the product market. The monetary payments in the product market are generally called sales.

Flows

The money flow includes all payments within the circular flow model. Money flows from businesses to households, then back to businesses. Money facilitates the exchange of products and resources. Since economics isn't really about money, some might say the money flow is not as important as the real flow.
The real flow is what economics is all about. It includes resources (land, labor, capital, and entrepreneurship) as well as products (goods and services). Resources flow from households to businesses and products flow from businesses to households.

Leakages & injections

A leakage from the circular flow model occurs any time money leaves the economy. If you purchase a foreign made product (import) or you save your money, it is no longer part of the circular flow. Those are leakages.

An injection occurs any time money enters the economy. If citizens in other countries purchase U.S. goods, or businesses borrow then spend money from banks (funded by people's savings), the money flow increases. Those are injections.

Note: This is a simplified free market circular flow model. In capitalist economies, the government is another economic actor. The government buys labor in the resource market and buys products in the product market (Reed, 2020.

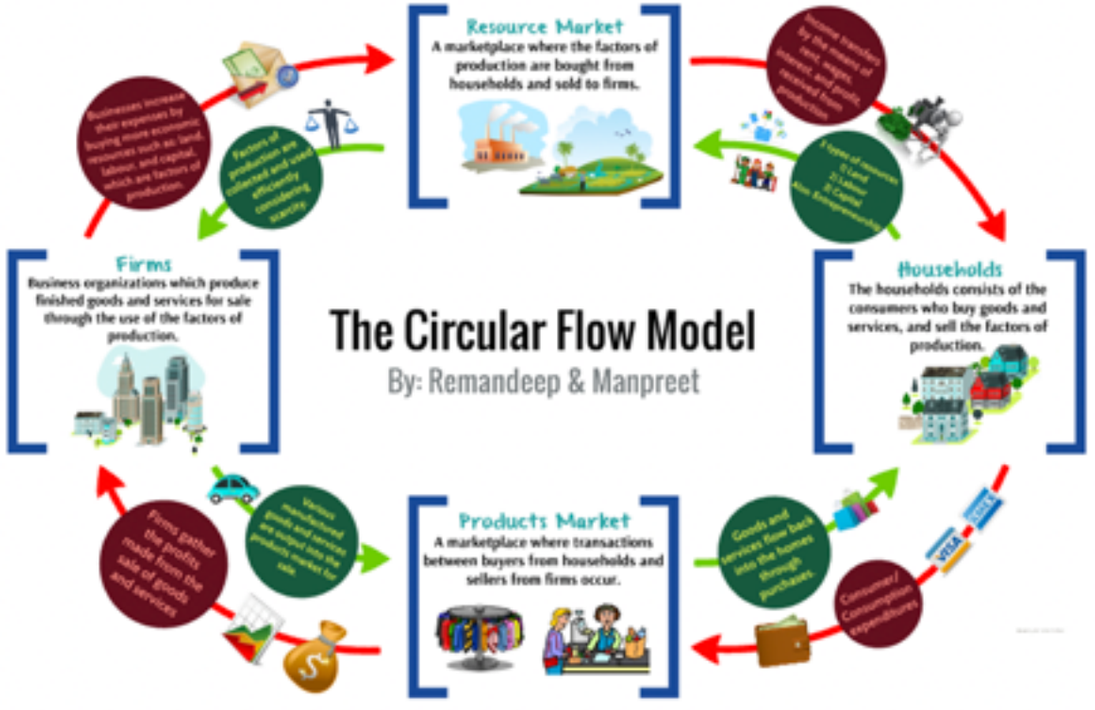

***Figure 2.1*:** Circular flow model (tap to expand)

Section 3

Demand

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 based on needs and wants—a consumer may be able to differentiate between a need and a want, but from an economist's perspective, they are the same thing. Demand is also based on ability to pay. If you can't pay for it, you have no effective demand.

What a buyer pays for a unit of the specific good or service is called the price. The total number of units purchased at that price is called the quantity demanded. A rise in the price of a good or service almost always decreases the quantity of that good or service demanded. Conversely, a fall in price will increase the quantity demanded. When the price of a gallon of gasoline goes up, 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.

Law of demand

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 are held constant.

***Image 2.2*:** Gasoline pump

Demand schedule

An example from the market for gasoline can be shown in the form of a table or a graph. A table that shows the quantity demanded at each price, such as *Table 2.1* (on the following page), is called a demand schedule. Price in this case is measured in dollars per gallon of gasoline. The quantity demanded is measured 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).

Demand curve

A demand curve shows the relationship between price and quantity demanded on a graph like *Figure 2.2* on the following page, with price per gallon on the vertical axis and quantity on

the horizontal axis. Note that each point on the demand curve comes from one row in *Table 2.1*. For example, the upper most point on the demand curve corresponds to the last row in *Table 2.1*, while the lower most point corresponds to the first row.

***Table 2.1*: Price & Quantity of Gasoline Demanded**	
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

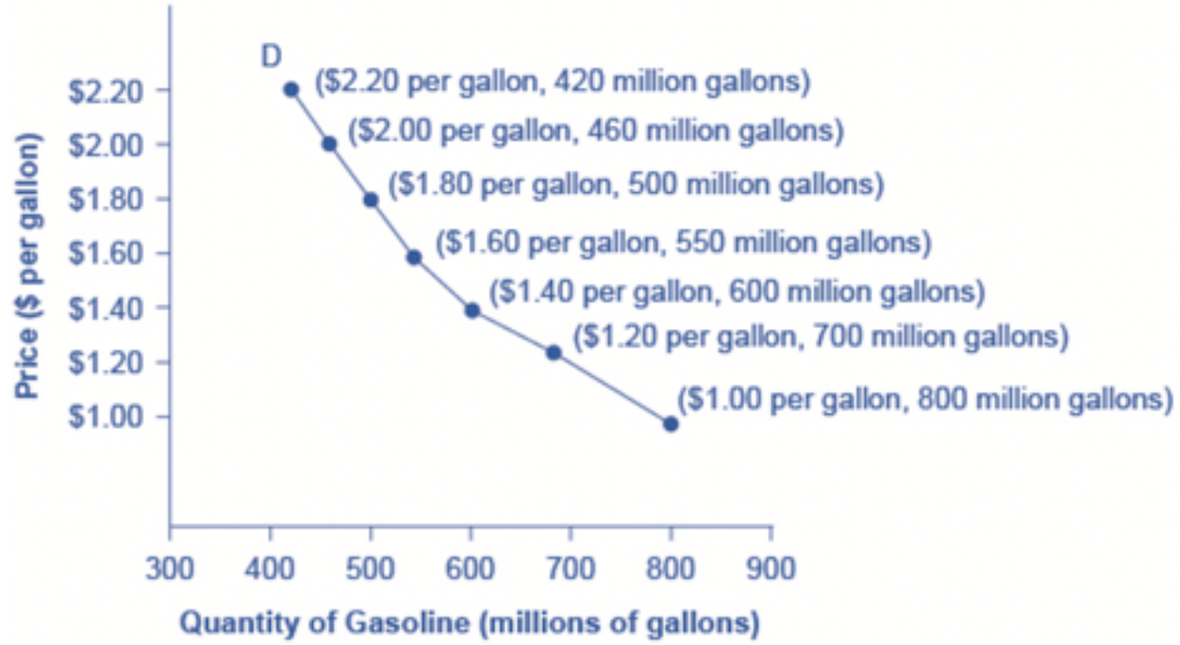

***Figure 2.2*:** Demand curve for gasoline based on data in *Table 2.1*

The demand schedule (*Table 2.1*) shows that as price rises, quantity demanded decreases, and vice versa. These points can then be graphed, and the line connecting them is the demand curve (shown by line *D* in the graph, above). The downward slope of the demand curve again illustrates the law of demand—the inverse relationship between prices and quantity demanded.

The demand schedule shown by *Table 2.1* and the demand curve shown by the graph in *Figure 2.2* are two ways of describing the same relationship between price and quantity demanded (Lumen Learning, n.d.).

Demand determinants

Price is the major determinant of the quantity demanded. However, Demand is also affected by a number of other non-price factors.

Non-price determinants of demand

- **Taste and preferences:** Tastes can change over time, as can preferences and fashions, and demand can increase or decrease to reflect these changes. For example, cigarette smoking is much less fashionable than it used to be.
- **Number of buyers:** more consumers that want to buy the product buyers lead to an increase in demand; fewer buyers lead to decrease.
- **Income:** When considering the impact of income on demand, economists differentiate normal and inferior goods.
    - **Normal goods:** Generally, for normal goods, the higher the income of a consumer the greater the quantity demanded.
    - **Inferior goods:** an increase in income will lead to a reduction in demand. For example, individuals on very low incomes are less likely to demand new motor cars, and more likely to take the bus. However, if they obtain higher income, demand for public transport may fall, while the demand for private transport is likely to rise. In this case, private transport is a normal good and public transport an inferior one.
- **Price of other goods** (either complementary or substitute):
    - **Complementary goods:** Many products have complements, which are either bought at the same time as the product, or are needed to make the product work. For example, batteries are a complement to many portable electronic products. As the price of complements rise, the demand for a product is likely to fall. A situation where complementary products are bought at the same time it is referred to as joint demand.
    - **Substitute goods:** Substitute goods are goods which can be replaced by each other in the mind of consumers. For instance, tea and coffee are for many (but not all) consumers interchangeable goods. If the price of tea goes up, the purchases of tea will decrease and the purchases of coffee will increase. Thus, the relationship between the price of tea and the quantity of coffee is direct. Butter and margarine, tea and coffee, taxi and bus, pen and pencil, hotel and motel, radio and record player, are all items which, for most people, can be replaced by each other. They are substitute goods.

- **Expectations about future:** Consumer expectations can influence the demand for many items. This is especially true with expensive and luxury items, including the demand for housing, for motor cars and expensive consumer electronics products.

Price determinant of change in quantity demanded

A change in any of the non-price determinants will cause the entire demand of consumers to change. Graphically this can be shown as a shift of the demand curve to the right or to the left.

These shifts in demand must be distinguished from movements along the demand curve caused by changes in price: these changes in price only cause the quantity demanded to change, but the entire demand schedule remains the same (Economics Online, n.d.).

A change in demand refers to a shift in the entire demand curve, which is caused by a variety of factors (preferences, income, prices of substitutes and complements, expectations, population, etc.).

In this case, the entire demand curve moves left or right, as demonstrated by *Figure 2.3* in the following column:

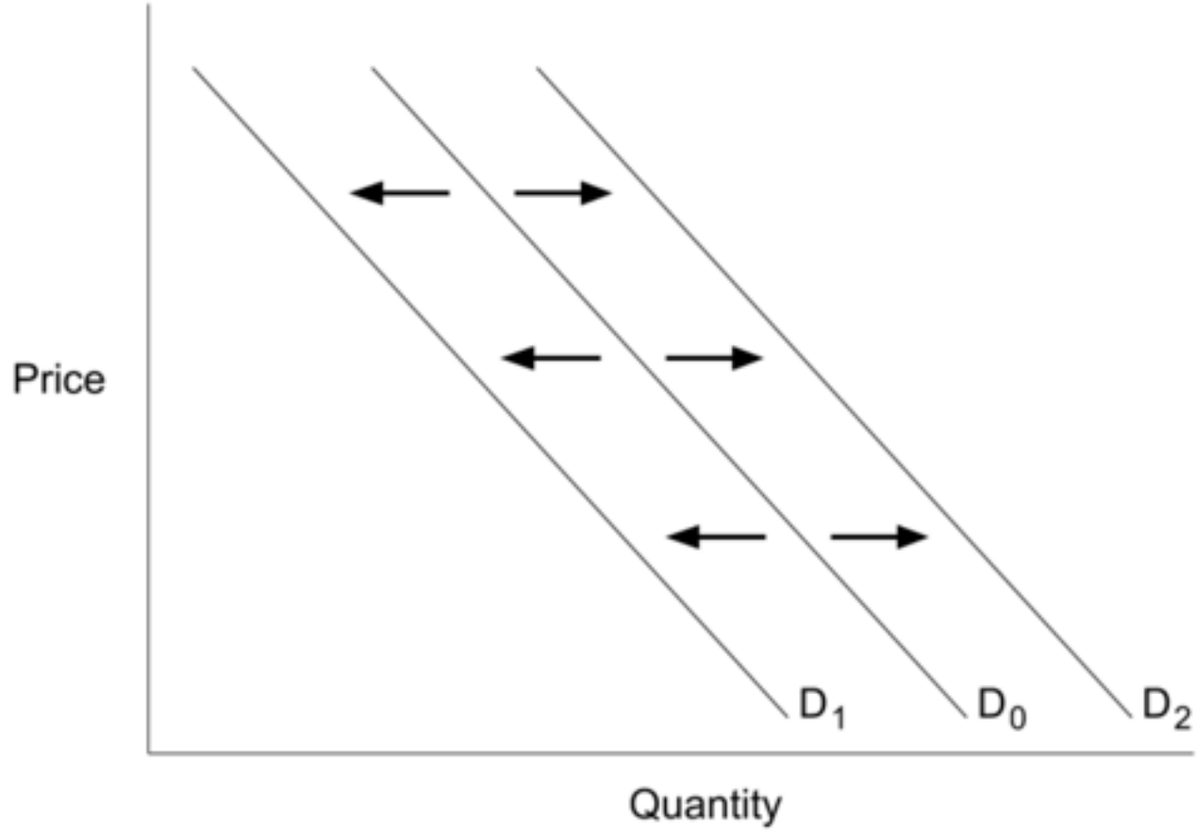

***Figure 2.3*:** Change in demand means that the entire demand curve shifts either left or right. The initial demand curve D_0 shifts to become either D_1 or D_2. This could be caused by a shift in tastes, changes in population, changes in income, prices of substitute or complement goods, or changes future expectations.

A change in quantity demanded refers to a movement along the demand curve, which is caused only by a change in price. In this case, the demand curve doesn't move; rather, we move along the existing demand curve, as shown in *Figure 2.4* on the following page:

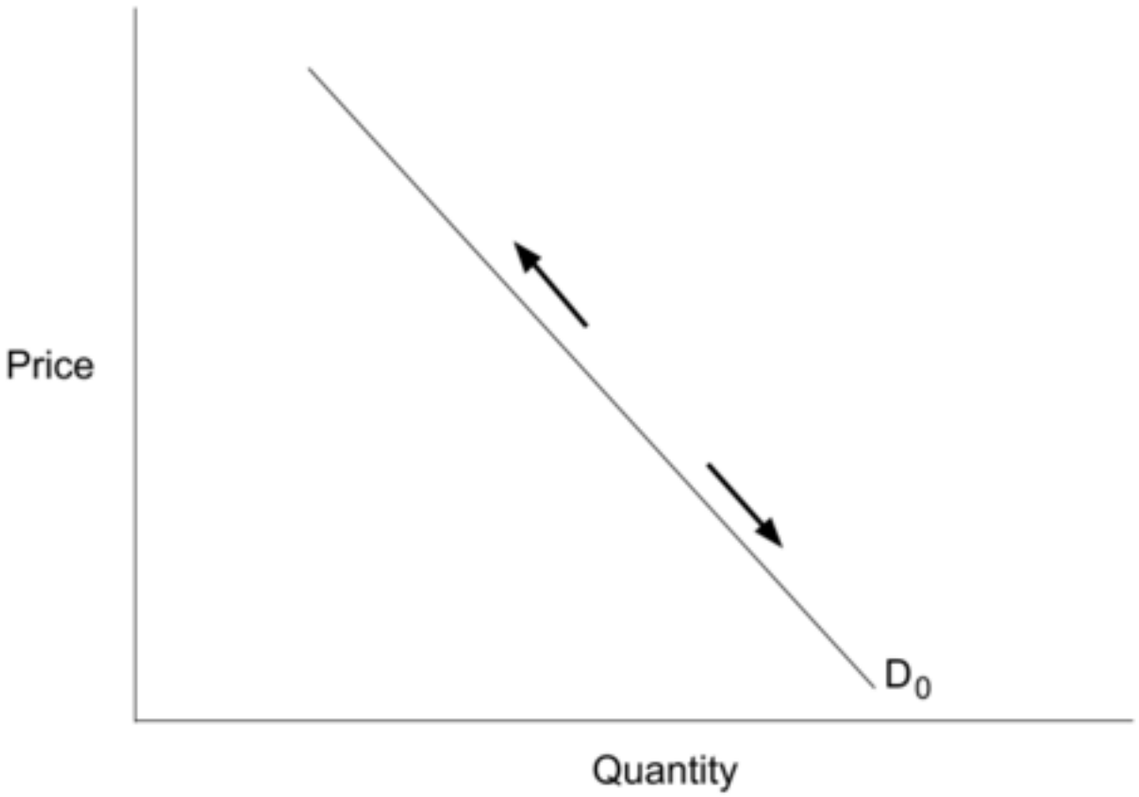

***Figure 2.4*:** Change in quantity demanded refers to movement along the existing demand curve, D_0. This is a change in price, which is caused by a shift in the supply curve.

Example of 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 2.5* "An Increase in Demand," on the following page, 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

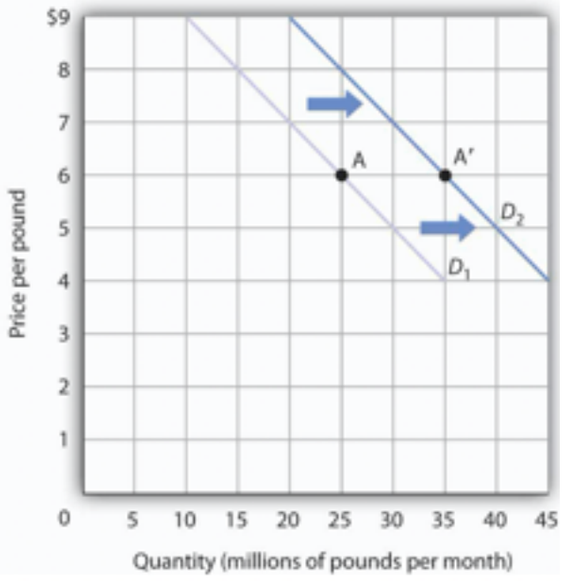

***Figure 2.5*:** Increase in demand

As shown in *Figure 2.5*, an increase in the quantity of a good or service demanded at each price is shown as an increase in demand. Here, the original demand curve D_1 shifts to D_2. Point *A* on D_1 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 D_2, the quantity demanded at this price rises to 35 million pounds of coffee per month (point *A'*) (Principles of Economics, 2011).

Section 4

Supply

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 where it can be refined 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.

Law of supply

The law of supply says that a higher price leads to a higher quantity supplied and a lower price leads to a lower quantity supplied. Economists call this positive relationship between price and quantity. The law of supply, like the law of demand, assumes that all other variables that affect supply are held equal (ceteris paribus).

Like demand, supply can be illustrated using a table or a graph. A supply schedule is a table—like *Table 2.2* below—that shows the quantity supplied at a range of different prices. Again, price is measured in dollars per gallon of gasoline, and quantity supplied is measured in millions of gallons.

***Table 2.2*: Price & 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

Supply curve

A supply curve is a graphic illustration of the relationship between price, shown on the vertical axis, and quantity, shown on the horizontal axis. *Figure 2.6* illustrates the law of supply, again using the market for gasoline as an example. You can see from this curve that as the price rises, quantity supplied also increases and vice versa. The supply schedule and the supply curve are just two different ways of showing the same information. Note that each point on the supply curve comes from one row in *Table 2.2*. For example, the lowermost point on the supply curve corresponds to the first row in *Table 2.2*, while the upper most point corresponds to the last row. Notice also that the horizontal and vertical axes on the graph for the supply curve are the same as for the demand curve (Lumen Learning, n.d.).

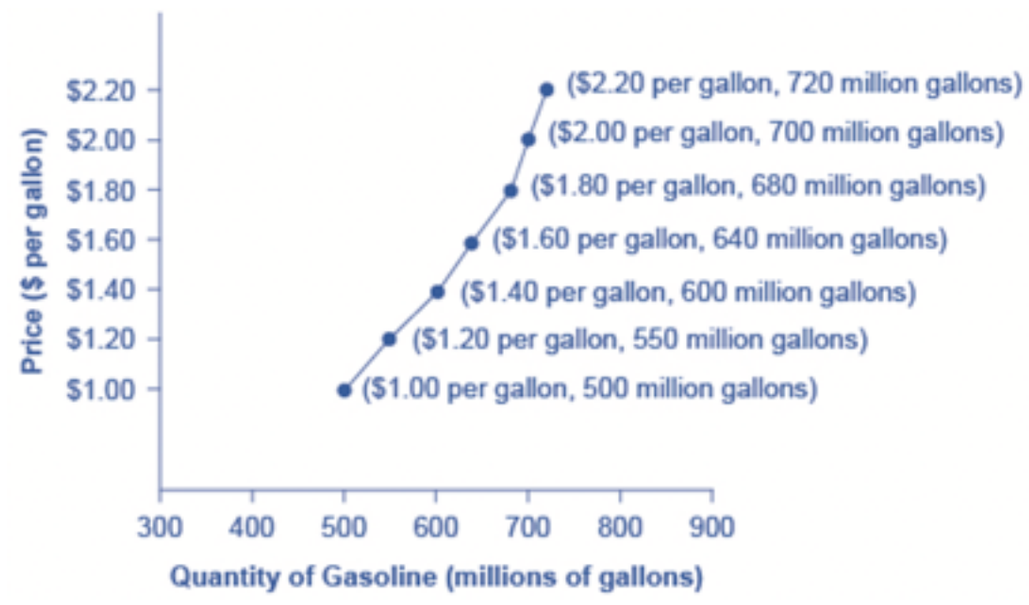

***Figure 2.6*:** Supply curve for gasoline

Supply determinants

Price is the major determinant of the quantity supplied. However, Supply is also affected by a number of other non-price factors.

Non-price determinants of supply

Price is the major determinant of supply. Nonprice determinants include the following:

- Number of sellers or producers
- Costs of production (including taxes)
- Technology (since it affects costs)
- Prices of other goods (as sources of possible profits)
- Expectations (but the effect is ambiguous)

Price determinant of change in quantity supplied

A change in any one of the supply non-price determinants will change the entire supply schedule and shift the supply curve. This shift of the supply curve is to be distinguished from the movement along the supply curve itself when price is changed: This only changes the quantity supplied (not supply).

A change in supply refers to a shift in the entire supply curve, which is caused by shifters such as taxes, production costs, and

technology. Just like with demand, this means that the entire supply curve moves left or right:

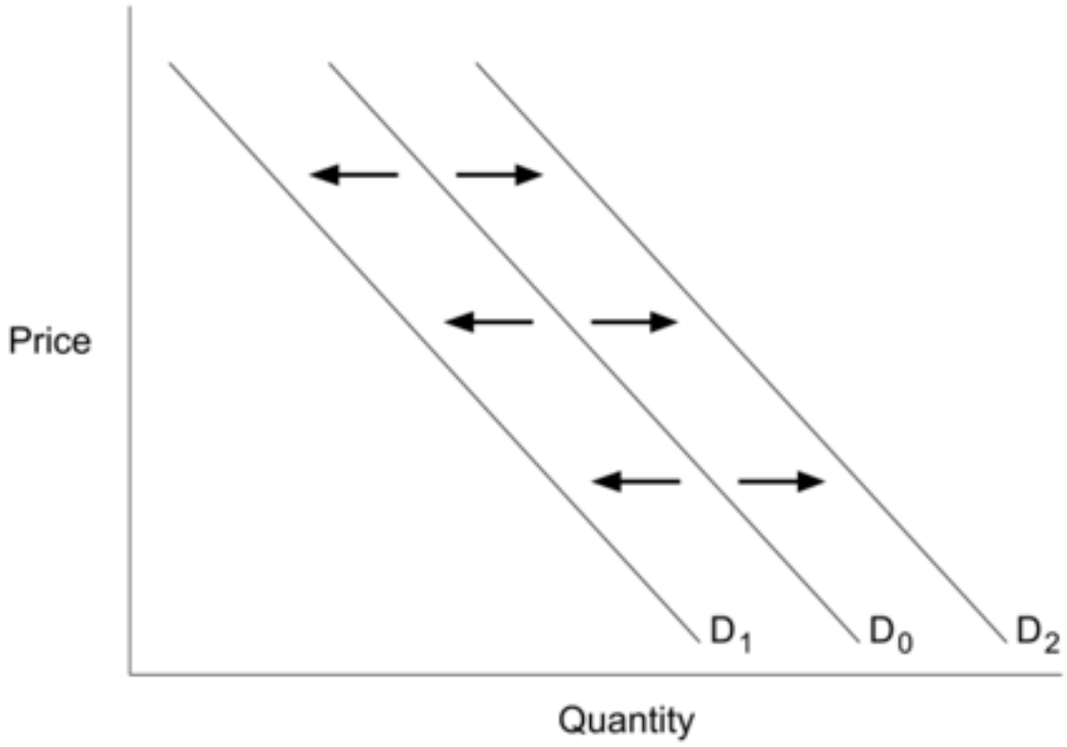

***Figure 2.7*:** Change in demand

As demonstrated in *Figure 2.7*, a change in demand means that the entire demand curve shifts either left or right. The initial demand curve D_0 shifts to become either D_1 or D_2. This could be caused by a shift in tastes, changes in population, changes in income, prices of substitute or complement goods, or changes future expectations.

A change in quantity supplied refers to a movement along the supply curve, which is caused only by a change in price. Similar to demand, a change in quantity supplied means that we're moving along the existing supply curve:

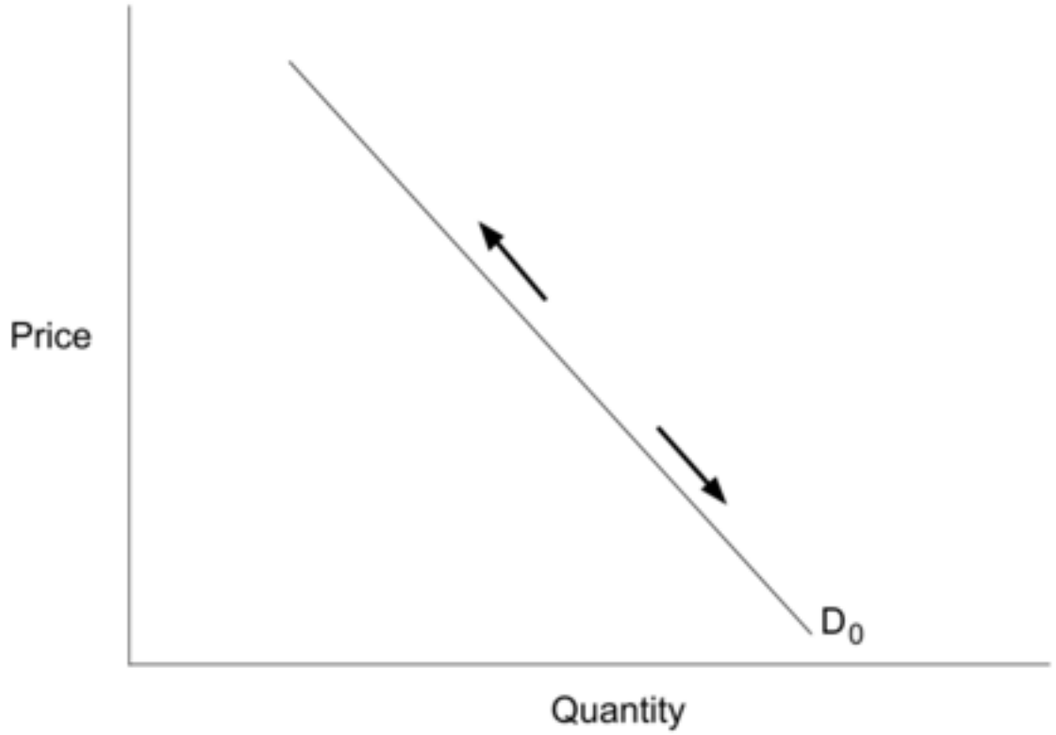

***Figure 2.8*:** Change in quantity demanded

A change in the quantity demanded refers to movement along the existing demand curve, D_0. This is a change in price, which is caused by a shift in the supply curve.

Here's one way to remember: A movement along a demand curve, resulting in a change in quantity demanded, is always caused by a shift in the supply curve. Similarly, a movement along a supply curve, resulting in a change in quantity supplied, is always caused by a shift in the demand curve (Lumen Learning, n.d.).

Example of 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 2.9* shown to the right, demonstrates an increase in the quantity of coffee supplied at each price. 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) (Principles of Economics, 2011).

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. 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') (Saylor Academy, n.d.).

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

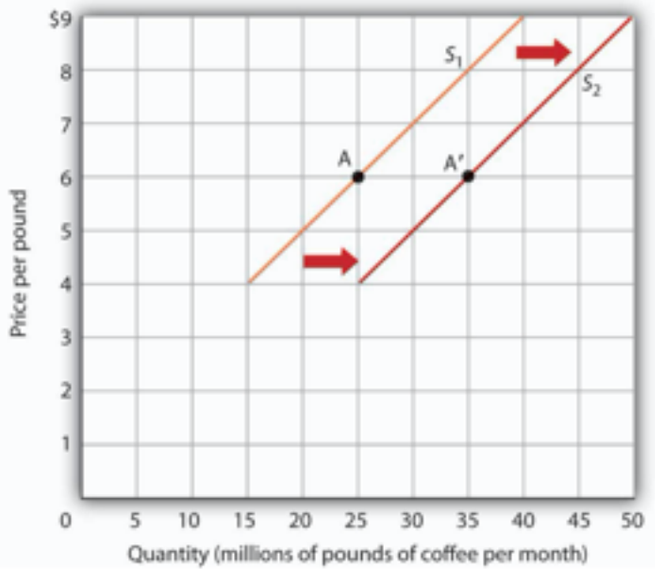

***Figure 2.9*:** An increase in supply

Section 5

Equilibrium

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 & 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 2.10 to the right combines the demand and supply data. 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. Thus, the equilibrium price in the market for coffee is $6 per pound. The equilibrium quantity is the quantity demanded and supplied at the equilibrium price.

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 and a downward-sloping demand curve, there is only a single price at which the two curves intersect. This means there is only one price

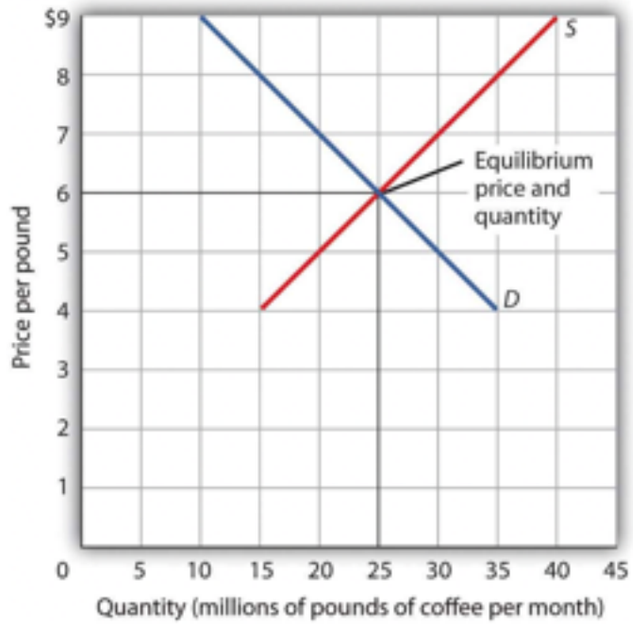

***Figure 2.10*:** Determination of equilibrium price and quantity

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 2.11, "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. 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.

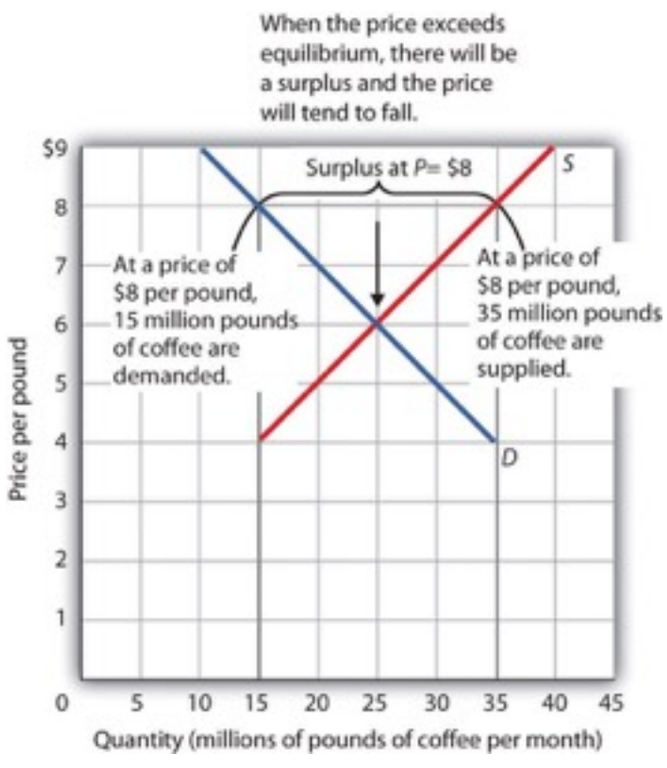

***Figure 2.11*:** Surplus in the market for coffee

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.

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 2.12, below, 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.

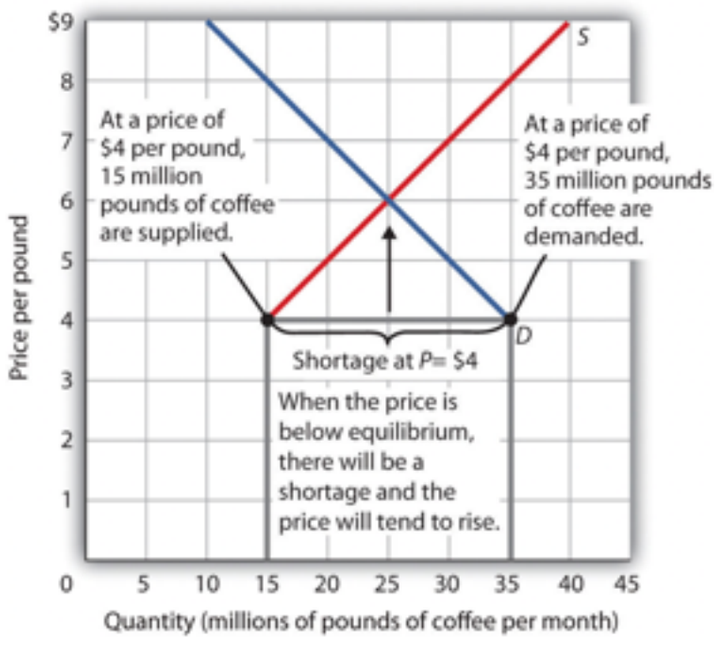

***Figure 2.12*:** Shortage in the market for coffee

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 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.

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Shifts in demand & 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.

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 2.13* on the following page combines the information about changes in the demand and supply of coffee. 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 2.13* 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.

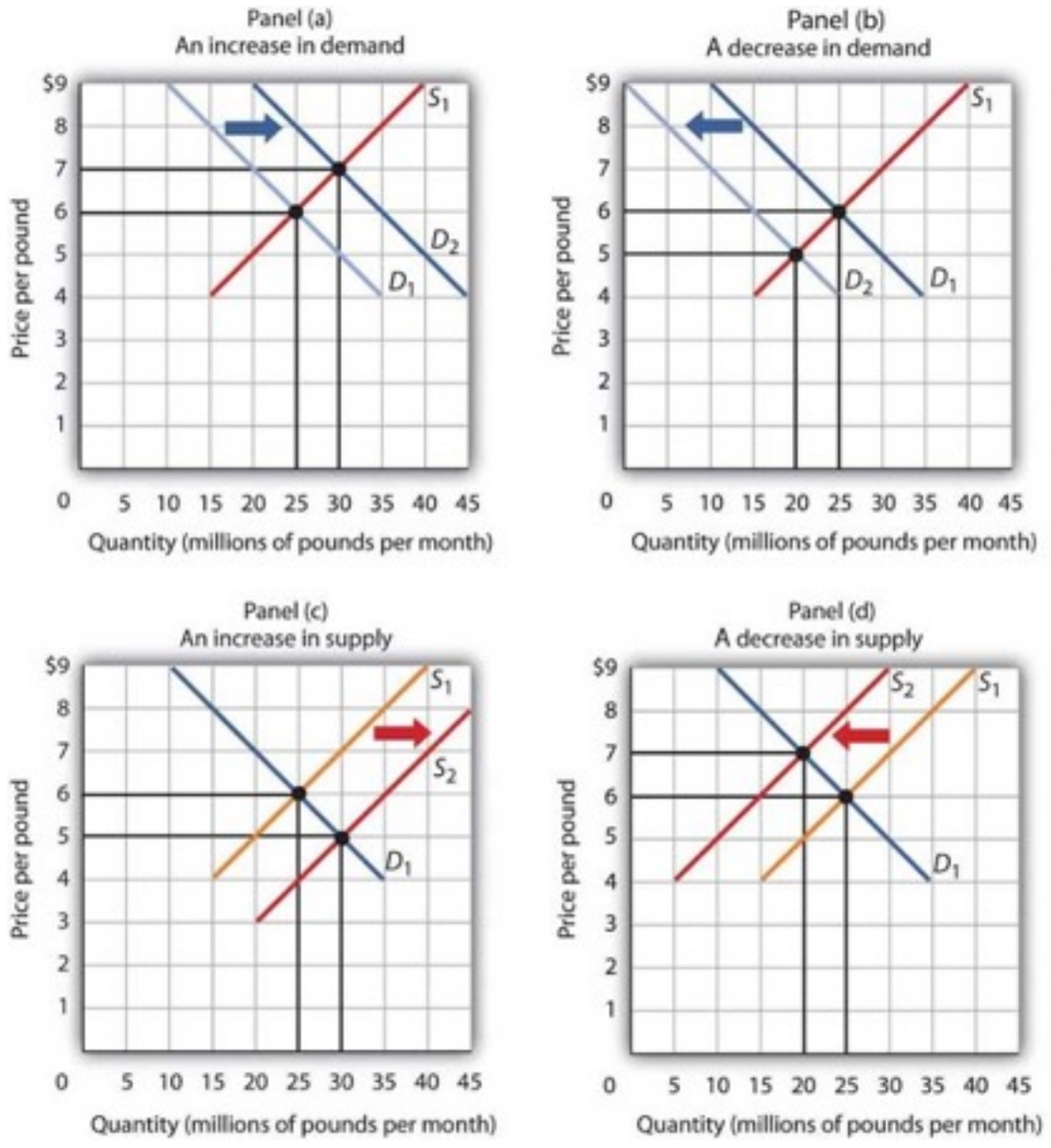


***Figure 2.13*:** Changes in supply and demand

An increase in demand

An increase in demand for coffee shifts the demand curve to the right, as shown in Panel (a) of *Figure 2.13*. 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 2.13* 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 2.13*, "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.

A decrease in supply

Panel (d) of *Figure 2.13* on the previous page 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.

Note: 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

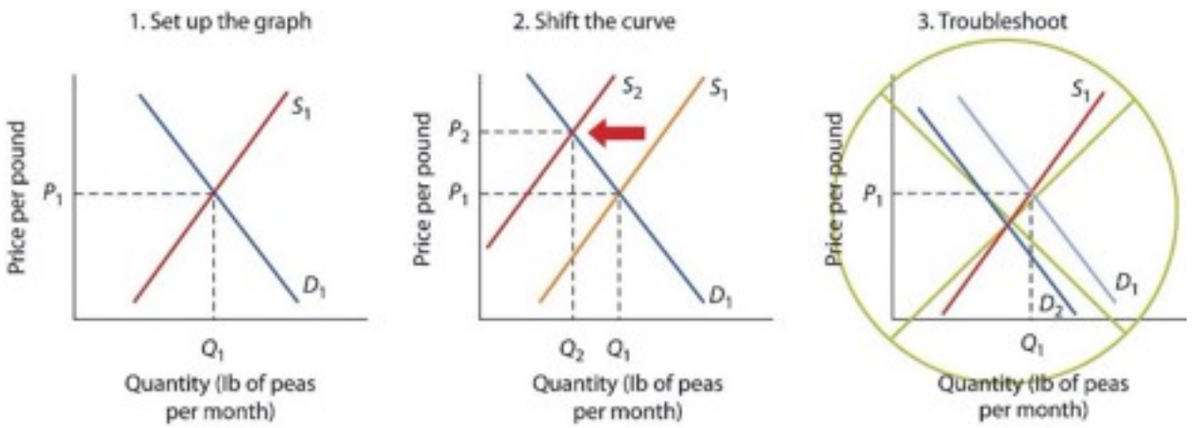


***Figure 2.14*:** Shifting a demand or supply curve

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 (Lumen Learning, n.d.).

Section 6

Market failures

Defining market failure

Market failure occurs when the price mechanism fails to account for all of the costs and benefits necessary to provide and consume a good. The market will fail by not supplying the socially optimal amount of the good.

Prior to market failure, the supply and demand within the market do not produce quantities of the goods where the price reflects the marginal benefit of consumption. The imbalance causes allocative inefficiency, which is the over- or under-consumption of the good.

The structure of market systems contributes to market failure. In the real world, it is not possible for markets to be perfect due to inefficient producers, externalities, environmental concerns, and lack of public goods. An externality is an effect on a third party which is caused by the production or consumption of a good or service.

During market failures the government usually responds to varying degrees. Possible government responses include:

***Image 2.2*:** Air pollution is an example of a negative externality. Governments may enact tradable permits to try and reduce industrial pollution.

Legislation: enacting specific laws. For example, banning smoking in restaurants, or making high school attendance mandatory.

Direct provision of merit and public goods: governments control the supply of goods that have positive externalities. For example, by supplying high amounts of education, parks, or libraries.

Taxation: placing taxes on certain goods to discourage use and internalize external costs. For example, placing a 'sin-tax' on tobacco products, and subsequently increasing the cost of tobacco consumption.

Subsidies: reducing the price of a good based on the public benefit that is gained. For example, lowering college tuition because society benefits from more educated workers. Subsidies are most appropriate to encourage behavior that has positive externalities.

Tradable permits: permits that allow firms to produce a certain amount of something, commonly pollution. Firms can trade permits with other firms to increase or decrease what they can produce. This is the basis behind cap-and-trade, an attempt to reduce of pollution.

Extension of property rights: creates privatization for certain non-private goods like lakes, rivers, and beaches to create a market for pollution. Then, individuals get fined for polluting certain areas.

Advertising: encourages or discourages consumption.

International cooperation among governments: governments work together on issues that affect the future of the environment.

Causes of market failure

Market failure occurs due to inefficiency in the allocation of goods and services. A price mechanism fails to account for all of the costs and benefits involved when providing or consuming a specific good. When this happens, the market will not produce the supply of the good that is socially optimal—it will be over or under produced.

In order to fully understand market failure, it is important to recognize the reasons why a market can fail. Due to the structure of markets, it is impossible for them to be perfect. As a result, most markets are not successful and require forms of intervention.

Types of market failure

Positive and negative externalities: an externality is an effect on a third party that is caused by the consumption or production of a good or service. A positive externality is a positive spillover that results from the consumption or production of a good or service.

For example, although public education may only directly affect students and schools, an educated population may provide positive effects on society as a whole. A negative externality is a negative spillover effect on third parties. For example, secondhand smoke may negatively impact the health of people, even if they do not directly engage in smoking.

Environmental concerns: effects on the environment as important considerations as well as sustainable development.

Lack of public goods: public goods are goods where the total cost of production does not increase with the number of consumers. As an example of a public good, a lighthouse has a fixed cost of production that is the same, whether one ship or one hundred ships use its light. Public goods can be underproduced; there is little incentive, from a private standpoint, to provide a lighthouse because one can wait for someone else to provide it, and then use its light without incurring a cost. This problem—someone benefiting from resources or goods and services without paying for the cost of the benefit—is known as the free rider problem.

Underproduction of merit goods: a merit good is a private good that society believes is under consumed, often with positive externalities. For example, education, health care, and sports centers are considered merit goods.

Overprovision of demerit goods: a demerit good is a private good that society believes is over consumed, often with negative externalities. For example, cigarettes, alcohol, and prostitution are considered demerit goods.

Abuse of monopoly power: imperfect markets restrict output in an attempt to maximize profit.

When a market fails, the government usually intervenes depending on the reason for the failure (Lumen Learning, n.d.).

Key takeaways

- 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.
- 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 (Saylor Academy, n.d.).

Part II: Microeconomics

Defining microeconomics

Microeconomics is the study of decisions made by people and businesses regarding the allocation of resources, and prices at which they trade goods and services.

Microeconomics focuses on supply and demand and other forces that determine price levels in the economy.

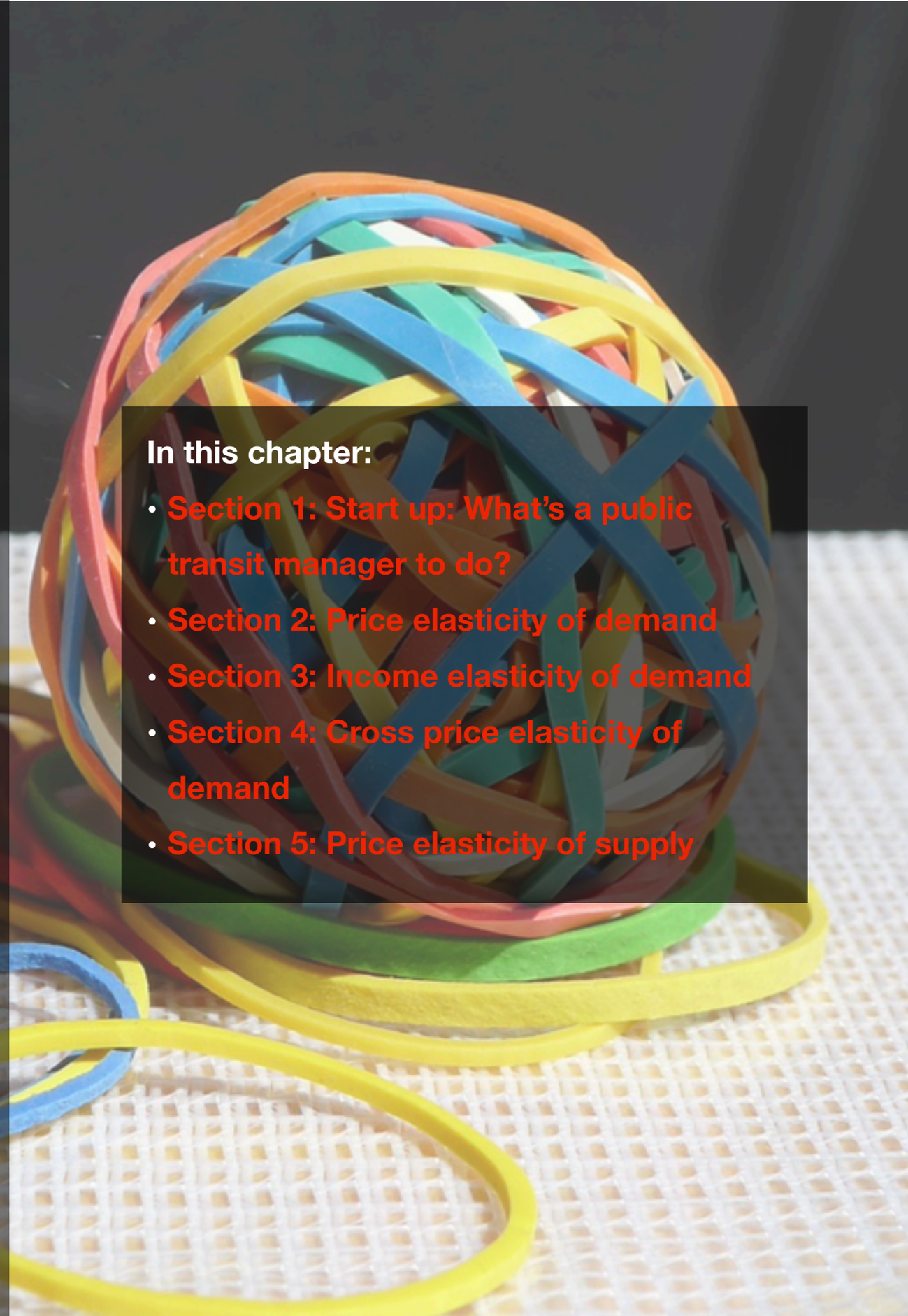
It takes a bottom-up approach to analyzing the economy. In other words, microeconomics tries to understand human choices, decisions and the allocation of resources (Investopedia, n.d.).

Chapter 3

Elasticity

After reading this chapter, students should be able to do the following:

- Define price elasticity of demand and how its calculation.
- Discuss demand as price inelastic, unit price elastic, price elastic, perfectly price inelastic, and perfectly price elastic.
- Outline the relationship between total revenue and price elasticity of demand.
- Explain the determinants of price elasticity of demand.
- Define the concepts of income elasticity, cross elasticity, and price elasticity.



In this chapter:

Section 1

Start up: Raising fares? Lowering fares? What's a public transit manager to do?

Imagine that you are the manager of the public transportation system for a large metropolitan area. Operating costs for the system have soared in the last few years, and you are under pressure to boost revenues. What do you do?

An obvious choice would be to raise fares. That will make your customers angry, but at least it will generate the extra revenue you need—or will it? The law of demand says that raising fares will reduce the number of passengers riding on your system. If the number of passengers falls only a little, then the higher fares that your remaining passengers are paying might produce the higher revenues you need. But what if the number of passengers falls by so much that your higher fares actually reduce your revenues? If that happens, you will have made your customers mad and your financial problem worse!

Maybe you should recommend lower fares. After all, the law of demand also says that lower fares will increase the number of passengers. Having more people use the public transportation system could more than offset a lower fare you collect from each person. But it might not. What will you do?

Your job and the fiscal health of the public transit system are riding on your making the correct decision. To do so, you need to know just how responsive the quantity demanded is to a price change. You need a measure of responsiveness, and economists use a measure of responsiveness called elasticity.

***Image 3.1*:** Transit bus

As manager of the public transit system, for example, you will want to know how responsive the number of passengers on your system (the dependent variable) will be to a change in fares (the independent variable). The concept of elasticity will help you solve your public transit pricing problem and a great many other issues in economics. We will examine several elasticities in this chapter—all will tell us how responsive one variable is to a change in another.

In this chapter the price elasticities of demand and supply will be discussed. Elasticities measure the responsiveness of demand and supply of a product to the change in price of that product.

Section 2

Price elasticity of demand

Elasticity measures how much one variable responds to changes in another variable. Price elasticity of demand measures the change in demand for a product when price of that product changes. Loosely speaking, it measures the price-sensitivity of buyers' demand to price changes. Elasticity is a numerical measure of the responsiveness of quantity of demand (Q^d) for a product to one of its price changes. The changes in price and quantity of demand are measured in percentages to avoid the measurement units problems. Therefore, being more precise, the price elasticity of demand measures the percentage change in quantity of demand for a product that results from one percentage change in price of that product (Saylor Academy, n.d).

***Image 3.2*:** Elasticity of demand

Determinants of price elasticity of demand

When consumer behavior is affected by price, the good is elastic; When consumer behavior is unaffected by changes in price, the good is inelastic. The elasticity (responsiveness to price changes) of a good's demand tends to relate to the following factors:

1. **The importance of the good.** The less essential a good is, the more likely consumers are to forego the good when it becomes more expensive. If a good is very important to the consumer, the consumer will continue to purchase it even if the price changes, and demand for that good will be inelastic.

2. **The availability of close substitutes.** If there are many substitutes available the demand for the good will likely be elastic. For example, if there are 10 brands of bicycles available and the price of one of them increases, the quantity of that brand demanded is likely to fall a lot. On the other hand, the demand for bicycles as a whole is less elastic than the demand for particular brand because the substitutes for bikes in general—cars, skateboards, walking—are not as close.

3. **The proportion of income spent on the good.** If a good represents a high proportion of a consumer's income, the demand for the good will likely be elastic. Consider the gum and cruise price-change scenarios mentioned above. The quantity of cruises purchased will probably be more affected by a 50 percent price increase than the quantity of gum, because an extra 2 cents is not a big deal, but an extra $500 is more likely to be prohibitive. In other words, consumers are more sensitive to a particular percent change in price at higher price levels.

4. **The ability to delay the purchase of the good.** When time is short, it is more difficult to change purchasing patterns in response to price changes; therefore, when less time is available, demand for a given good is less elastic. The more time consumers have to adapt, the more they are able to find substitutes or learn to do without goods whose prices have increased.

When thinking about elasticity, economists divide goods into three groups: elastic, unit elastic, and inelastic. If the percentage change in quantity demanded exceeds the percentage change in price for a particular good—meaning, for example, that a 50 percent price increase results in more than a 50 percent decrease in quantity demanded—the demand for that good is on the more price (Princeton Review, 2020).

Formula

The price elasticity of demand is measured by dividing the percentage change in quantity of demand for a product by the percentage change in the price of that product, as follows:

Price elasticity of demand = (percentage change in quantity of demand)/(percentage change in price)

Or:

Elasticity = (% change in Q^d)/(% change in P)

Example: Supposed David sells T-shirts. He charges $20 per T-shirt, and currently sells 300 T-shirts per month. His monthly revenue is $60000. Costs of producing T-shirts are rising, he considers raising the price to $25 per T-shirt.The law of demand dictates that David will not sell as many T-shirts as before when the price was $20, if he raises the price to $25.How many fewer T-shirts will he sell? How much will his revenue fall, or will his revenue increase? The answer depends on the price elasticity of

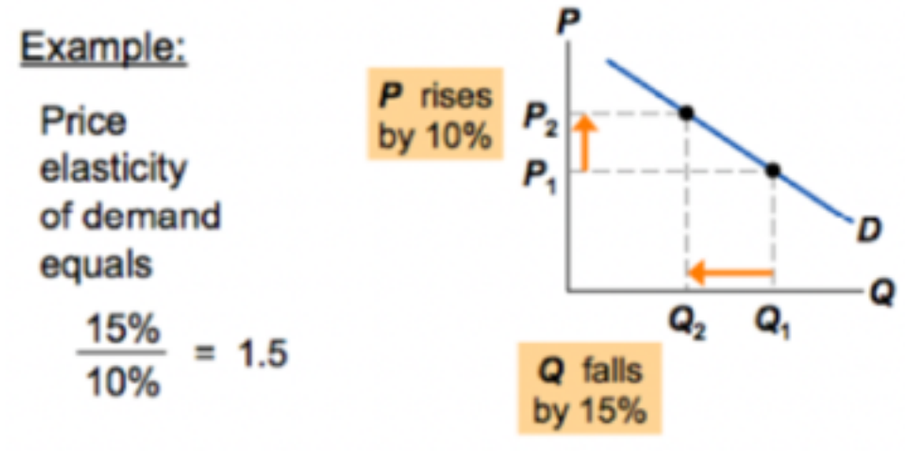


***Figure 3.1*:** Price elasticity of demand

demand for the T-shirts that David sells. Revenue is equal to the price per unit times quantity of sales, or:

Revenue = *P* x *Q*

A price increase has two effects on revenue: higher price means more revenue on T-shirt that he sells. But, he sells fewer T-shirts due to Law of Demand (higher the price, lower the demand for T-shirts), less t-shirts sold means lower revenue. Which one of these two effects is bigger? It depends on the price elasticity of demand. For example, if his sales fall to 100 T-shirts, then his revenue will fall to $25 x 100 = 2500.

Then demand for the T-shirts is elastic, fell a lot from 300 to 100. He raised the price, but he ended up making less money. on the other hand, if his sales fall only a little to 250, then his revenue will go up to 25 x 250 = $62500. His revenue will increase if buyers keep buying the T- shirts and demand for his T-shirts does not go down that much. Remember the definition of the elasticity: Price elasticity of demand measures the percentage change in demand (how much Q^d responds) to a percentage change in price (P) and the formula:

Price elasticity of demand = percentage change Q^d/ percentage change in *P*

In the previous example price changes by 10%, then quantity of demand falls by 15%. Price elasticity of demand is 1.5.

Based on the law of demand, price and quantity of demand move in opposite directions, therefore the price elasticity of demand is always negative. But, the negative sign is always dropped and only the value of the price elasticity of a product is considered.

Economists classify the elasticity of demand for a product according to the value of the elasticity. If price elasticity of demand is greater than one (1), then it is said that demand for that product is elastic. If price elasticity of demand is smaller than one (1), then it is said that demand for that product is inelastic. If elasticity is equal to one (1), then it is said that demand is unitary elastic. When price elasticity of demand is greater than one (1), then percentage change in quantity of demand will be greater than the percentage change in price. Or in the other words, demand changes a lot when price changes, it is elastic. If demand is elastic, then the rise in price will result is greater drop in the demand and revenue will fall. When demand is inelastic

then the percentage fall in demand is smaller than the percentage rise in price, then revenue will go up when price goes up.

There are two general methods for calculating elasticities: the point elasticity approach and the midpoint (or arc) elasticity approach. Elasticity looks at the percentage change in quantity demanded divided by the percentage change in price, but which quantity and which price should be the denominator in the percentage calculation? The point approach uses the initial price and initial quantity to measure percent change. This makes the math easier, but the more accurate approach is the midpoint approach, which uses the average price and average quantity over the price and quantity change. (These are the price and quantity halfway between the initial point and the final point.) Let's compare the two approaches (Lumen Learning, n.d.).

Allowing *A* to represent change and Q^d to represent the quantity demanded, the formula for price elasticity is the percentage change in quantity demanded divided by the percentage change in price:

$$\frac{\dfrac{\text{Change in quantity}}{\text{Average in quantity}}}{\dfrac{\text{Change in quantity}}{\text{Average in quantity}}} = \frac{\dfrac{\text{Q new-Q old}}{\left[\dfrac{\text{Q new-Q old}}{2}\right]}}{\dfrac{\text{P new-P old}}{\left[\dfrac{\text{P new-P old}}{2}\right]}}$$

The above formula uses the initial price and quantity as the basis for calculating the percentage change. Although this is the simplest way to do it, the following formula is more precise, especially when the changes in price or quantity are large:

$$\frac{\dfrac{\text{Change in quantity}}{\text{Average in quantity}}}{\dfrac{\text{Change in quantity}}{\text{Average in quantity}}} = \frac{\dfrac{\text{Q new-Q old}}{\left[\dfrac{\text{Q new-Q old}}{2}\right]}}{\dfrac{\text{P new-P old}}{\left[\dfrac{\text{P new-P old}}{2}\right]}}$$

This is more precise because a percent increase in price or quantity is different from a percent decrease in price or quantity over the same range. Here's an example: a percent increase from $4 to $5 = 25 percent, whereas a percent decrease from $5 to $4 = 20 percent.

Conveniently, the second formula produces the same elasticity measure between two points on a demand curve, regardless of which point you consider the "old" point and which you consider the "new" point. Finding the elasticity measure is simply a matter of plugging in the new and old price and quantity:

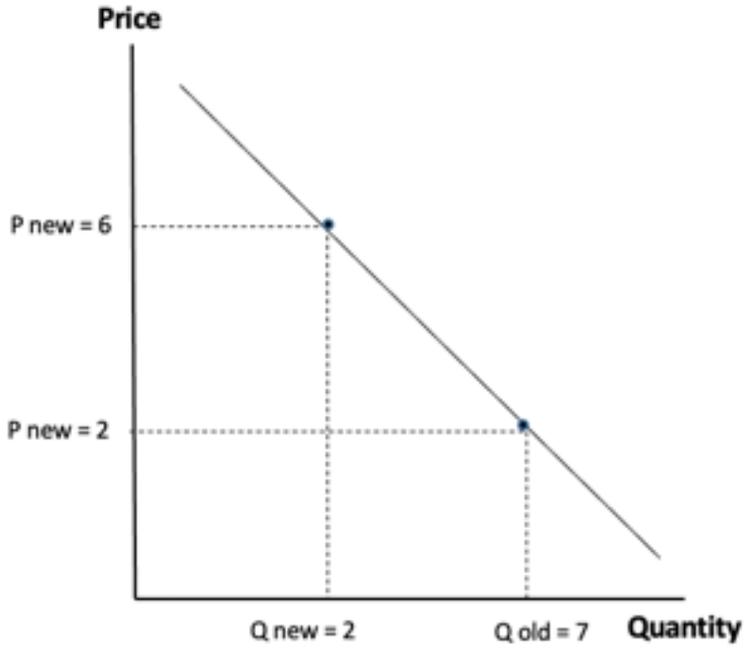


***Figure 3.2*:** Price elasticity measure

For example, the price elasticity of demand in the range shown in the figure is:

$$\frac{\left[\frac{5-7}{2}\right]}{\frac{6-2}{\frac{6+2}{2}}} = \frac{\frac{-2}{6}}{\frac{4}{4}} = \frac{-1}{3} = -.\overline{33}$$

Because the elasticity quotient is less than one, the demand is inelastic. In this equation, 1 is the critical number in determining elasticity. If the quotient is less than 1, as is the case here, then the denominator (%ΔP) is greater than the numerator (%ΔQ^d), and the good is therefore inelastic. If the numerator and the denominator are equal, the result is 1, and the good is unit elastic. If the result is greater than 1, then the numerator is greater than the denominator, and the good is elastic.

Keep in mind that the results for the equation to determine elasticity will always be negative given the law of demand. As the law of demand says, an increase in price should result in a decrease in the quantity demanded, and a decrease in price should result in an increase in the quantity demanded. Because price and quantity demanded are always going in opposite directions, either the top or the bottom of the elasticity formula will always be negative and the other half will be positive. Either way, the elasticity of demand will come out negative. This being the case, it is conventional to drop the negative sign (take the absolute value) and refer to price elasticities in positive terms. The above elasticity would thus be 1/3.

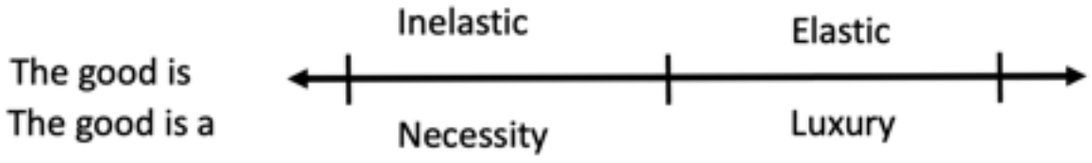


***Figure 3.3*:** Elasticity quotient of demand

The elasticity of demand relates to the slope of the demand curve, but it does not equal the slope of the demand curve.

Goods with an elastic demand are categorized as luxuries. If the percentage change in quantity demanded equals the percentage change in price, demand for the good is labeled unit elastic. If the percentage change in quantity demanded is less than the percentage change in price, the demand is labeled inelastic and the good is categorized as a necessity.

There are two general methods for calculating elasticities: the point elasticity approach and the midpoint (or arc) elasticity approach. Elasticity looks at the percentage change in quantity demanded divided by the percentage change in price, but which quantity and which price should be the denominator in the percentage calculation? The point approach uses the initial price and initial quantity to measure percent change. This makes the math easier, but the more accurate approach is the midpoint approach, which uses the average price and average quantity over the price and quantity change. (These are the price and quantity halfway between the initial point and the final point.) Let's compare the two approaches (Princeton Review, 2020).

Section 3

Income elasticity of demand

Income elasticity of demand measures responsiveness of quantity of demand (Qd) for a product to a change in consumers' incomes.

Income elasticity of demand measures the percentage change in quantity demanded resulting from one percentage change in income.

Formula

The formula for measuring income elasticity of demand is as follows:

Income elasticity of demand = percent change in Q^d/percent change in income

Normal and Inferior goods

For most goods and services increase in incomes causes demand for them to increase, those goods and services are called Normal Goods. Hence, for normal goods, income elasticity of demand is always positive because income and demand change in the same direction.Based on the formula for the income elasticity of demand, positive change in income brings positive change in demand, then positive divided by positive is positive, hence for decline in income, demand also declines, then negative divided by negative becomes positive.

Hence, for normal goods, the sign of income elasticity of demand is positive and greater than zero. An increase in income causes an increase in demand for a normal good.

For some goods and services, demand decreases when incomes increase, those goods and services are called inferior goods.Examples of inferior goods are used cars, starchy foods (potatoes, rice, etc.).

For inferior goods, the sign of income elasticity is negative and smaller than zero.

Section 4

Cross price elasticity of demand

Cross-price elasticity of demand measures the responsiveness of demand for one good to changes in the price of another good.

Cross price elasticity of demand measures the percentage change in quantity demanded of a product (*x*) as a result of one percent change in price of another product (*y*).

Formula

The formula for measuring cross price elasticity of demand is as follows:

Cross-price elasticity of demand = percent change in Q^d for good 1/percent change in price of good 2

Substitutes & complementary goods

For substitute goods and services, cross-price elasticity is greater than zero.For example, an increase in price of beef causes an increase in demand for chicken. Beef and chicken meats are substitutes.

The cross price elasticity of demand for complementary products is negative. For example if price of coffee goes up, demand for cream will go down. Coffee and cream are complementaries.

Section 5

Price elasticity of supply

Price elasticity of supply measures responsiveness of quantity of supply of a product to change in price of that product. It measures how much quantity of supply of a product (*Qs*) responds to a change in price of that product (*P*). Loosely speaking, it measures the price- sensitivity of sellers' of a product.

Formula

Price elasticity of supply is defined by the following formula:

Price elasticity of supply = percentage change in Q^s/ percentage change in *P*

When price elasticity of supply is greater than one (1), then the supply is elastic. When price elasticity of supply is smaller than one (1), then the supply is inelastic. The more easily sellers can change the quantity of what they produce, the greater the price elasticity of supply of that product.

For example, the supply of beachfront properties is harder to vary and thus less elastic than the supply of new cars.

Short long and long run price elasticity of supply

For many goods, price elasticity of supply is greater in the long run than in the short run. In the short run, if price increases, firms will want to produce more but cannot hire workers and buy machines immediately; thus the supply is less elastic. In contrast, supply is more elastic in the long run, because firms can build new factories, or new firms might enter the market in the long run.

Key takeaways

- Elasticity measures how much one variable responds to changes in another variable.
- Price elasticity of demand measures the change in demand for a product when price of that product changes.
- Price elasticity of supply measures the change in supply of a product when price of that product changes.

- Income elasticity of demand measures responsiveness of quantity of demand for a product to a change in consumers' incomes.
- For normal goods, the sign of income elasticity of demand is positive and greater than zero. An increase in income causes an increase in demand for a normal good.
- For inferior goods, the sign of income elasticity is negative and smaller than zero.
- Cross price elasticity of demand measures the responsiveness of demand for one good to changes in the price of another good.
- For substitute goods and services, cross-price elasticity is greater than zero.
- For complementary products, cross-price elasticity is negative (Saylor Academy, n.d).

Chapter 4

Theory of Consumer Choice

After reading this chapter, students should be able to do the following:

- Discuss what economists mean by utility.
- Distinguish between the concepts of total utility and marginal utility.
- Explain the law of diminishing marginal utility and illustrate it graphically.
- Outline the notion of the marginal rate of substitution and how it relates to the utility-maximizing solution.
- Identify the individual demand curve and market demand curve.
- Explain the substitution and income effects of a price change.

In this chapter:

Section 1

Start up: A day at the grocery store

You are in the checkout line at the grocery store when your eyes wander over to the ice cream display. It is a hot day and you could use something to cool you down before you get into your hot car. The problem is that you have left your checkbook and credit and debit cards at home—on purpose, actually, because you have decided that you only want to spend $20 today at the grocery store.

You are uncertain whether or not you have brought enough cash with you to pay for the items that are already in your cart. You put the ice cream bar into your cart and tell the clerk to let you know if you go over $20 because that is all you have. He rings it up and it comes to $22. You have to make a choice. You decide to keep the ice cream and ask the clerk if he would mind returning a box of cookies to the shelf. We all engage in these kinds of choices every day. We have budgets and must decide how to spend them.

The model of utility theory that economists have constructed to explain consumer choice assumes that consumers will try to maximize their utility. For example, when you decided to keep the ice cream bar and return the cookies, you, consciously or not, applied the marginal decision rule to the problem of maximizing your utility: You bought the ice cream because you expect that eating it will give you greater satisfaction than would consuming the box of cookies.

***Image 4.1*:** Grocery store

Utility theory provides insights into demand. It lets us look behind demand curves to see how utility- maximizing consumers can be expected to respond to price changes. While the focus of this chapter is on consumers making decisions about what goods and services to buy, the same model can be used to understand how individuals make other types of decisions, such as how much to work and how much of their incomes to spend now or to sock away for the future.

We can approach the analysis of utility maximization in two ways. The first two sections of the chapter cover the marginal utility concept, while the final section examines an alternative approach using indifference curves.

Section 2

The budget line & choices

Economists typically use a different set of tools than those presented in the chapter up to this point to analyze consumer choices. While somewhat more complex, the tools presented in this section give us a powerful framework for assessing consumer choices.

We will begin our analysis with an algebraic and graphical presentation of the budget constraint. We will then examine a new concept that allows us to draw a map of a consumer's preferences. Then we can draw some conclusions about the choices a utility-maximizing consumer could be expected to make.

As we have already seen, a consumer's choices are limited by the budget available. Total spending for goods and services can fall short of the budget constraint but may not exceed it (Saylor Academy, n.d).

The budget line

To begin an analysis of consumption choices, we first must consider how a limited income and the prices of goods and services put constraints on our choices.

***Image 4.2*:** Choices

As a student, you came to college to improve your life not only intellectually but also financially. As a college graduate, you can expect your lifetime earnings to be triple those of someone with only a high school education. Even once you have achieved these higher earnings, there will be limits on what you can buy. But first, let us return to the present.

Assume you have $50 a week to spend on pizza and wall climbing. This is a proxy for a more general choice between food and entertainment. We could use different goods or more goods, but the principle would still be the same. In our specific example, if pizzas cost $10 each and an hour of wall climbing costs $20, you can climb walls for 2.5 hours or consume 5 pizzas each

week, or do some combination of these two. Your options are plotted in *Figure 4.1*.

This budget line (constraint) is a lot like the production possibilities frontier (PPF) discussed before. Although you might prefer to have more of both goods, you are limited to consumption choices lying on the budget line, or inside the budget line if you want to save any part of your $50 weekly budget. As with the PPF, however, any points to the right of the line are unattainable for you—they exceed your available income.

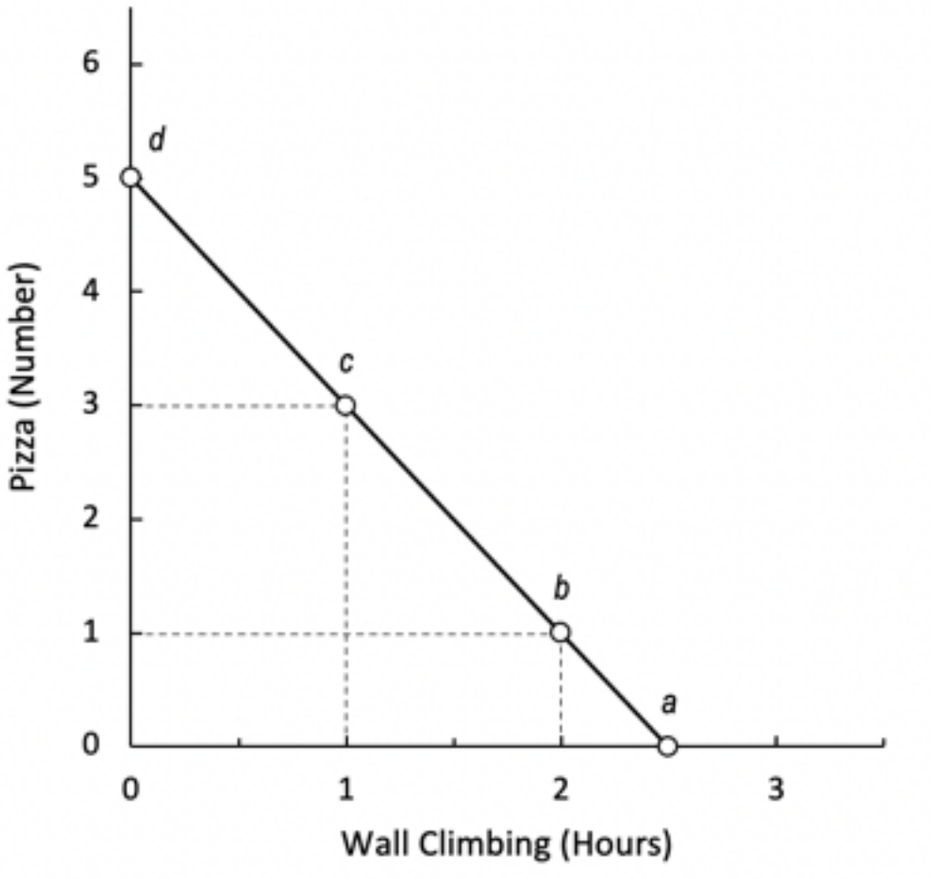


***Figure 4.1*:** Example of a plotted budget line

When pizzas cost $10 each, wall climbing costs $20 per hour, and you have $50 a week to spend, you could buy 5 pizzas per week, 2.5 hours of wail climbing or some combination of the two. The budget line makes clear all of the possible purchasing combinations of two products given a particular budget

In this example, the budget line makes clear that many different combinations of wall climbing and pizzas will exhaust your $50 budget. But which of these possible combinations will you select? That depends on your personal preferences. If you love pizza, you will probably make different choices than if you are a fitness fanatic who rarely consumes fatty foods .Your own preferences determine how much pleasure you can expect to get from the various possible options. We study how optimal choices are made in the next section of this chapter.

Changes to the budget line

The budget line, like most money matters, is subject to changes in the prices of goods or changes in income. When the price of a good or income changes, the combinations of goods that become affordable change as well. Let's look at how the budget line changes.

Changes in the price of a good

Suppose the wall-climbing establishment offers a half-price discount to college students, reducing the price of wall climbing

from $20 to $10 per hour. *Figure 4.1* on the previous page illustrates what happens when the price of wall climbing changes as the price of pizza stays the same. Notice that the vertical intercept remains at 5 pizzas; because the price of pizza did not change, the total number of pizzas that can be purchased for $50 is still 5. However, the reduction in the price of wall climbing allows the total number of hours that can be purchased to increase from 2.5 to 5. In *Figure 4.2*, the budget line pivots outward to budget line b, which opens up many more combinations of pizza and wall climbing that previously were unaffordable.

Notice that in this case it is possible for a person to actually consume more of both pizza and wall climbing, even though the price of pizza did not change, nor did the income of $50. Suppose that originally you would spend the entire $50 on wall climbing, purchasing 2.5 hours. Because the price is now $10, the new cost of maintaining the same purchase of 2.5 hours is $25, leaving $25 to use on either more wall climbing or pizza, or both.

Even hough your actual income did not change, you can now purchase more than you could before, as if you had a higher income. This is true for any point along the original budget line except for the one point at which the entire budget was spent on pizza. Only in this case does the fall in price of wall climbing not increase the number of pizzas that can be purchased.

Now suppose that instead of a discount on wall climbing, the gym decides to raise the price to $25. How would this affect the budget line? It pivots inward. In *Figure 4.2*, budget line *c* shows the maximum quantity of wall climbing decreasing to two hours. The increase in price reduces the combinations of both pizza and wall climbing that can be purchased with $50.

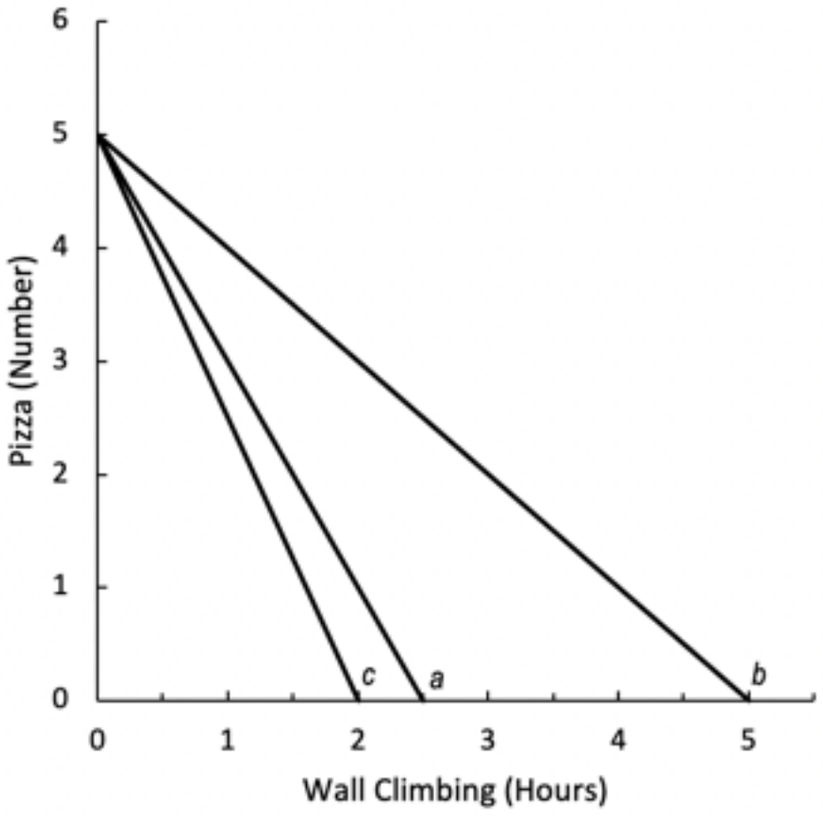


***Figure 4.2*:** Budget line showing consumption choices

In *Figure 4.2*, the budget line a shows the consumption choices available with a budget of $50 and prices of pizza and wall climbing at $10 and $20, respectively. When the price of wall climbing decreases to $10, the budget line pivots outward to

budget line b. The combinations of pizza and wall climbing increases to $25, the budget line *c*, reducing the amounts that can be purchased.

The budget line in *Figure 4.3* shows a show the consumption choices available with a budget of $50 and prices of pizza and wall climbing at $10 and $20 respectively. When the budget increases to $100 the budget line shifts parallel outward to budget line b, doubling the quantities that can be purchased. When the budget falls to $20, the budget line shifts inward to budget line c, reducing the amounts that can be purchased.

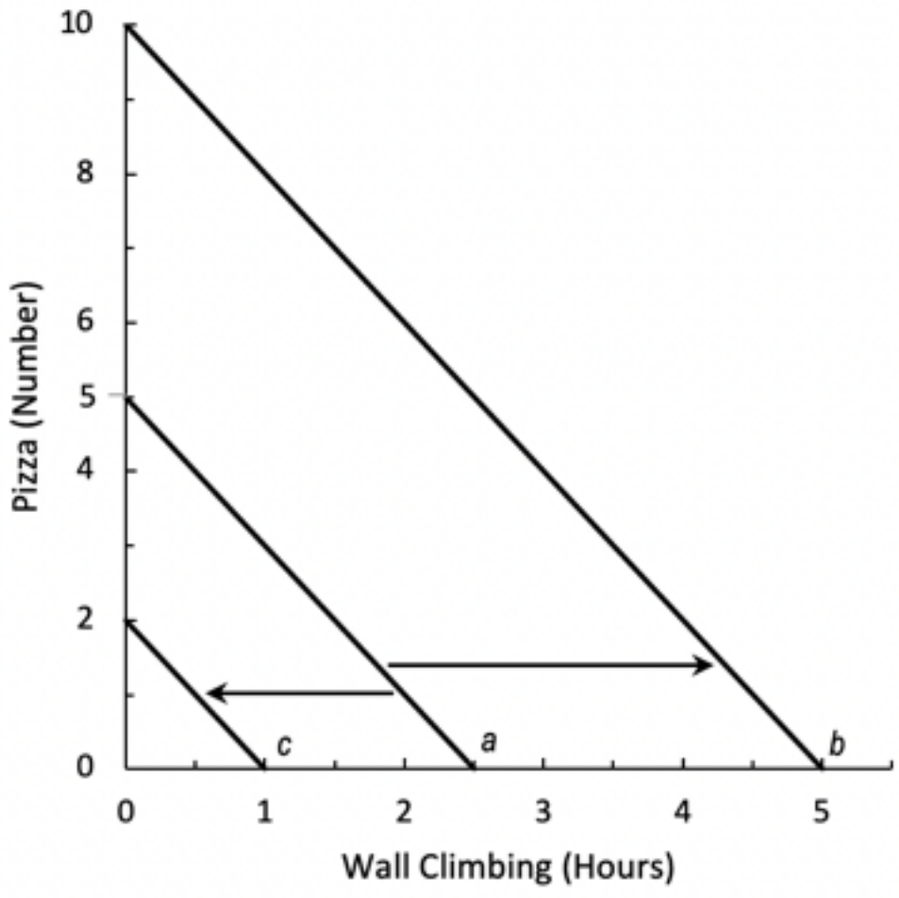


***Figure 4.3*:** Budget line showing consumption choices

Changes in income

Changes to Income we now know that changes in the price of a good will pivot the budget line inward or outward along the axis for that good. But what if income itself changes?. Suppose that prices of pizza and wall climbing remain at $10 and $20, respectively but you are given extra money by your parents, allowing you to increase our food and entertainment budget to $100 per week. Figure 3 illustrates how an increase in income shifts your budget line outward to budget line *b* in a parallel fashion. Because $100 is double the original income, you can now afford twice as many pizzas and wall climbing hours as before as long as prices do not change. Budget line *b* shows that the maximum quantity of pizza that can be purchased increases to 10 and the maximum quantity of climbing hours increases to 5.

Similar to price changes, we can analyze the effect of a decrease in income on the budget line as well. Suppose increased expenses elsewhere force you to cut back on entertainment spending from $50 to $20 per week. *Figure 4.3* shows how the reduced income shifts the budget line parallel inward to budget line *c*.

Now that we have analyzed how budget lines determine what we can afford, we must answer the important question of what combination of goods and services results in the highest satisfaction. One approach is to use marginal utility analysis, which we turn to next (Chiang, 2016).

Section 3

Marginal utility analysis

Microeconomics seeks to understand the behavior of individual economic agents such as individuals and businesses. Economists believe that we can analyze individuals' decisions, such as what goods and services to buy, as choices we make within certain budget constraints. Generally, consumers are trying to get the most for their limited budget. In economic terms they are trying to maximize total utility, or satisfaction, given their budget constraint.

The previous section showed how our choices of goods and services are limited to what we can afford given a budget. Similar to how PPFs showed the maximum output an economy can produce, budget lines show the maximum quantity quantity of goods (in various combinations) that can be purchased. And like PPF analysis, an individual is able to select appoint on the budget line that would maximize one's satisfaction. But which point would accomplish this goal?

To answer this question, we need to determine which combination of goods and services results in the highest level of satisfaction. Solving this riddle of consumer behavior can be accomplished using marginal utility analysis. Let's begin by defining preferences and utility, and then discuss how marginal utility analysis allows a person to maximize his or her well-being.

***Figure 4.3*:** Calculations

Preferences & utility

Utility

Utility is a hypothetical measure of consumer satisfaction. It was introduced by early economists attempting to explain how consumers make decisions. The utilitarian theory of consumer

behavior assumes, first of all, that utility is something that can be measured.

Returning to our example from the previous section, the theory assumes that we can quantify the utility (satisfaction) you derive from consuming one or more pizzas, and how much utility you derive from spending one or more hours on the climbing wall. *Table 4.1* on the following page provides estimates of the utility you derive from both pizzas and wall climbing, measured in utils, hypothetical units of satisfaction or utility. Compare columns (1) and (2) with columns (4) and (5).

At first glance, it might seem that if you wanted to maximize your utility given your $50 budget, you would simply go wall climbing for 2.5 hours, thereby maximizing your total utility at 270 utils. If you spent a little time analyzing the table, you would notice that combinations give you more total utility.

If you went wall climbing for 2 hours and had 1 pizza (again spending your entire $50 budget), your total utility would be 330 utils (260 + 70 = 330), much more than concentrating on one item alone.

Other than trial and error, how do we determine the best combination? Before we can see just which combination of these two goods would actually bring you the most happiness, we need to distinguish between total utility and marginal utility.

Total & marginal utility

Total utility

Total utility is the total satisfaction that a person receives from consuming a given quantity of goods and services. In Table I, the total utility received from consuming 3 pizzas IS 180 utils, whereas the total utility from 4 pizzas is 220 utils. Marginal utility is something different.

Marginal utility

Marginal utility is the additional satisfaction derived from consuming one more unit of a given product or service. It is determined by taking the difference between the total utility derived from, say, consuming 4 pizzas and consuming 3 pizzas. The total utility derived from 4 pizzas is 220 utils, and that from 3 pizzas is 180 utils. Therefore, consuming the fourth pizzas yields only an additional 40 utils of satisfaction (220 – 180 = 40 utils).

The marginal utility for both pizza eating and wall climbing is listed in *Table 4.1*. Notice that as we move from one quantity of pizza to the next, total utility rises by an amount exactly equal to marginal utility. This is no coincidence. Marginal utility is nothing but the change in total utility obtained from consuming one more pizza (the marginal pizza); therefore, as pizza eating increases by 1 pizza, total utility will rise by the amount of additional

satisfaction derived from consuming that additional pizza. Also note that, for both pizzas and wall climbing marginal utility declines as more of a particular product or activity is consumed.

Table 4.1: Total and marginal utility					
Pizza			**Wall climbing**		
(1) Quantity	**(2) Total utility**	**(3) Marginal utility**	**(4) Quantity**	**(5) Total utility**	**(6) Marginal utility**
0	0	-	0.0	0	-
1	70	70	0.5	90	90
2	130	60	1.0	170	80
3	180	50	1.5	230	60
4	220	40	2.0	260	30
5	250	30	2.5	270	10

The law of diminishing marginal utility

Why does marginal utility decline as the consumption of one product or activity increases? No matter our personal tastes and preferences, we eventually become sated once we have consumed a certain amount of any given commodity. Most of us love ice cream.

As youngsters, some of us imagined a world in which meals consisted of nothing but ice cream-no casseroles, no vegetables, just ice cream. To children this might sound heavenly, but as adults, we recognize that we would quickly grow sick of ice cream. Human beings simply crave diversity; we quickly tire of the same product or service if we consume it day after day.

This fact of human nature led early economists to formulate the law of diminishing marginal utility. This law states that as we consume more of a product, the rate at which our total satisfaction increases with the consumption of each additional unit will decline. And if we continue to consume still more of the product after that, our total satisfaction will eventually begin to decline.

This principle is in *Table 4.1*. Notice that total utility, graphed in panel A, rises continually as we move from 1 pizza per week to 5 pizzas. Nevertheless, the rate of this increase declines as more pizzas are consumed.

Accordingly, panel *B* shows that marginal utility declines with more pizzas eaten. On your student budget, you could not afford any more than 5 pizzas a week, but we can imagine that if you were to keep eating pizzas—20 pizzas in a week—your total utility would actually start to drop with each additional pizza. At some point, it simply hurts to stuff down any more pizzas.

It is one thing to grasp the obvious fact that consumers have limited budgets and that the products they can choose among provide them increasing satisfaction but are subject

to diminishing marginal utility. It is another thing to figure out exactly how consumers al locate their limited funds so as to maximize their total level of satisfaction or utility. We now turn our attention to how early economists solved the problem of maximizing utility and the analytic methods that resulted from their work.

Maximizing utility

Let's take a moment to review everything we need to know to plot the budget line in *Figure 4.1,* your total income and the prices of all the products you could purchase. In our example, the weekly budget is $50, pizzas cost $10 apiece, and wall climbing is $20 per hour or $10 per half-hour. This is enough information to plot all of the options available to you.

Given these options, how do individuals maximize their total utility from consuming various combinations of goods? Knowing the marginal utility of each unit of good consumed is not enough. Surely, the marginal utility of a new car is greater than the marginal utility of a cup of coffee.

But the price of the car is also much greater than the price of coffee. The ability to maximize utility given a fixed budget requires us to compare the marginal utilities per dollar spent on each good.

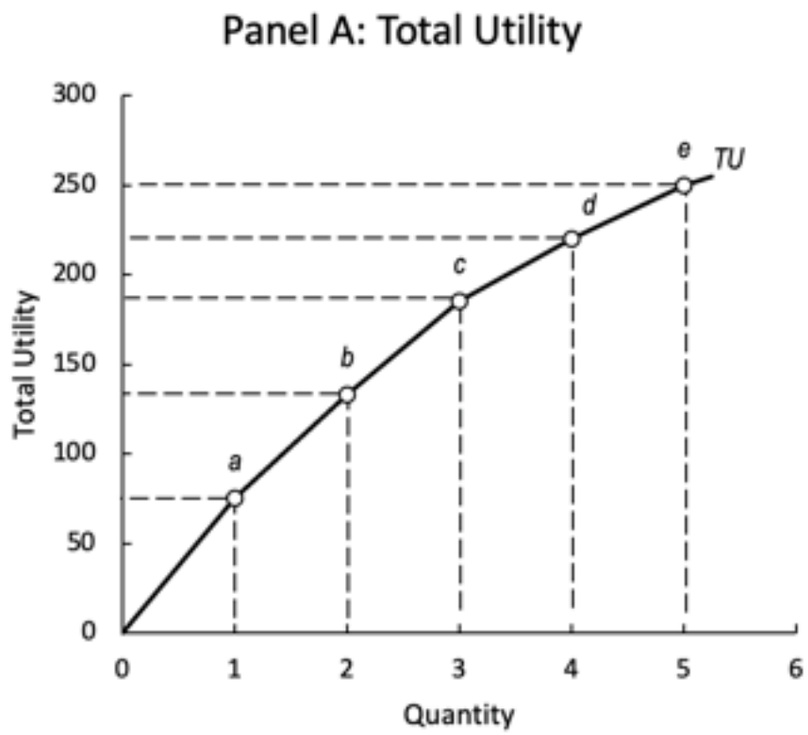
Take a look at columns (3) and (6) of *Table 4.1*. These two columns express the marginal utilities of pizzas and wall climbing, respectively, in terms of marginal utility per dollar; these amounts are computed by dividing the marginal utility of each product by the product's price. To see the importance of computing marginal utility per dollar, consider the following.

Given the figures in columns (3) and (6), and assuming you want to get the most for your money, on which activity would you spend the first $10 of your weekly budget? You can spend the first $10 on a pizza or on a half-hour of wall climbing.

A pizza returns 70 utils of satisfaction, whereas a half-hour of wall climbing yields 90 utils. Since 90 is greater than 70, clearly the first $10 would be better spent on wall climbing.

Now, for the sake of simplicity, let's keep your spending increments constant. On what will you spend your next $10—pizza or climbing?

Look again at the table. Your first pizza Still gives you 70 utils, while the second half-hour of wall climbing returns 80 utils. Wall climbing again is the obvious choice. If your total budget had only been $20 per week, you would have been inclined to give up pizzas completely.



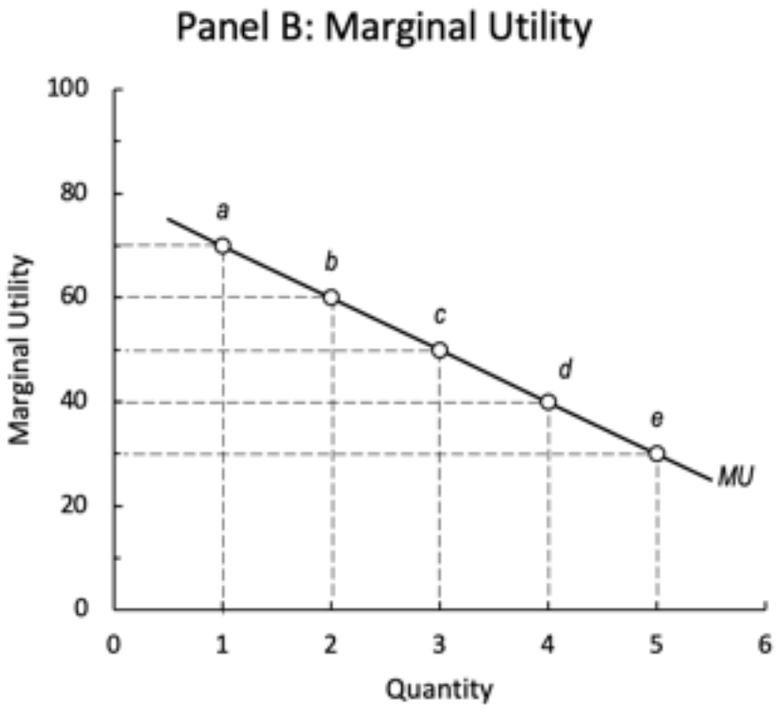


***Figure 4.4*:** Total utility, graphed in panel A, rises continually as we move from 1 pizza per week to 5. Nevertheless, the rate of this increase declines as more pizzas are consumed. Accordingly, panel B shows that marginal utility declines with more pizzas eaten.

***Table 4.2*: Total marginal utility per dollar from pizzas and wall climbing**

Pizza				Wall climbing			
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Quantity (units of pizza)	Total utility	Marginal utility	Marginal utility per dollar (price = $10)	Quantity (hours of wall climbing)	Total utility	Marginal utility	Marginal utility per dollar (price = $10)
0	0	-	-	0.0	-	-	-
1	70	70	7	0.5	90	90	9
2	130	60	6	1.0	170	80	8
3	180	50	5	1.5	230	60	6
4	220	40	4	2.0	260	30	3
5	250	30	3	2.5	270	10	1

Proceeding in the same way using your third $10 to buy your first pizza will yield an additional 70 utils of satisfaction, whereas using this money to purchase a third half-hour of wall climbing will bring only 60 utils. (Wall climbing is starting to get a bit boring.) Because 70 is greater than 60, with your third $10 you buy first pizza.

The next $10 provides the same amount of utility (60 utils) regardless of whether you buy another pizza or another half-hour of wall climbing. Therefore, you split the remaining $20 of your budget evenly between these two activities. When the consumption of additional units of two products provides equal satisfaction, economists say consumers are indifferent to which product they consume first.

By following this incremental process, we have determined that you will spend your $50 on 2 pizzas ($20) and 1.5 hour of wall climbing ($30). This results in a total utility of 360 utils (130 for pizza and 230 for wall climbing). No other combination of pizzas and wall climbing will result in total satisfaction this high, as you can prove to yourself by trying to spend the $50 differently.

Note: That for the last 2 units of each product consumed, the marginal utilities per dollar were equal at 6. This result is to be expected. Simple logic tells u that if one activity yields more satisfaction per dollar than some other, you will continue to pursue the activity with the higher satisfaction per dollar until some other activity starts yielding more satisfaction. This observation leads to a simple rule for maximizing utility: You should allocat your budget so that the marginal utility per last dollar spent on each of your purchases in the same. This utility-maximizing rule, in turn, leads to the following equation, where:

***MU* = marginal utility and *P* = price.**

So:

***MU* pizza/*P* pizza = *MU* wall climbing/*P* wall climbing**

This equation and the analyses described earlier can be generalized to cover numerous good and services. For all goods and services *a*, *b*, ……*n*:

MU a/P a = MU b/P b ..... = MU n/P n

The important point to remember is that, according to this theory of consumer behavior, consumers approach every purchase by asking themselves which of all possible additional acts of consumption would bring them the most satisfaction per dollar.

You have seen how the marginal utility analysis consumer behavior works when we assume that satisfaction or well-being can be measured directly (in utils).

We can now use this theory of consumer behavior to derive the demand curve for wall climbing (Chiang, 2016).

Key takeaways

- The utility of a good or service is determined by how much satisfaction a particular consumer obtains from it. Utility is not a quality inherent in the good or service itself.
- Total utility is a conceptual measure of the number of units of utility a consumer gains from consuming a good, service, or activity. Marginal utility is the increase in total utility obtained by consuming one more unit of a good, service, or activity.
- As a consumer consumes more and more of a good or service, its marginal utility falls.
- Utility maximization requires seeking the greatest total utility from a given budget.
- Utility is maximized when total outlays equal the budget available and when the ratios of marginal utility to price are equal for all goods and services a consumer consumes; this is the utility-maximizing condition.
- A budget line shows combinations of two goods a consumer is able to consume, given a budget constraint.
- An indifference curve shows combinations of two goods that yield equal satisfaction.
- To maximize utility, a consumer chooses a combination of two goods at which an indifference curve is tangent to the budget line.
- At the utility-maximizing solution, the consumer's marginal rate of substitution (the absolute value of the slope of the indifference curve) is equal to the price ratio of the two goods.
- We can derive a demand curve from an indifference map by observing the quantity of the good consumed at different price (Saylor Academy, n.d).

Chapter 5

Theory of the Firm: Production & Cost

After reading this chapter, students should be able to do the following:

- Comprehend total product, average product, and marginal product.
- Demonstrate the concepts of increasing, diminishing, and negative marginal returns and explain the law of diminishing marginal returns.
- Comprehend total variable cost, total fixed cost, total cost, average variable cost, average fixed cost, average total cost, and marginal cost—and explain how they are related to each other.
- Demonstrate how product and cost curves are related to each other and to determine in what ranges on these curves marginal returns are increasing, diminishing, or negative.

In this chapter:

Section 1

Start up: Street cleaning around the world

It is dawn in Shanghai, China. Already thousands of Chinese are out cleaning the city's streets. They are using brooms.

On the other side of the world, night falls in Washington, D.C., where the streets are also being cleaned—by a handful of giant street-sweeping machines driven by a handful of workers. The difference in method is not the result of a greater knowledge of modern technology in the United States—the Chinese know perfectly well how to build street- sweeping machines.

It is a production decision based on costs in the two countries. In China, where wages are relatively low, an army of workers armed with brooms is the least expensive way to produce clean streets. In Washington, where labor costs are high, it makes sense to use more machinery and less labor.

All types of production efforts require choices in the use of factors of production. In this chapter we examine such choices. Should a good or service be produced using relatively more labor and less capital? Or should relatively more capital and less labor be used? What about the use of natural resources?

In this chapter we see why firms make the production choices they do and how their costs affect their choices. We will apply the marginal decision rule to the production process and see how this rule ensures that production is carried out at the lowest cost possible.

We examine the nature of production and costs in order to gain a better understanding of supply. We thus shift our focus to firms, organizations that produce goods and services. In producing goods and services, firms combine the factors of production—labor, capital, and natural resources—to produce various products.

Economists assume that firms engage in production in order to earn a profit and that they seek to make this profit as large as possible. That is, economists assume that firms apply the marginal decision rule as they seek to maximize their profits. Whether we consider the operator of a shoe-shine stand at an airport or the firm that produces airplanes, we will find there are basic relationships between the use of factors of production and output levels, and between output levels and costs, that apply to all production. The production choices of firms and their associated costs are at the foundation of supply.

Section 2

Production, costs, & profit

Introduction

Production: short run vs. long run

Economists differentiate between short and long run production.

The short run is the period of time during which at least some factors of production are fixed. During the period of the pizza restaurant lease, the pizza restaurant is operating in the short run, because it is limited to using the current building—the owner can't choose a larger or smaller building.

The long run is the period of time during which all factors are variable. Once the lease expires for the pizza restaurant, the shop owner can move to a larger or smaller place.

Costs

Chloe, the owner of the Cookie Factory, buys flour, sugar, chocolate chips, and other cookie ingredients. She also buys the mixers and ovens and hires workers to run this equipment. She then sells the cookies to consumers. By examining some of the issues that Chloe faces in her business, we can learn some lessons about costs that apply to all firms.

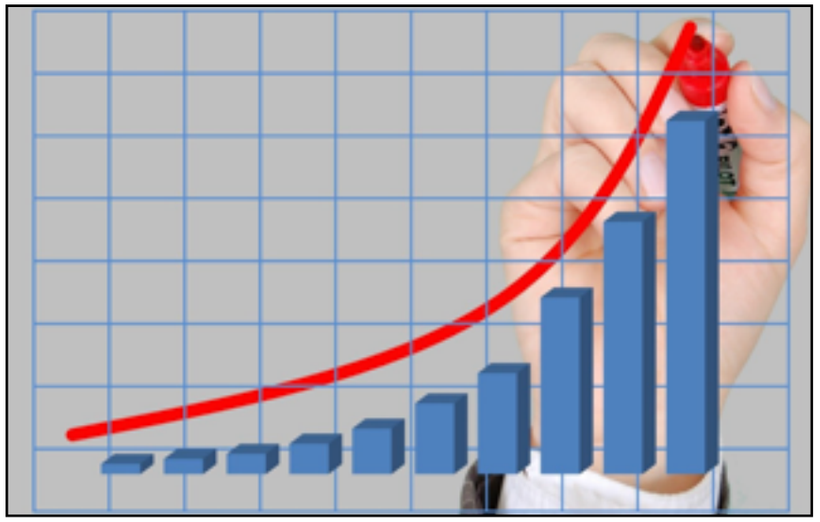


Image 5.1: Charting a curve

To understand the decisions a firm makes, we must understand what it is trying to do. Chloe may have started her firm because of an altruistic desire to provide the world with cookies or simply out of love for the cookie business, but it is more likely that she started the business to make money. Economists normally assume that the goal of a firm is to maximize profit, and they find that this assumption works well in most cases.

Profit

What is a firm's profit? The amount that the firm receives for the sale of its output (cookies) is called total revenue. The amount

that the firm pays to buy inputs (flour, sugar, workers, ovens, and so forth) is called total cost. As the business owner, Chloe gets to keep any revenue above her costs. That is, a firm's profit equals its total revenue minus its total cost:

Profit = total revenue – total cost

Chloe's objective is to make her firm's profit as large as possible.

To see how a firm maximizes profit, we must consider fully how to measure its total revenue and its total cost. Total revenue is the easy part: It equals the quantity of output the firm produces multiplied by the price at which it sells its output. If Chloe produces 10,000 cookies and sells them at $2 a cookie, her total revenue is $20.000 . The measurement of a firm's total cost, however, is more subtle.

Cost as opportunity costs

When measuring costs at Chloe's Cookie Factory or any other firm, it is important to keep in mind that the cost of something is what you give up to get it. Recall that the opportunity cost of an item refers to all the things that must be forgone to acquire that item. When economists speak of a firm's cost of production, they include all the opportunity costs of making its output of goods and services.

While some of a firm's opportunity costs of production are obvious, others are less so. When Chloe pays $1000 for flour, that $1000 is an opportunity cost because Chloe can no longer use that $1000 to buy something else. Similarly, when Chloe hires workers to make the cookies, the wages she pays are part of the firm's costs. Because these opportunity costs require the firm to pay out some money, they are called explicit costs. By contrast, some of a firm's opportunity costs, called implicit costs, do not require a cash outlay. Imagine that Chloe is skilled with computers and could earn $100 per hour working as a programmer. For every hour that Chloe works at her cookie factory, she gives up $100 in income, and this forgone income is also part of her costs. The total cost of Chloe's business is the sum of her explicit and implicit costs.

The distinction between explicit and implicit costs highlights a difference between how economists and accountants analyze a business. Economists are interested in studying how firms make production and pricing decisions. Because these decisions are based on both explicit and implicit costs, economists include both when measuring a firm's costs. By contrast, accountants have the job of keeping track of the money that flows into and out of firms. As a result, they measure the explicit costs but usually ignore the implicit costs.

Economic profit vs. accounting profit

Now let's return to the firm's objective: profit. Because economists and accountants measure costs differently, they also

measure profit differently. An economist measures a firm's economic profit as its total revenue minus all its opportunity costs (explicit and implicit) of producing the goods and services sold. An accountant measures the firm's accounting profit as its total revenue minus only its explicit costs (Mankiw, 2021).

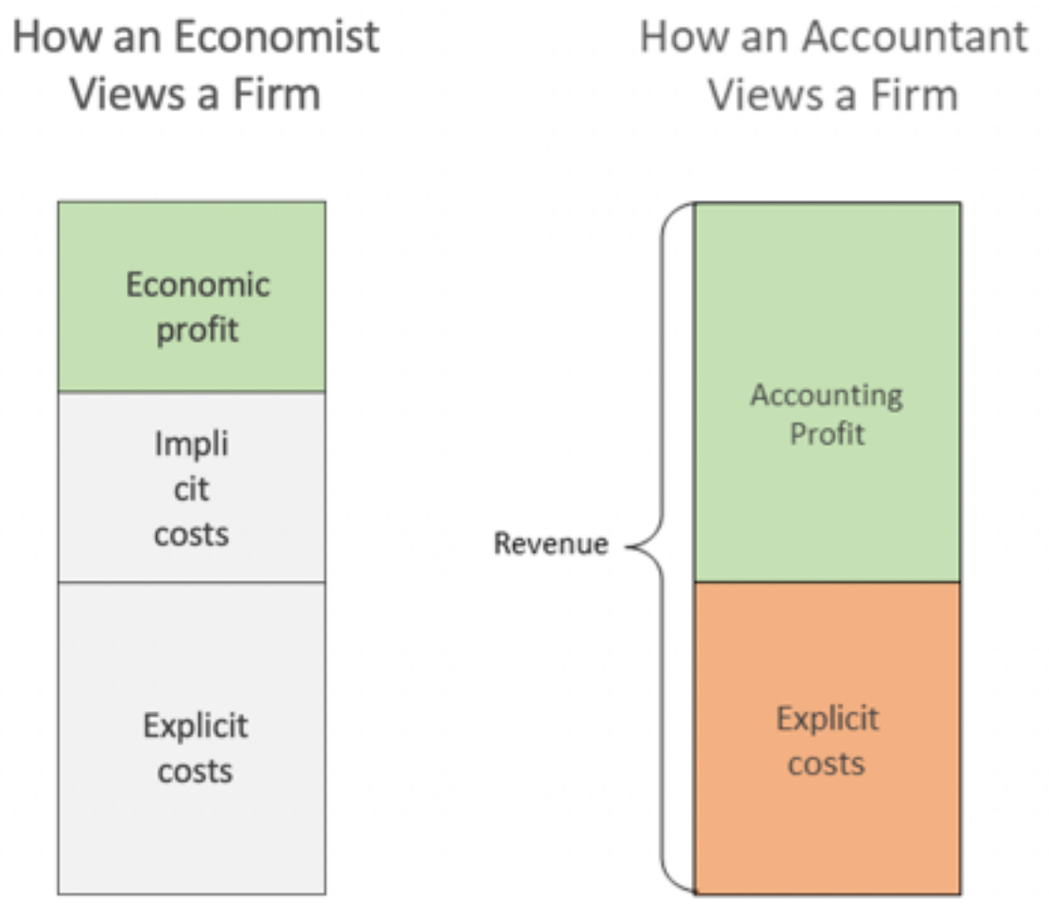


***Figure 5.1*:** Economist's view of a firm versus accountant's view. of a firm

Section 3

Production in the short run

Production is the process of turning inputs into outputs. Most products can be made using variety of different technologies. As discussed earlier, these can be either capital-intensive or labor-intensive. The type of technology a firm chooses will depend on many things, including ease of implementation and the relative cost of each input into the process.

Again, in the simplified model we are working with, firms can vary their output in the short run only by altering the amount of labor they employ, because plant capacity is fixed in the short run. The extent to which output will change from adding labor depends on the ability to specialize in tasks and use other resources efficiently. But like all resources, labor is eventually subject to diminishing returns. Therefore, an individual firm's production possibilities will follow the same general pattern as the production function for the entire economy. In the short run, output for an existing plant will vary by the amount of labor employed. This output is referred to as total product.

Total product

Let's examine some production basics by assuming that you start your own firm. Imagine that you decide to begin manufacturing windsurfing sails in an old warehouse that you rent. Your physical plant is constrained in the short run by the size of the entire manufacturing facility.

***Image 5.2*:** Macarons

Table 5.1 on the following page lists your firm's total output (total product) as you hire more workers. Output of sails varies with the number of people you employ. Output rises from 0 to 16 when 3 people are working to a maximum of 28 when 6 people are employed (point b). As you continue to hire employees beyond 6, you encounter negative returns. Total output actually begins to fall, possibly because the workplace has become overly crowded, confusing, hazardous, or noisy. Clearly, hiring any more than 6 employees would be counterproductive, because output falls but costs (such as the total wages of all the employees) rise.

Table 5.1: Total output (total product) as more workers are hired			
Labor (L)	**Total product (Q)**	**Marginal product (MP)**	**Average product (AP)**
0	0	-	-
1	3	3	3
2	8	5	4
3	16	8	5.33
4	22	6	5.50
5	26	4	5.20
6	28	2	4.67
7	26	-2	3.71
8	23	-3	2.88

Marginal & average product

Marginal product (column 3 in *Table 5.1*) is the change in output that results from a change in labor input. Marginal product is computed by dividing the change in output (AQ) by the change in labor (AL). The delta (A) symbol is used to denote “change in.”

Thus, marginal product (MP) is equal to AQ/AL; it is the change in output that results from adding additional workers.

Notice that when employment rises from 2 workers to 3 workers, output grows from 8 to 16 sails. Marginal product is therefore 8 sails at this point. This is shown graphically with a point placed between the second and third worker, because this represents the change in output going from 2 workers to 3 workers. Contrast this with a change in employment when 6 people are already employed. Adding another employee actually reduce the total output of windsurfing sails from 28 to 26; therefore, marginal product is -2 from the sixth to the seventh worker.

Average product (AP) or output per worker is found by dividing total output by the number of workers employed to produce that output (QL). When employment is 3 people and output is 16, for instance, average product is 5.33.

Increasing & diminishing returns

In our example, each of the first 3 workers adds more to output than the previous worker hired.

Therefore, the marginal product going from 0 to 1 worker, 1 to 2 workers, and 2 to 3 workers increases. This is called the increasing marginal returns portion of the curve. In this range, output grows faster as you employ additional labor.

However, after you have employed 3 people, marginal productivity begins to trail off. Between 3 and 6 workers, you face diminishing marginal returns because each additional worker adds to total output, but at a diminishing rate.

Finally, once you have hired 6 employees, if you hire any more, this will result in negative marginal returns. Therefore, the marginal product curve crosses the horizontal axis at the sixth worker, which corresponds to the highest point on the total product curve. Hiring additional people will actually reduce output; therefore, rational firms never operate in this range.

Meanwhile, the average product curve follows a similar path as the marginal product curve, although there isn't as dramatic a change as each worker is added. Average product gives you a sense of the overall productivity of a firm. The relationship between marginal product and average product is an important one. When marginal product exceeds average product—when a new worker adds more to output than the average of the previous workers—hiring an additional worker increases average productivity. This might be because hiring more people allows you to establish more of production line, thereby increasing specialization and raising productivity. The marginal product curve always crosses the average product curve at its highest point, because once marginal product falls below the average product, the average product must fall as well.

Firms hire workers to produce output based on available resources, many of which are fixed in the in the short run. By adding more workers, firms can increase productivity by allowing workers to specialize in tasks for which they are more suited. As more workers are hired, diminishing or even negative returns can set in. The typical production curves shown in Figure I embody the law of diminishing returns. All firms eventually face diminishing marginal returns, but this does not mean production should be avoided as long as the value of the additional output produced exceeds the additional costs.

This analysis is important because it shows how much output is generated based on the number of workers hired, which will eventually translate into revenues for the firm once the output is sold. Therefore, production is an important component of profits, but not enough to determine the optimal production output. To maximize profits, we must also evaluate the cost of production, to which we turn next (Lumen Learning, n.d.).

Section 4

Costs of production

Cost in the short run

A firm's total costs depend on the quantities of inputs the firm uses to produce its output and the cost of those inputs to the firm. The firm's production function tells us how much output the firm will produce with given amounts of inputs. However, if we think about that backwards, it tells us how many inputs the firm needs to produce a given quantity of output, which is the first thing we need to determine total cost. Let's move to the second factor we need to determine.

For every factor of production (or input), there is an associated factor payment. Factor payments are what the firm pays for the use of the factors of production. From the firm's perspective, factor payments are costs. From the owner of each factor's perspective, factor payments are income. Factor payments include the following:

- Raw materials prices for raw materials
- Rent for land or buildings
- Wages and salaries for labor
- Interest and dividends for the use of financial capital (loans and equity investments)
- Profit for entrepreneurship. Profit is the residual, what's left over from revenues after the firm pays all the other costs. While it may seem odd to treat profit as a "cost", it is what entrepreneurs earn for taking the risk of starting a business.

***Image 5.3*:** Man in suit

You can see this correspondence between factors of production and factor payments in the inside loop of the circular flow diagram in *Figure 5.2* on the following page.

We now have all the information necessary to determine a firm's costs.

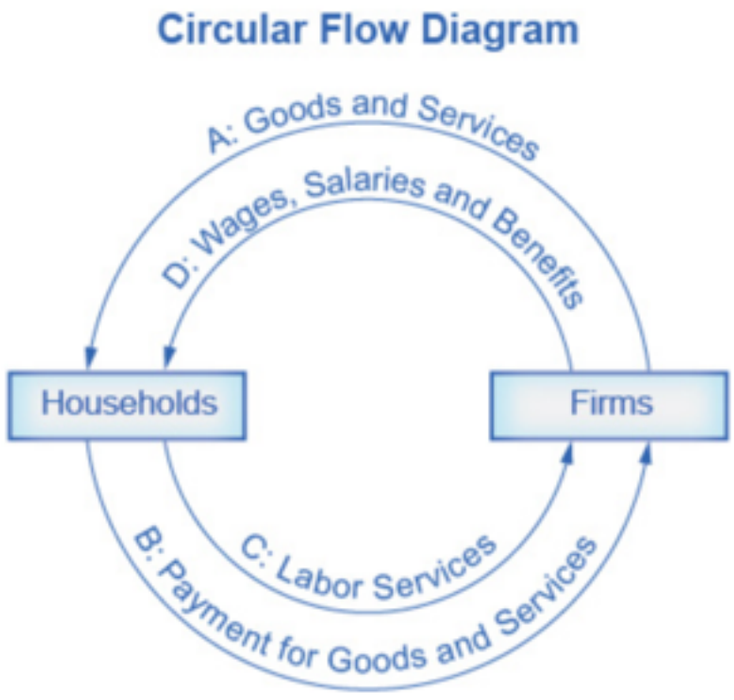


***Image 5.2*:** Circular flow diagram

A cost function is a mathematical expression or equation that shows the cost of producing different levels of output.

***Table 5.2*: Cost function for producing widgets**				
Q	1	2	3	4
Cost	$32.50	$44	$52	$90

What we observe is that the cost increases as the firm produces higher quantities of output. This is pretty intuitive, since producing more output requires greater quantities of inputs, which cost more dollars to acquire. What is the origin of these cost figures? They come from the production function and the factor payments. The discussion of costs in the short run above, costs in the short run, was based on the following production function, which is similar to *Table 5.3* except for "widgets" instead of trees.

***Table 5.3*: Costs in the short run**										
Workers (*L*)	1	2	3	3.2	4.4	5.2	6	7	8	9
Widgets (*Q*)	0.2	0.4	0.8	1	2	3	3.5	3.8	3.95	4

We can use the information from the production function to determine production costs. What we need to know is how many workers are required to produce any quantity of output. If we flip the order of the rows, we “invert” the production function so it shows $L = f(Q)$ $L = f(Q)$.

***Table 5.4*: Determine production costs**										
Workers (*L*)	0.2	0.4	0.8	1	2	3	3.5	3.8	3.9	4
Widgets (*Q*)	1	2	3	3.25	4.4	5.2	6	7	8	9

Now focus on the whole number quantities of output. We'll eliminate the fractions from the table:

Table 5.5: Whole number quantities of output										
Workers (*L*)	-	-	-	1	2	3	-	-	-	4
Widgets (*Q*)	-	-	-	3.25	4.4	5.2	-	-	-	9

Suppose widget workers receive $10 per hour. Multiplying the workers row by $10 (and eliminating the blanks) gives us the cost of producing different levels of output.

Table 5.6: Cost of producing different levels of output at $10/hr.				
Widgets (*Q*)	1.00	2.00	3.00	4.00
Workers (*L*)	3.25	4.4	5.2	9
***X* wage rate per hour**	$10	$10	$10	$10
= cost	$32.50	$44.00	$52.00	$90.00

This is same cost function with which we began! Now that we have the basic idea of the cost origins and how they are related to production, let's drill down into the details.

Average & marginal costs

The cost of producing a firm's output depends on how much labor and physical capital the firm uses. A list of the costs involved in producing cars will look very different from the costs involved in producing computer software or haircuts or fast-food meals.

We can measure costs in a variety of ways. Each way provides its own insight into costs. Sometimes firms need to look at their cost per unit of output, not just their total cost. There are two ways to measure per unit costs. The most intuitive way is average cost. Average cost is the cost on average of producing a given quantity. We define average cost as total cost divided by the quantity of output produced: $AC = TC/QAC = TC/Q$. If producing two widgets costs a total of $44, the average cost per widget is $44/2 =$22 $44/2 = $22 per widget. The other way of measuring cost per unit is marginal cost. If average cost is the cost of the average unit of output produced, marginal cost is the cost of each individual unit produced. More formally, marginal cost is the cost of producing one more unit of output. Mathematically, marginal cost is the change in total cost divided by the change in output: $MC = \Delta TC/\Delta QMC = \Delta TC/\Delta Q$. If the

cost of the first widget is $32.50 and the cost of two widgets is $44, the marginal cost of the second widget is $44–$32.50 = $11.50. $44–$32.50 = $11.50. We can see the widget cost redrawn in *Table 5.7* below with average and marginal cost added.

Table 5.7: **Extended cost function for producing widgets**

Q	1	2	3	4
Total cost	$32.50	$44.00	$52	$90.00
Average cost	$32.50	$22.00	$17.33	$22.50
Marginal cost	$32.50	$11.50	$8.00	$38.00

Note that the marginal cost of the first unit of output is always the same as total cost.

Fixed & variable costs

We can decompose costs into fixed and variable costs. Fixed costs are the costs of the fixed inputs (e.g. capital). Because fixed inputs do not change in the short run, fixed costs are expenditures that do not change regardless of the level of production. Whether you produce a great deal or a little, the fixed costs are the same. One example is the rent on a factory or a retail space. Once you sign the lease, the rent is the same regardless of how much you produce, at least until the lease expires. Fixed costs can take many other forms: for example, the cost of machinery or equipment to produce the product, research and development costs to develop new products, even an expense like advertising to popularize a brand name. The amount of fixed costs varies according to the specific line of business: for instance, manufacturing computer chips requires an expensive factory, but a local moving and hauling business can get by with almost no fixed costs at all if it rents trucks by the day when needed.

Variable costs are the costs of the variable inputs (e.g. labor). The only way to increase or decrease output is by increasing or decreasing the variable inputs. Therefore, variable costs increase or decrease with output. We treat labor as a variable cost, since producing a greater quantity of a good or service typically requires more workers or more work hours. Variable costs would also include raw materials.

Total costs are the sum of fixed plus variable costs. Let's look at another example. Consider the barber shop called “The Clip Joint” in *Figure 5.3*. The data for output and costs are in *Table 5.8*. The fixed costs of operating the barber shop, including the space and equipment, are $160 per day. The variable costs are the costs of hiring barbers, which in our example is $80 per barber each day. The first two columns of the table show the quantity of haircuts the barbershop can produce as it hires additional barbers. The third column shows the fixed costs, which

do not change regardless of the level of production. The fourth column shows the variable costs at each level of output. We calculate these by taking the amount of labor hired and multiplying by the wage. For example, two barbers cost: 2 × $80 = $160. Adding together the fixed costs in the third column and the variable costs in the fourth column produces the total costs in the fifth column. For example, with two barbers the total cost is: $160 + $160 = $320.

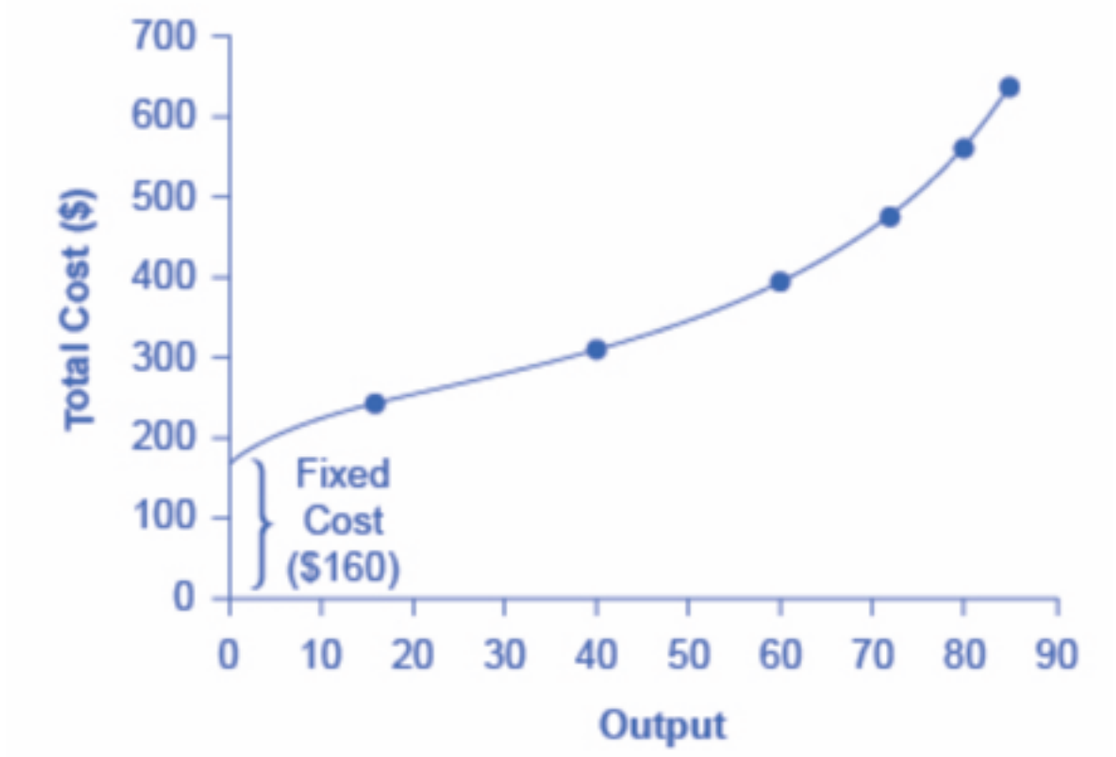


***Figure 5.3*:** How output affects total costs at zero production. Fixed costs of $160 are still present. As production increases, variable costs are added to fixed costs, and the total cost is the sum of the two.

Table 5.8: Output and total costs				
Labor	**Quantity**	**Fixed cost**	**Variable cost**	**Total cost**
1	16	$160	$80	$240
2	40	$160	$160	$320
3	60	$160	$240	$400
4	72	$160	$320	$480
5	80	$160	$400	$560
6	84	$160	$480	$640
7	82	$160	$560	$720

At zero production, the fixed costs of $160 are still present. As production increases, we add variable costs to fixed costs, and the total cost is the sum of the two. *Figure 5.3* graphically shows the relationship between the quantity of output produced and the cost of producing that output. We always show the fixed costs as the vertical intercept of the total cost curve; that is, they are the costs incurred when output is zero so there are no variable costs.

You can see from the graph that once production starts, total costs and variable costs rise. While variable costs may initially increase at a decreasing rate, at some point they begin increasing at an increasing rate. This is caused by diminishing marginal

productivity, which we discussed earlier in the section of this chapter on production in the short run, which is easiest to see with an example. As the number of barbers increases from zero to one in the table, output increases from 0 to 16 for a marginal gain (or marginal product) of 16. As the number rises from one to two barbers, output increases from 16 to 40, a marginal gain of 24. From that point on, though, the marginal product diminishes as we add each additional barber. For example, as the number of barbers rises from two to three, the marginal product is only 20; and as the number rises from three to four, the marginal product is only 12.

To understand the reason behind this pattern, consider that a one-man barber shop is a very busy operation. The single barber needs to do everything: say hello to people entering, answer the phone, cut hair, sweep, and run the cash register. A second barber reduces the level of disruption from jumping back and forth between these tasks, which allows a greater division of labor and specialization. The result can be increasing marginal productivity.

However, as the shop adds other barbers, the advantage of each additional barber is less, since the specialization of labor can only go so far. The addition of a sixth or seventh or eighth barber just to greet people at the door will have less impact than the second one did. This is the pattern of diminishing marginal productivity. As a result, the total costs of production will begin to rise more rapidly as output increases. At some point, you may even see negative returns as the additional barbers begin bumping elbows and getting in each other's way. In this case, the addition of still more barbers would actually cause output to decrease, as the last row of *Table 5.8* shows.

This pattern of diminishing marginal productivity is common in production. As another example, consider the problem of irrigating a crop on a farmer's field. The plot of land is the fixed factor of production, while the water that the farmer can add to the land is the key variable cost. As the farmer adds water to the land, output increases.

However, adding increasingly more water brings smaller increases in output, until at some point the water floods the field and actually reduces output. Diminishing marginal productivity occurs because, with fixed inputs (land in this example), each additional unit of input (e.g., water) contributes less to overall production.

Average total cost, average variable cost, & marginal cost

The breakdown of total costs into fixed and variable costs can provide a basis for other insights as well. The first five columns of *Table 5.8*. duplicate the previous table, but the last three columns show average total costs, average variable costs, and marginal costs. These new measures analyze costs on a per-unit (rather than a total) basis and are reflected in the curves in *Figure 5.4*.

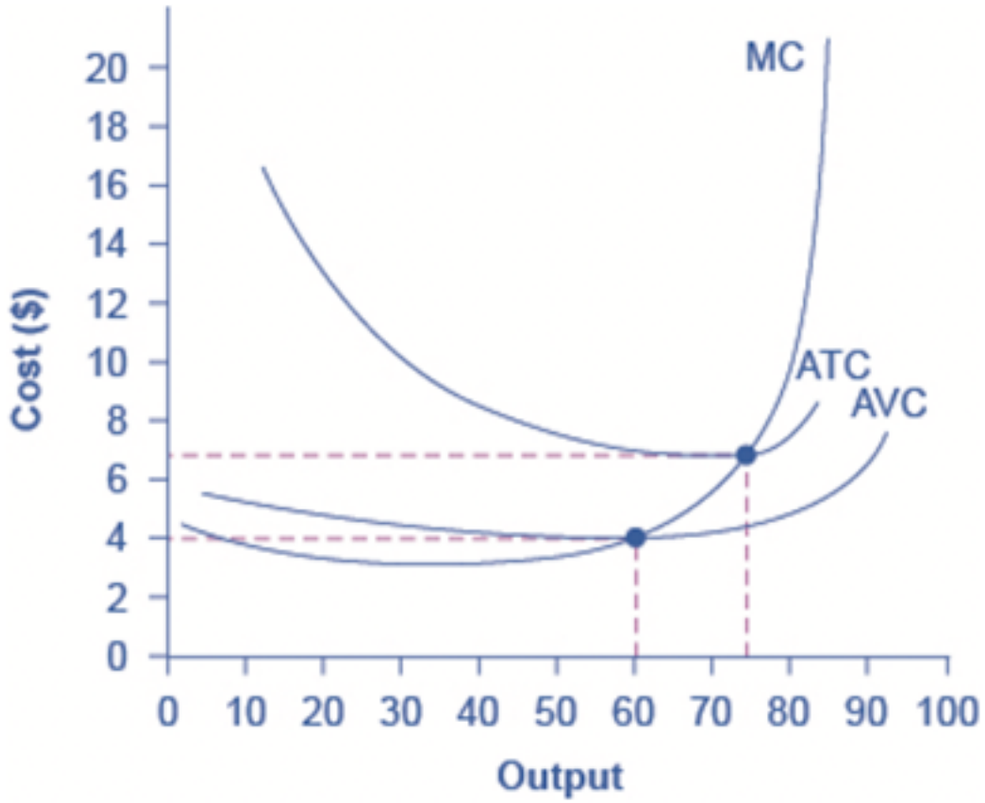


***Figure 5.4*:** Cost curves at the clip joint.

Looking at *Figure 5.4*, we can also present the information on total costs, fixed cost, and variable cost on a per-unit basis. We calculate average total cost (ATC) by dividing total cost by the total quantity produced. The average total cost curve is typically U-shaped.

We calculate average variable cost (AVC) by dividing variable cost by the quantity produced. The average variable cost curve lies below the average total cost curve and is also typically U-shaped. We calculate marginal cost (MC) by taking the change in total cost between two levels of output and dividing by the change in output. The marginal cost curve is upward-sloping.

Average total cost (sometimes referred to simply as average cost) is total cost divided by the quantity of output. Average total cost starts off relatively high, because at low levels of output total costs are dominated by the fixed cost. Mathematically, the denominator is so small that average total cost is large. Average total cost then declines, as the fixed costs are spread over an increasing quantity of output. In the average cost calculation, the rise in the numerator of total costs is relatively small compared to the rise in the denominator of quantity produced. However, as output expands still further, the average cost begins to rise. At the right side of the average cost curve, total costs begin rising more rapidly as diminishing returns come into effect.

We obtain average variable cost when we divide variable cost by quantity of output. Note that at any level of output, the average variable cost curve will always lie below the curve for average total cost, as *Figure 5.4* on the previous page shows. The reason is that average total cost includes average variable cost and average fixed cost. However, as output grows, fixed costs become relatively less important (since they do not rise with output), so average variable cost sneaks closer to average cost.

Average total and variable costs measure the average costs of producing some quantity of output. Marginal cost is somewhat different. Marginal cost is the additional cost of producing one more unit of output. It is not the cost per unit of all units produced, but only the next one (or next few). We calculate

marginal cost by taking the change in total cost and dividing it by the change in quantity. Thus, the marginal cost for each of those marginal 20 units will be 80/20, or $4 per haircut. The marginal cost curve is generally upward-sloping, because diminishing marginal returns implies that additional units are more costly to produce. We can see small range of increasing marginal returns in the figure as a dip in the marginal cost curve before it starts rising.

Table 5.9: **Maximizing profit practice**

Output	Variable cost	Fixed cost	Total cost	Marginal cost	MR	TR	Profit
0	$0	$20	$20	-	-	-	-
1	$12	$20	$32	$12	$30	$30	-$2
2	$22	$20	$42	$10	$30	$60	$18
3	$27	$20	$47	$5	$30	$90	$43
4	$40	$20	$60	$13	$30	$120	$60
5	$60	$20	$80	$20	$30	$150	$70
6	$100	$20	$120	$40	$30	$180	$60

Costs in the long run

As in the short run, costs in the long run depend on the firm's level of output, the costs of factors, and the quantities of factors needed for each level of production output. The chief difference between long- and short-run costs is that there are no fixed factors in the long run. There are thus no fixed costs. All costs are variable, so we do not distinguish between total variable cost and total cost in the long run: total cost is total variable cost.

The long-run average cost (*LRAC*) curve shows the firm's lowest cost per unit at each level of output, assuming that all factors of production are variable. The *LRAC* curve assumes that the firm has chosen the optimal factor mix, as described in the previous section, for producing any level of output. The costs it shows are therefore the lowest costs possible for each level of output. It is important to note, however, that this does not mean that the minimum points of each short-run *ATC* curves lie on the *LRAC* curve. This critical point is explained in the next paragraph and expanded upon even further in the next section.

Figure 5.5: Relationship between short-run and long-run average total costs, shows how a firm's *LRAC* curve is derived. Suppose Lifetime Disc Co. produces compact discs (CDs) using capital and labor. We have already seen how a firm's average total cost curve can be drawn in the short run for a given quantity of a particular factor of production, such as capital. In

the short run, Lifetime Disc might be limited to operating with a given amount of capital; it would face one of the short-run average total cost curves shown in *Figure 5.5*. If it has 30 units of capital, for example, its average total cost curve is ATC_{30}.

In the long run, the firm can examine the average total cost curves associated with varying levels of capital. Four possible short-run average total cost curves for Lifetime Disc are shown in *Figure 5.5* for quantities of capital of 20, 30, 40, and 50 units. The relevant curves are labeled ATC_{20}, ATC_{30}, ATC_{40}, and ATC_{50} respectively. The *LRAC* curve is derived from this set of short- run curves by finding the lowest average total cost associated with each level of output. Again, notice that the U-shaped *LRAC* curve is an envelope curve that surrounds the various short-run *ATC* curves. With the exception of ATC_{40}, in this example, the lowest cost per unit for a particular level of output in the long run is not the minimum point of the relevant short-run curve.

The *LRAC* curve is found by taking the lowest average total cost curve at each level of output. Here, average total cost curves for quantities of capital of 20, 30, 40, and 50 units are shown for the Lifetime Disc Co. At a production level of 10,000 CDs per week, Lifetime minimizes its cost per CD by producing with 20 units of capital (point A). At 20,000 CDs per week, an expansion to a plant size associated with 30 units of capital minimizes cost per unit (point B). The lowest cost per unit is achieved with production of 30,000 CDs per week using 40 units of capital (point C). If

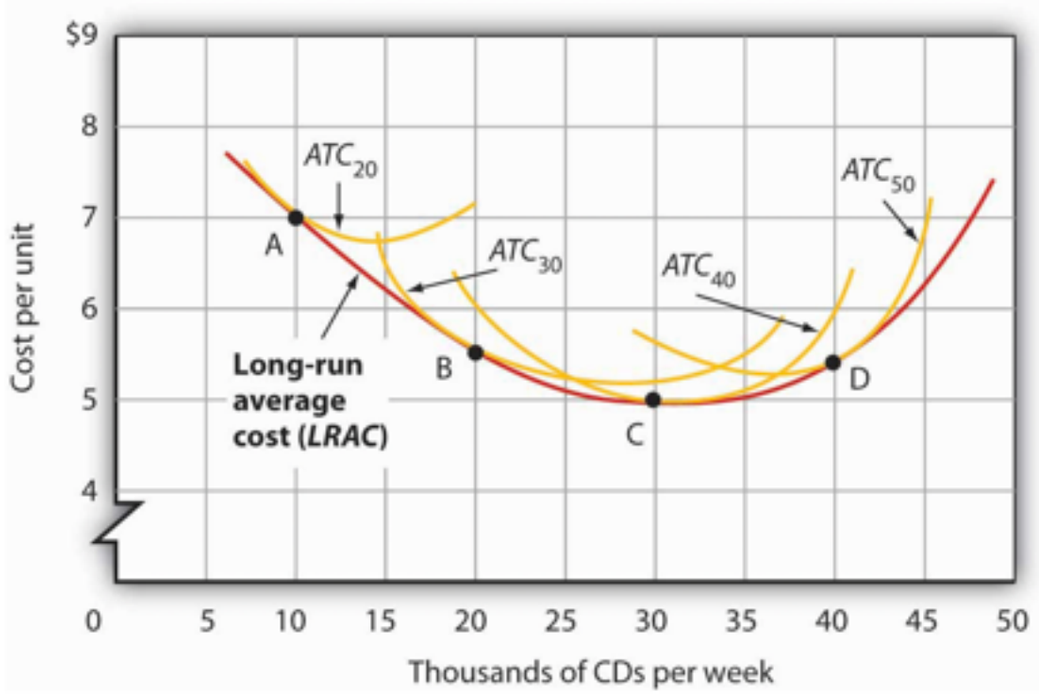


***Figure 5.5*:** Relationship between short-run and long-run average total costs

Lifetime chooses to produce 40,000 CDs per week, it will do so most cheaply with 50 units of capital (point D).

Economies & diseconomies of scale

Notice that the long-run average cost curve in *Figure 5.5* first slopes downward and then slopes upward. The shape of this curve tells us what is happening to average cost as the firm changes its scale of operations. A firm is said to experience economies of scale when long-run average cost declines as the firm expands its output. A firm is said to experience diseconomies of scale when long-run average cost increases as

the firm expands its output. Constant returns to scale occur when long-run average cost stays the same over an output range.

Why would a firm experience economies of scale? One source of economies of scale is gains from specialization. As the scale of a firm's operation expands, it is able to use its factors in more specialized ways, increasing the workers productivity. Another source of economies of scale lies in the economies that can be gained from mass production methods. As the scale of a firm's operation expands, the company can begin to utilize large-scale machines and production systems that can substantially reduce cost per unit.

Why would a firm experience diseconomies of scale? At first glance, it might seem that the answer lies in the law of diminishing marginal returns, but this is not the case. The law of diminishing marginal returns, after all, tells us how output changes as a single factor is increased, with all other factors of production held constant. In contrast, diseconomies of scale describe a situation of rising average cost even when the firm is free to vary any or all of its factors as it wishes.

Diseconomies of scale are generally thought to be caused by management problems. As the scale of a firm's operations expands, it becomes harder and harder for management to coordinate and guide the activities of individual units of the firm. Eventually, the diseconomies of management overwhelm any gains the firm might be achieving by operating with a larger scale of plant, and long-run average costs begin rising. Firms experience constant returns to scale at output levels where there are neither economies nor diseconomies of scale. For the range of output over which the firm experiences constant returns to scale, the long-run average cost curve is horizontal.

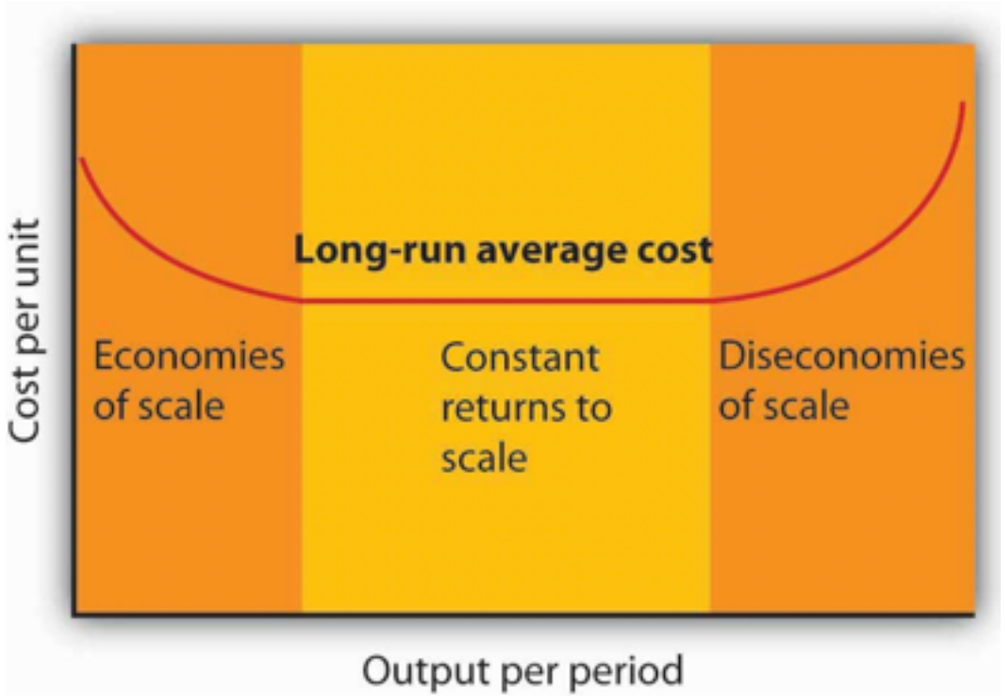


***Figure 5.6*:** Economies and diseconomies of scale and long-run average

The downward-sloping region of the firm's *LRAC* curve is associated with economies of scale. There may be a horizontal range associated with constant returns to scale. The upward-sloping range of the curve implies diseconomies of scale.

Firms are likely to experience all three situations, as shown in *Figure 5.5*. At very low levels of output, the firm is likely to

experience economies of scale as it expands the scale of its operations. There may follow a range of output over which the firm experiences constant returns to scale— empirical studies suggest that the range over which firms experience constant returns to scale is often very large. And certainly there must be some range of output over which diseconomies of scale occur; this phenomenon is one factor that limits the size of firms. A firm operating on the upward-sloping part of its LRAC curve is likely to be undercut in the market by smaller firms operating with lower costs per unit of output (Lumen Learning, n.d.).

Key takeaways

- Production is the process a firm uses to transform inputs (e.g., labor, capital, raw materials, etc.) into outputs. It is not possible to vary fixed inputs (e.g. capital) in a short period. Thus, in the short run the only way to change output is to change the variable inputs (e.g. labor).
- Marginal product is the additional output a firm obtains by employing more labor in production.
- At some point, employing additional labor leads to diminishing marginal productivity, meaning the additional output obtained is less than for the previous increment to labor.
- The cost of production for a given quantity of output is the sum of the amount of each input required to produce that quantity of output times the associated factor payment.
- In a short-run perspective, we can divide a firm's total costs into fixed costs, which a firm must incur before producing any output, and variable costs, which the firm incurs in the act of producing.
- Privately owned firms are motivated to earn profits. Profit is the difference between revenues and costs.
- While accounting profit considers only explicit costs, economic profit considers both explicit and implicit costs (Principles of Economics, 2011).

Chapter 6

Market Structures

After reading this chapter, students should be able to do the following:

- Detail perfect competition and price-taking behavior.
- Define a monopoly and the relationship between price setting and monopoly power.
- Explain both short-run equilibrium and long-run equilibrium for a monopolistically competitive firm.
- Define an oligopoly and differentiate it from other types of market structures.
- Illustrate the collusion model of oligopoly and game theory.

In this chapter:

Section 1

Start up: Life on the farm

They produce a commodity that is essential to our daily lives, one for which the demand is virtually assured. And yet many—even as farm prices are reaching record highs—seem to live on the margin of failure. Thousands are driven out of business each year. We provide billions of dollars in aid for them, but still we hear of the hardships many of them face. They are our nation's farmers.

What is it about farmers, and farming, that arouses our concern? Much of the answer probably lies in our sense that farming is fundamental to the American way of life. Our country was built, in large part, by independent men and women who made their living from the soil. Many of us perceive their plight as our plight. But part of the answer lies in the fact that farmers do, in fact, face a difficult economic environment. Most of them operate in highly competitive markets, markets that tolerate few mistakes and generally offer small rewards. Finally, perhaps our concern is stirred by our recognition that the farmers' plight is our blessing.

***Image 6.1*:** Growth

The low prices that make life difficult for farmers are the low prices we enjoy as consumers of food.

What keeps farming returns as low as they are?

What holds many farmers in a situation in which they always seem to be just getting by? In this chapter we shall see that prices just high enough to induce firms to continue to produce are precisely what we would expect to prevail in a competitive market. We will examine a model of how competitive markets work. Not only does this model help to explain the situation facing farmers, but it will also help us to understand the determination of price and output in a wide range of markets. A farm is a firm, and our analysis of such a firm in a competitive market will give us the tools to analyze the choices of all firms operating in competitive markets. We will put the concepts of marginal cost, average variable cost, and average total cost to work to see how firms in a competitive market respond to market forces. We will see how firms adjust to changes in demand and supply in the short run and in the long run. In all of this, we will be examining how firms use the marginal decision rule.

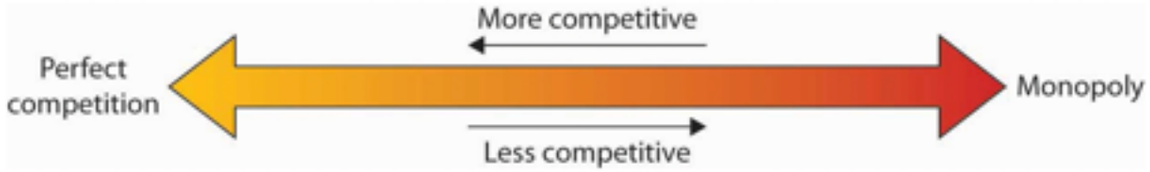


***Figure 6.1*:** Scale of perfect competition to monopoly

The competitive model introduced in this chapter lies at one end of a spectrum of market models. At the other end is the monopoly model. It assumes a market in which there is no competition, a market in which only a single firm operates. Two models that fall between the extremes of perfect competition and monopoly are monopolistic competition and oligopoly (Saylor Academy, n.d).

Market structure analysis

To appreciate competitive markets, we need to look at competition within the full range of possible market structures. Economists use market structure analysis to categorize industries based on a few key characteristics. By knowing simple industry facts, economists can predict the behavior of firms in that industry in such areas as pricing and sales.

The following four factors help to define the intensity of competition in an industry and to provide some sense of the issues behind each one.

1. **Number of firms in the industry:** Does the industry comprise many firms, each with limited or no ability to set the market price, such as local strawberry farms, or is it dominated by a large firm such as Apple that can influence price regardless of the number of other firms?

2. **Nature of the industry's product:** Are we talking about a homogeneous product such as plain table salt, for which no consumer will pay a premium or are we considering leather handbags, which consumers may think vary greatly, in that some firms (Coach, Gucci) produce better goods than others?

3. **Barriers to entry:** Does the industry require low start-up and maintenance costs such as found at a roadside fruit and vegetable stand, or is it a computer-chip business that may require $1 billion to build a new chip plant?

***Image 6.2*:** Shipping containers

4. **Extent to which individual firms can control prices:** Pharmaceutical companies can set prices for new medicines, at least for a period of time, because of patent protection. Farmers and copper producers have virtually no control and get their prices from world markets.

Possible market structures range from perfect competition, characterized by many firms, to monopoly, where an industry is

made up of only one firm. These market structures will make more sense to you as we consider each one in the chapters ahead. Right now, use this list and the descriptions as reference points. You can always return here and put the discussion in context.

Primary market structures

The primary market structures economist have identified, along with their key characteristics, are as follows:

Perfect competition

- Many buyers and sellers
- Homogeneous (standardized) products
- No barriers to market entry or exit
- No long-run economic profit
- No control over price (no market power)

Monopolistic competition

- Many buyers and sellers
- Differentiated products
- Little to no barriers to market entry or exit
- No long-run economic profit
- Some control over price (limited market power)

Oligopoly

- Fewer firms (such as the auto industry)
- Mutually interdependent decisions
- Substantial barriers to market entry
- Potential for long-run economic profit
- Shared market power and considerable control over price

Monopoly

- One firm
- No close substitutes for product
- Nearly insuperable barriers to entry
- Potential for long-run economic profit
- Substantial market power and control over price

Putting off discussion of the other market structures for later chapters, we turn to an extended examination of the requirements for a perfectly competitive market. In the remainder of this chapter, we explore short-run pricing and output decisions

and also the importance of entry and exit in the long run. Moreover, we use the conditions of perfect competition to establish a benchmark for efficiency as we turn to evaluate other market structures in the following chapters.

Section 3

Perfect competition

Defining perfect competition

Perfect competition is a model of the market based on the assumption that a large number of firms produce identical goods consumed by a large number of buyers. The model of perfect competition also assumes that it is easy for new firms to enter the market and for existing ones to leave. And finally, it assumes that buyers and sellers have complete information about market conditions.

Characteristics

- Many sellers and buyers
- Low barriers to entry
- No control over the price/price takers
- Standard/homogeneous products

As we examine these assumptions in greater detail, we will see that they allow us to work with the model more easily. No market fully meets the conditions set out in these assumptions. As is always the case with models, our purpose is to understand the way things work, not to describe them.

Image 6.3: Track

Assumptions of the model

The assumptions of the model of perfect competition, taken together, imply that individual buyers and sellers in a perfectly competitive market accept the market price as given. No one buyer or seller has any influence over that price. Individuals or firms who must take the market price as given are called price takers. A consumer or firm that takes the market price as given has no ability to influence that price. A price-taking firm or consumer is like an individual who is buying or selling stocks. He

or she looks up the market price and buys or sells at that price. The price is determined by demand and supply in the market—not by individual buyers or sellers. In a perfectly competitive market, each firm and each consumer is a price taker. A price-taking consumer assumes that he or she can purchase any quantity at the market price—without affecting that price.

Similarly, a price-taking firm assumes it can sell whatever quantity it wishes at the market price without affecting the price. You are a price taker when you go into a store. You observe the prices listed and make a choice to buy or not. Your choice will not affect that price. Should you sell a textbook back to your campus bookstore at the end of a course, you are a price-taking seller. You are confronted by a market price and you decide whether to sell or not. Your decision will not affect that price.

Identical goods

In a perfectly competitive market for a good or service, one unit of the good or service cannot be differentiated from any other on any basis. A bushel of, say, hard winter wheat is an example. A bushel produced by one farmer is identical to that produced by another. There are no brand preferences or consumer loyalties.

The assumption that goods are identical is necessary if firms are to be price takers. If one farmer's wheat were perceived as having special properties that distinguished it from other wheat, then that farmer would have some power over its price. Economists sometimes say that the goods or services in a perfectly competitive market are homogeneous, meaning that they are all alike. There are no brand differences in a perfectly competitive market.

Large number of buyers & sellers

How many buyers and sellers are in our market? The answer rests on our presumption of price-taking behavior. There are so many buyers and sellers that none of them has any influence on the market price regardless of how much any of them purchases or sells. A firm in a perfectly competitive market can react to prices but cannot affect the prices it pays for the factors of production or the prices it receives for its output.

Ease of entry & exit

The assumption that it is easy for other firms to enter a perfectly competitive market implies an even greater degree of competition. Firms in a market must deal not only with the large number of competing firms but also with the possibility that still more firms might enter the market.

Later in this chapter, we will see how ease of entry is related to the sustainability of economic profits. If entry is easy, then the promise of high economic profits will quickly attract new firms. If entry is difficult, it will not.

The model of perfect competition assumes easy exit as well as easy entry. The assumption of easy exit strengthens the assumption of easy entry. Suppose a firm is considering entering a particular market.

Entry may be easy, but suppose that getting out is difficult. For example, suppliers of factors of production to firms in the industry might be happy to accommodate new firms but might require that they sign long term contracts. Such contracts could make leaving the market difficult and costly. If that were the case, a firm might be hesitant to enter in the first place. Easy exit helps make entry easier.

Complete information

We assume that all sellers have complete information about prices, technology, and all other knowledge relevant to the operation of the market. No one seller has any information about production methods that is not available to all other sellers. If one seller had an advantage over other sellers, perhaps special information about a lower-cost production method, then that seller could exert some control over market price—the seller would no longer be a price taker.

The assumptions of the perfectly competitive model ensure that each buyer or seller is a price taker. The market, not individual consumers or firms, determines price in the model of perfect competition. No individual has enough power in a perfectly competitive market to have any impact on that price.

Perfect competition & the real world

The assumptions of identical products, a large number of buyers, easy entry and exit, and perfect information are strong assumptions. The notion that firms must sit back and let the market determine price seems to fly in the face of what we know about most real firms, which is that firms customarily do set prices. Yet this is the basis for the model of demand and supply, the power of which you have already seen.

When we use the model of demand and supply, we assume that market forces determine prices. In this model, buyers and sellers respond to the market price. They are price takers. The assumptions of the model of perfect competition underlie the assumption of price-taking behavior. Thus, we are using the model of perfect competition whenever we apply the model of demand and supply.

We can understand most markets by applying the model of demand and supply. Even though those markets do not fulfill all the assumptions of the model of perfect competition, the model allows us to understand some key features of these markets.

Changes within your lifetime have made many markets more competitive. Falling costs of transportation, together with dramatic advances in telecommunications, have opened the

possibility of entering markets to firms all over the world. A company in South Korea can compete in the market for steel in the United States. A furniture maker in New Mexico can compete in the market for furniture in Japan. A firm can enter the world market simply by creating a web page to advertise its products and to take orders.

The perfect competition model

The perfect competition model in the short run

Our goal in this section is to see how a firm in a perfectly competitive market determines its output level in the short run—a planning period in which at least one factor of production is fixed in quantity. We shall see that the firm can maximize economic profit by applying the marginal decision rule and increasing output up to the point at which the marginal benefit of an additional unit of output is just equal to the marginal cost. This fact has an important implication: Over a wide range of output, the firm's marginal cost curve is its supply curve.

This time, we will use the five simple steps illustrated in *Figure 6.2*:

Step 1: Find the point at which marginal revenue (*MR*) equals marginal cost (*MC*).

Remember that in a perfectly competitive market, *MR* equals price.

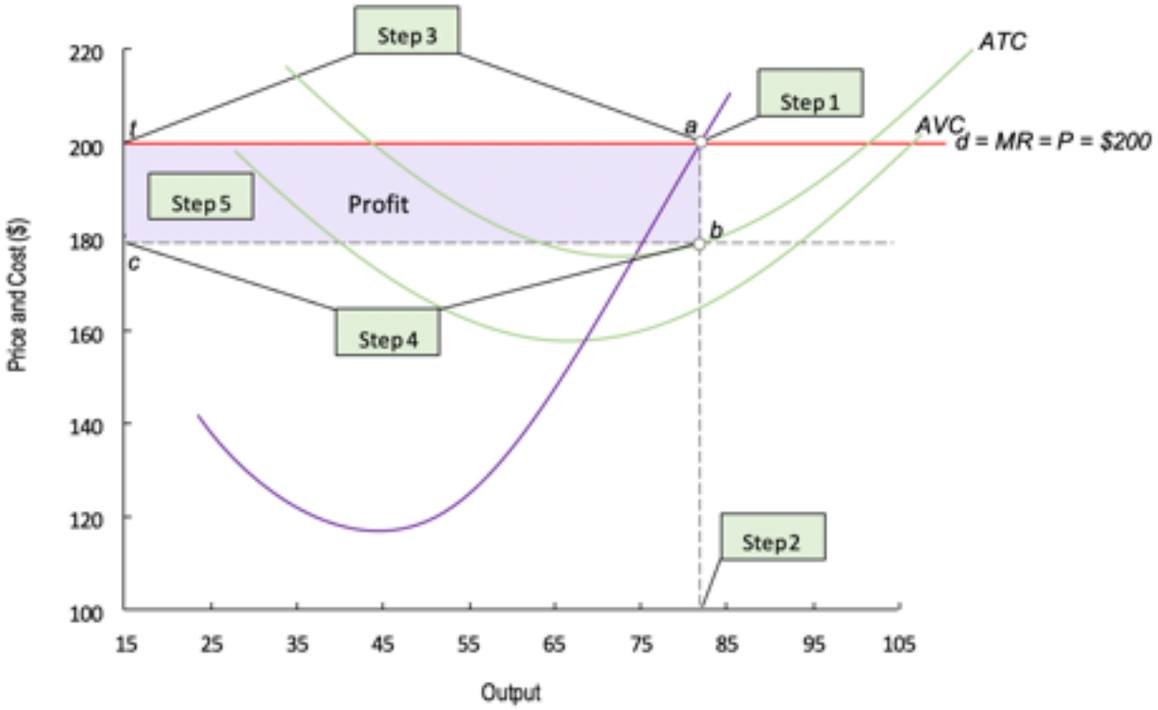


***Figure 6.2*:** Price and cost vs. output

Step 2: At the point at which *MR* = *MC*, find the corresponding point on the horizontal axis; this is the profit-maximizing output.

Step 3: At the profit-maximizing output, draw a line straight up to the demand curve (which is equal to *MR* in a perfectly competitive market) and then to the vertical axis. This is the profit-maximizing price.

Step 4: Again, using the profit-maximizing output, draw a line straight up to the average total cost curve, and then to the vertical axis. This is the average total cost per unit.

Step 5: Find the profit, which is the rectangle formed between the profit-maximizing price and average total cost on the vertical axis, and the profit-maximizing output on the horizontal axis.

Some of these steps might seem redundant. However, using this approach will help you to identify the profit-maximizing price, output, and profit in any type of market structure as we'll see in the next two chapters. It is therefore useful to remember these steps now when the diagrams are easier to follow.

The perfect competition model in the long run

Suppose there are two industries in the economy, and that firms in Industry A are earning economic profits. By definition, firms in Industry A are earning a return greater than the return available in Industry B. That means that firms in Industry B are earning less than they could in Industry A. Firms in Industry B are experiencing economic losses.

Given easy entry and exit, some firms in Industry B will leave it and enter Industry A to earn the greater profits available there. As they do so, the supply curve in Industry B will shift to the left, increasing prices and profits there. As former Industry B firms enter Industry A, the supply curve in Industry A will shift to the right, lowering profits in A. The process of firms leaving Industry B and entering A will continue until firms in both industries are earning zero economic profit. That suggests an important long-run result: Economic profits in a system of perfectly competitive markets will, in the long run, be driven to zero in all industries (Chiang, 2016).

Section 4

Monopoly

Start up: Surrounded by monopolies

If your college or university is like most, you spend a lot of time and money dealing with firms that face very little competition. Your campus bookstore is likely to be the only local firm selling the texts that professors require you to read. Your school may have granted an exclusive franchise to a single firm for food service and to another firm for vending machines. A single firm may provide your utilities—electricity, natural gas, and water.

Unlike the individual firms we have previously studied that operate in a competitive market, taking the price, which is determined by demand and supply, as given, in this chapter we investigate the behavior of firms that have their markets all to themselves. As the only suppliers of particular goods or services, they face the downward-sloping market demand curve alone.

We will find that firms that have their markets all to themselves behave in a manner that is in many respects quite different from the behavior of firms in perfect competition. Such firms continue to use the marginal decision rule in maximizing profits, but their freedom to select from the price and quantity combinations given by the market demand curve affects the way in which they apply this rule.

***Image 6.4*:** Monopoly

We will show that a monopoly firm is likely to produce less and charge more for what it produces than firms in a competitive industry. As a result, a monopoly solution is likely to be inefficient from society's perspective.

We will explore the policy alternatives available to government agencies in dealing with monopoly firms. First, though, we will look at characteristics of monopoly and at conditions that give rise to monopolies in the first place.

Defining monopoly

Monopoly is at the opposite end of the spectrum of market models from perfect competition. A monopoly firm has no rivals. It is the only firm in its industry.

There are no close substitutes for the good or service a monopoly produces. Not only does a monopoly firm have the market to itself, but it also need not worry about other firms entering. In the case of monopoly, entry by potential rivals is prohibitively difficult.

A monopoly does not take the market price as given; it determines its own price. It selects from its demand curve the price that corresponds to the quantity the firm has chosen to produce in order to earn the maximum profit possible. The entry of new firms, the long run in a competitive market, cannot occur in the monopoly model.

A firm that sets or picks price based on its output decision is called a price setter. A firm that acts as a price setter possesses monopoly power. We shall see in the next chapter that monopolies are not the only firms that have this power; however, the absence of rivals in monopoly gives it much more price-setting power.

As was the case we discussed with perfect competition in the previous section of this chapter, the assumptions of the monopoly model are rather strong. In assuming there is one firm in a market, we assume there are no other firms producing goods or services that could be considered part of the same market as that of the monopoly firm. In assuming blocked entry, we assume, for reasons we will discuss below, that no other firm can enter that market. Such conditions are rare in the real world. As always with models, we make the assumptions that define monopoly in order to simplify our analysis, not to describe the real world. The result is a model that gives us important insights into the nature of the choices of firms and their impact on the economy.

Characteristics

- One seller
- No close substitutes
- High barriers to entry
- High control over the price/price makers

Sources of monopoly power

Why are some markets dominated by single firms? What are the sources of monopoly power?

Economists have identified a number of conditions that, individually or in combination, can lead to domination of a market by a single firm and create barriers that prevent the entry of new firms.

Barriers to entry are characteristics of a particular market that block new firms from entering it. They include economies of scale, special advantages of location, high sunk costs, a dominant position in the ownership of some of the inputs required to produce the good, and government restrictions. These barriers may be interrelated, making entry that much more formidable. Although these barriers might allow one firm to gain and hold monopoly control over a market, there are often forces at work that can erode this control.

Economies of scale

Scale economies and diseconomies define the shape of a firm's long-run average cost (*LRAC*) curve as it increases its output. If long-run average cost declines as the level of production increases, a firm is said to experience economies of scale.

A firm that confronts economies of scale over the entire range of outputs demanded in its industry is a natural monopoly. Utilities that distribute electricity, water, and natural gas to some markets are examples. In a natural monopoly, the *LRAC* of any one firm intersects the market demand curve where long-run average costs are falling or are at a minimum. If this is the case, one firm in the industry will expand to exploit the economies of scale available to it. Because this firm will have lower unit costs than its rivals, it can drive them out of the market and gain monopoly control over the industry.

Suppose there are 12 firms, each operating at the scale shown by ATC_1 (average total cost) in *Figure 6.3* below. A firm that expanded its scale of operation to achieve an average total cost curve such as ATC_2 could produce 240 units of output at a lower cost than could the smaller firms producing 20 units each. By cutting its price below the minimum average total cost of the smaller plants, the larger firm could drive the smaller ones out of business. In this situation, the industry demand is not large enough to support more than one firm. If another firm attempted to enter the industry, the natural monopolist would always be able to undersell it.

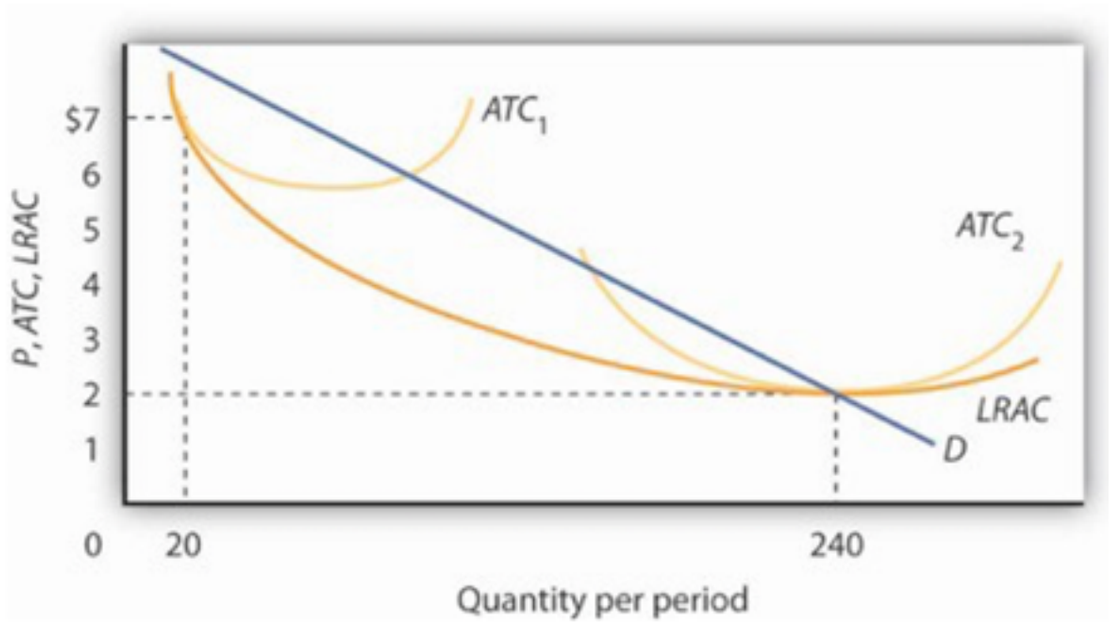


***Figure 6.3*:** Economies of scale lead to natural monopoly

A firm with falling *LRAC* throughout the range of outputs relevant to existing demand (*D*) will monopolize the industry. Here, one firm operating with a large plant (ATC_2) produces 240 units of output at a lower cost than the $7 cost per unit of the 12 firms operating at a smaller scale (ATC_1) and producing 20 units of output each.

Location

Sometimes monopoly power is the result of location. For example, sellers in markets isolated by distance from their nearest rivals have a degree of monopoly power. The local movie theater in a small town has a monopoly in showing first-run movies. Doctors, dentists, and mechanics in isolated towns may also be monopolists.

Sunk costs

The greater the cost of establishing a new business in an industry, the more difficult it is to enter that industry. That cost will, in turn, be greater if the outlays required to start a business are unlikely to be recovered if the business should fail.

Suppose, for example, that entry into a particular industry requires extensive advertising to make consumers aware of the new brand. Should the effort fail, there is no way to recover the expenditures for such advertising. An expenditure that has already been made and that cannot be recovered is called a sunk cost.

If a substantial fraction of a firm's initial outlays will be lost upon exit from the industry, exit will be costly.

Difficulty of exit can make for difficulty of entry. The more firms have to lose from an unsuccessful effort to penetrate a particular market, the less likely they are to try. The potential for high sunk costs could thus contribute to the monopoly power of an established firm by making entry by other firms more difficult.

Restricted ownership of raw materials & inputs

In very few cases the source of monopoly power is the ownership of strategic inputs. If a particular firm owns all of an input required for the production of a particular good or service, then it could emerge as the only producer of that good or service.

The Aluminum Company of America (ALCOA) gained monopoly power through its ownership of virtually all the bauxite mines in the world (bauxite is the source of aluminum). The International Nickel Company of Canada at one time owned virtually all the world's nickel.

De Beers acquired rights to nearly all the world's diamond production, giving it enormous power in the market for diamonds. With new diamond supplies in Canada, Australia, and Russia being developed and sold independently of DeBeers, however, this power has declined, and today DeBeers controls a substantially smaller percentage of the world's supply.

Government restrictions

Another important basis for monopoly power consists of special privileges granted to some business firms by government agencies. State and local governments have commonly assigned exclusive franchises—rights to conduct business in a specific market—to taxi and bus companies, to cable television companies, and to providers of telephone services, electricity, natural gas, and water, although the trend in recent years has been to encourage competition for many of these services.

Governments might also regulate entry into an industry or a profession through licensing and certification requirements.

Governments also provide patent protection to inventors of new products or production methods in order to encourage innovation; these patents may afford their holders a degree of monopoly power during the 17-year life of the patent.

Patents can take on extra importance when network effects are present. Network effects arise in situations where products become more useful the larger the number of users of the product.

For example, one advantage of using the windows computer operating system is that so many other people use it. That has advantages in terms of sharing files and other information (Saylor Academy, n.d).

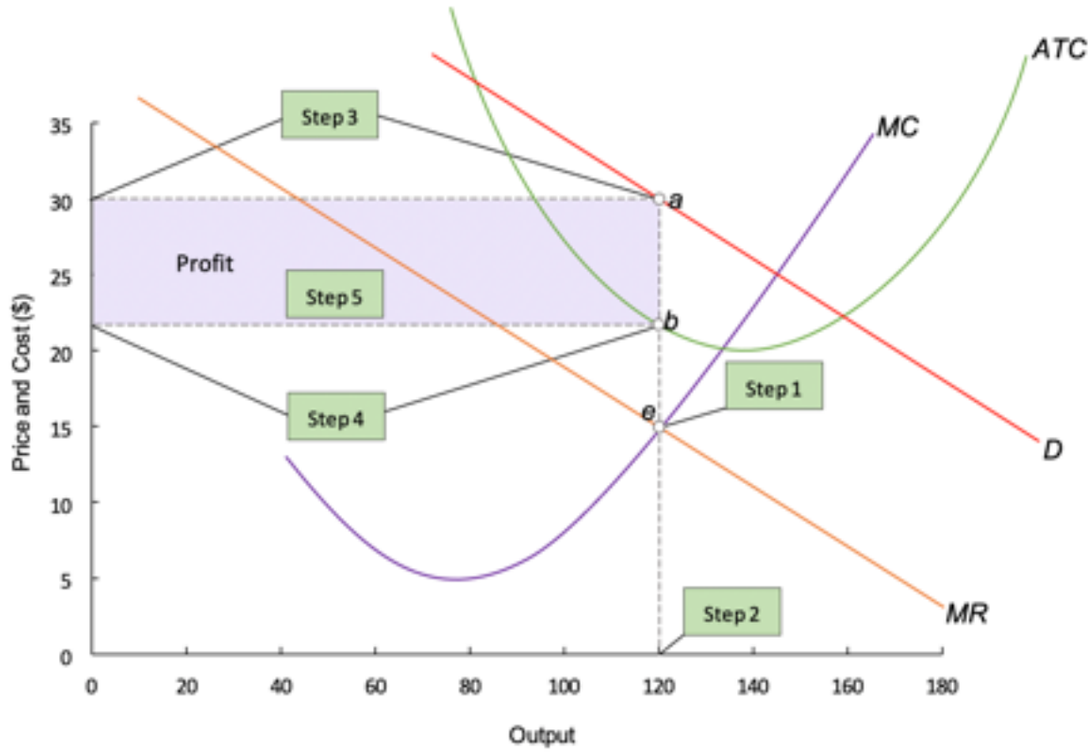


***Figure 6.4*:** Price and cost vs. output

The monopoly model

Five steps to maximize profit:

Step 1: Find the point at which *MR* = *MC*

Step 2: At that point, look down and determine the profit-maximizing output on the horizontal axis.

Step 3: At this output, extend a vertical line upward to the demand curve and follow it to the left to determine the equilibrium price on the vertical axis.

Step 4: Using the same vertical line, find the point on the *ATC* curve to determine the average total cost per unit on the vertical axis.

Step 5: Find total profit by asking *P - ATC* and multiply by output (Chiang, 2016).

Monopoly & the concentration of power

A monopoly firm determines its output by setting marginal cost equal to marginal revenue. It then charges the price at which it can sell that output, a price determined by the demand curve. That price exceeds marginal revenue; it therefore exceeds marginal cost as well. That contrasts with the case in perfect competition, in which price and marginal cost are equal. The higher price charged by a monopoly firm may allow it a profit—in large part at the expense of consumers, whose reduced options may give them little say in the matter. The monopoly solution thus raises problems of efficiency, equity, and the concentration of power.

The objections to monopoly run much deeper than worries over economic efficiency and high prices. Because it enjoys barriers that block potential rivals, a monopoly firm wields considerable market power. For many people, that concentration of power is objectionable. A decentralized, competitive market constantly tests the ability of firms to satisfy consumers, pushes them to find new products and new and better production methods, and whittles away economic profits. Firms that operate in the shelter of monopoly may be largely immune to such pressures. Consumers are likely to be left with fewer choices, higher costs, and lower quality.

Perhaps more important in the view of many economists is the fact that the existence of economic profits provides both an incentive and the means for monopolists to aggressively protect their position and extend it if possible. These economists point out that monopolists may be willing to spend their economic profits in attempts to influence political leaders and public authorities (including regulatory authorities) who can help them maintain or enhance their monopoly position. Graft and corruption may be the result, claim these critics. Indeed, Microsoft has been accused by its rivals of bullying computer manufacturers into installing its web browser, Internet Explorer, exclusively on their computers.

Attitudes about Microsoft reflect these concerns. Even among people who feel that its products are good and fairly priced, there is uneasiness about our seeming dependence on them. And once it has secured its dominant position, will it charge more for its products? Will it continue to innovate (Rittenberg & Tregarthen, 2017)?

Section 5

Monopolistic competition

Start up: eBay needs Google, Google needs eBay, and neither trusts the other

The Internet auction site eBay has had a close and cooperative relationship with Google, the giant search engine. eBay has relied heavily on Google to advertise its products. Google relies heavily on the advertising revenue it gets from eBay. The greater the success of eBay, the greater the revenue Google will have from eBay's advertising.

The greater the success of Google as a search engine, the greater will be the impact of eBay's advertising. To paraphrase Rick's line from Casablanca, "This could be a beautiful relationship." It is not. The two Internet giants simply do not get along. Consider what happened in 2007. A Google spokesman said the firm was hosting a "Freedom Party" to announce the inauguration of a new payment service that would compete directly with PayPal, the online payment service owned by eBay. eBay was quick to retaliate. It pulled all of its advertising from Google later on the same day Google made its announcement. Two days later, Google backed down. It canceled its party and the payment service the party was to kick off.

***Image 6.5*:** Telecommunications tower

In 2003, eBay commissioned an analysis of whether Google represented a threat to its operations. The study concluded that Google was unlikely to enter into e-commerce and was not a potential rival to eBay. That sanguine conclusion started to unravel in 2005.

Google began recruiting eBay engineers. In October, Google started testing Google Base, a free classified advertising service that threatened eBay's auction service.

Executives at eBay took the threat seriously. In private meetings, they divided into two teams. A green team represented eBay's interests; a red team tried to emulate Google's strategy. The red team concluded that Google represented a serious threat, and eBay executives began exploratory talks with Microsoft and Yahoo to see if some collaborative effort could ward off the Google threat.

eBay spokesman Chris Donlay describes the firm's dilemma of dealing with a firm that has been a valuable ally but at the same time could be a competitive threat: "Given how really fast the Internet changes, it comes as no surprise that the line between competition and cooperation is sometimes blurry." By the late spring of 2006, eBay's management was still in a quandary about what to do about Google. Some executives, fearful of losing the advantages of continuing to work with Google, wanted to maintain eBay's ties to the firm. Others worried that continuing a close relationship with Google was akin to putting the fox in the proverbial henhouse. They wanted to move quickly to establish a relationship with Yahoo or with Microsoft that would compete with Google.

The tension between eBay and Google hardly suggests the aloof world of perfect competition where consumers are indifferent about which firm has produced a particular product, where each firm knows it can sell all it wants at the going market price, where firms must settle for zero economic profit in the long run. Nor is it the world of monopoly, where a single firm maximizes its profits, believing that barriers to entry will keep out would-be competitors, at least for a while. This is the world of imperfect competition, one that lies between the idealized extremes of perfect competition and monopoly. It is a world in which firms battle over market shares, in which economic profits may persist, in which rivals try to outguess each other with pricing, advertising, and product-development strategies.

Unlike the chapters on perfect competition and monopoly, this chapter does not provide a single model to explain firms' behavior. There are too many variations on an uncertain theme for one model to explain the complexities of imperfect competition.

Rather, the chapter provides an overview of some of the many different models and explanations advanced by economists for the behavior of firms in the imperfectly competitive markets. The analytical tools you have acquired in the course of studying the models of competitive and monopoly markets will be very much in evidence in this discussion.

The spectrum of business enterprise ranges from perfectly competitive firms to monopoly. Between these extremes lies the business landscape in which the vast majority of firms—those in the world of imperfect competition—actually operate.Imperfect competition is a market structure with more than one firm in an industry in which at least one firm is a price setter. An imperfectly competitive firm has a degree of monopoly power, either based

on product differentiation that leads to a downward-sloping demand curve or resulting from the interaction of rival firms in an industry with only a few firms. There are two broad categories of imperfectly competitive markets. The first is one in which many firms compete, each offering a slightly different product. The second is one in which the industry is dominated by a few firms. Important features of both kinds of markets are advertising and price discrimination. Monopolistic competition market structure will be discussed in this section and oligopoly market structure in the next section.

Defining monopolistic competition

The first model of an imperfectly competitive industry that we shall investigate has conditions quite similar to those of perfect competition. The model of monopolistic competition assumes a large number of firms. It also assumes easy entry and exit. This model differs from the model of perfect competition in one key respect: it assumes that the goods and services produced by firms are differentiated. This differentiation may occur by virtue of advertising, convenience of location, product quality, reputation of the seller, or other factors. Product differentiation gives firms producing a particular product some degree of price-setting or monopoly power.

However, because of the availability of close substitutes, the price-setting power of monopolistically competitive firms is quite limited. Monopolistic competition is a model characterized by many firms producing similar but differentiated products in a market with easy entry and exit.

Restaurants are a monopolistically competitive sector; in most areas there are many firms, each is different, and entry and exit are very easy. Each restaurant has many close substitutes—these may include other restaurants, fast-food outlets, and the deli and frozen- food sections at local supermarkets. Other industries that engage in monopolistic competition include retail stores, barber and beauty shops, auto-repair shops, service stations, banks, and law and accounting firms.

Characteristics

- A large number of firms
- Product differentiation
- Low barriers to entry
- Modest control over the price/modest price makers

Suppose a restaurant raises its prices slightly above those of similar restaurants with which it competes. Will it continue to have any customers? Probably.

Because the restaurant is different from other restaurants, some people will continue to patronize it. Within limits, then, the restaurant can set its own prices; it does not take the market

prices as given. In fact, differentiated markets imply that the notion of a single “market price” is meaningless.

Because products in a monopolistically competitive industry are differentiated, firms face downward- sloping demand curves. Whenever a firm faces a downward-sloping demand curve, the graphical framework for monopoly can be used. In the short run, the model of monopolistic competition looks exactly like the model of monopoly. An important distinction between monopoly and monopolistic competition, however, emerges from the assumption of easy entry and exit. In monopolistic competition, entry will eliminate any economic profits in the long run. We begin with an analysis of the short run.

The monopolistic competition model

The monopolistic competition model in the short run

Because a monopolistically competitive firm faces a downward-sloping demand curve, its marginal revenue curve is a downward-sloping line that lies below the demand curve, as in the monopoly model. We can thus use the model of monopoly that we have already developed to analyze the choices of a monopoly the short run.

Figure 6.5 shows the demand, marginal revenue, marginal cost, and average total cost curves facing a monopolistically competitive firm, Mama’s Pizza. Mama’s competes with several other similar firms in a market in which entry and exit are relatively easy. Mama’s demand curve D_1 is downward-sloping; even if Mama’s raises its prices above those of its competitors, it will still have some customers. Given the downward-sloping demand curve, Mama’s marginal revenue curve MR_1 lies below demand.

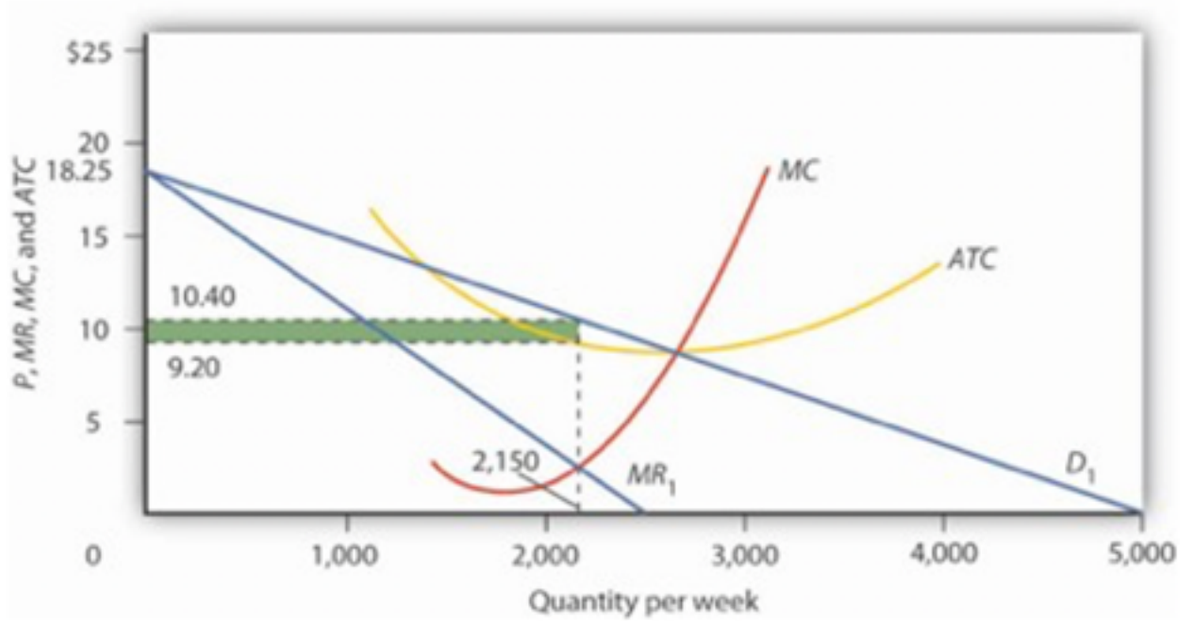


***Figure 6.5*:** Short-run equilibrium in monopolistic competition

To sell more pizzas, Mama’s must lower its price, and that means its marginal revenue from additional pizzas will be less than price.

Looking at the intersection of the marginal revenue curve MR_1 and the marginal cost curve *MC*, we see that the profit-maximizing quantity is 2,150 units per week. Reading up to the average total cost curve *ATC*, we see that the cost per unit equals $9.20. Price, given on the demand curve D_1. is $10.40, so the

profit per unit is $1.20. Total profit per week equals $1.20 times 2,150, or $2,580; it is shown by the shaded rectangle.

Given the marginal revenue curve *MR* and marginal cost curve *MC*, Mama's will maximize profits by selling 2,150 pizzas per week. Mama's demand curve tells us that it can sell that quantity at a price of $10.40.

Looking at the average total cost curve *ATC*, we see that the firm's cost per unit is $9.20. Its economic profit per unit is thus $1.20. Total economic profit, shown by the shaded rectangle, is $2,580 per week.

The monopolistic competition model in the long run

We see in *Figure 6.5* (on the previous page) that Mama's Pizza is earning an economic profit. If Mama's experience is typical, then other firms in the market are also earning returns that exceed what their owners could be earning in some related activity. Positive economic profits will encourage new firms to enter Mama's market.

As new firms enter, the availability of substitutes for Mama's pizzas will increase, which will reduce the demand facing Mama's Pizza and make the demand curve for Mama's Pizza more elastic. Its demand curve will shift to the left. Any shift in a demand curve shifts the marginal revenue curve as well. New firms will continue to enter, shifting the demand curves for existing firms to the left, until pizza firms such as Mama's no longer make an economic profit. The zero- profit solution occurs where Mama's demand curve is tangent to its average total cost curve—at point *A* in *Figure 6.6* to the right. Mama's price will fall to $10 per pizza and its output will fall to 2,000 pizzas per week. Mama's will just cover its opportunity costs, and thus earn zero economic profit. At any other price, the firm's cost per unit would be greater than the price at which a pizza could be sold, and the firm would sustain an economic loss. Thus, the firm and the industry are in long-run equilibrium. There is no incentive for firms to either enter or leave the industry.

The existence of economic profits in a monopolistically competitive industry will induce entry in the long run. As new firms enter, the demand curve D_1 and marginal revenue curve MR_1 facing a typical firm will shift to the left, to D_2 and MR_2.

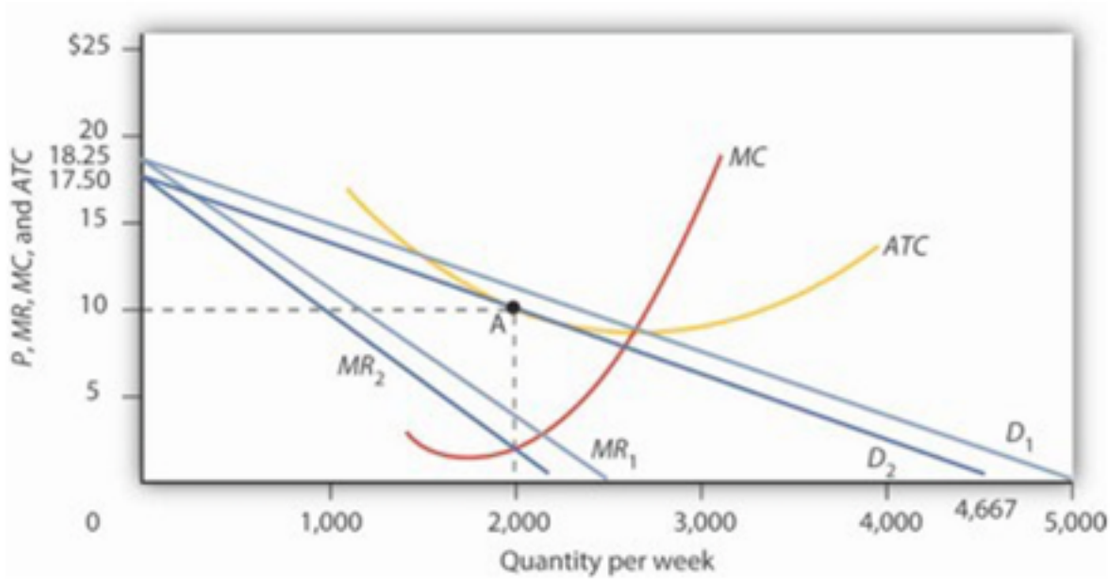


***Figure 6.6*:** Monopolistic competition in the long run

Eventually, this shift produces a profit-maximizing solution at zero economic profit, where D_2 is tangent to the average total cost curve *ATC* (point *A*). The long-run equilibrium solution here is an output of 2,000 units per week at a price of $10 per unit.

Had Mama's Pizza and other similar restaurants been incurring economic losses, the process of moving to long-run equilibrium would work in reverse. Some firms would exit. With fewer substitutes available, the demand curve faced by each remaining firm would shift to the right.

Price and output at each restaurant would rise. Exit would continue until the industry was in long-run equilibrium, with the typical firm earning zero economic profit.

Because entry and exit are easy, favorable economic conditions in the industry encourage start-ups. New firms hope that they can differentiate their products enough to make a go of it. Some will; others will not. Competitors to Mama's may try to improve the ambience, play different music, offer pizzas of different sizes and types. It might take a while for other restaurants to come up with just the right product to pull customers and profits away from Mama's. But as long as Mama's continues to earn economic profits, there will be incentives for other firms to try.

One can thus criticize a monopolistically competitive industry for falling short of the efficiency standards of perfect competition. But monopolistic competition is inefficient because of product differentiation. Think about a monopolistically competitive activity in your area. Would consumers be better off if all the firms in this industry produced identical products so that they could match the assumptions of perfect competition? If identical products were impossible, would consumers be better off if some of the firms were ordered to shut down on grounds the model predicts there will be "too many" firms? The inefficiency of monopolistic competition may be a small price to pay for a wide range of product choices. Furthermore, remember that perfect competition is merely a model. It is not a goal toward which an economy might strive as an alternative to monopolistic competition (Principles of Economics, 2011).

Section 6

Oligopoly

Defining oligopoly

Many purchases that individuals make at the retail level are produced in markets that are neither perfectly competitive, monopolies, nor monopolistically competitive. Rather, they are oligopolies. Oligopoly arises when a small number of large firms have all or most of the sales in an industry. Examples of oligopoly abound and include the auto industry, cable television, and commercial air travel. Oligopolistic firms are like cats in a bag. They can either scratch each other to pieces or cuddle up and get comfortable with one another. If oligopolists compete hard, they may end up acting very much like perfect competitors, driving down costs and leading to zero profits for all. If oligopolists collude with each other, they may effectively act like a monopoly and succeed in pushing up prices and earning consistently high levels of profit. We typically characterize oligopolies by mutual interdependence where various decisions such as output, price, and advertising depend on other firm(s)' decisions. Analyzing the choices of oligopolistic firms about pricing and quantity produced involves considering the pros and cons of competition versus collusion at a given point in time.

Characteristics

***Image 6.6*:** Handshake

- Few firms dominate an industry
- High barriers to entry
- Substantial market power/ control over price. However, oligopolies are characterized by mutual interdependence where various decisions such as output, price, and advertising depend on other firm(s)' decisions (Greenlaw & Shapiro, 2017).

Collusion vs. cartels

When oligopoly firms in a certain market decide what quantity to produce and what price to charge, they face a temptation to act as if they were a monopoly. By acting together, oligopolistic firms can hold down industry output, charge a higher price, and divide the profit among themselves. When firms act together in this way

to reduce output and keep prices high, it is called collusion. A group of firms that have a formal agreement to collude to produce the monopoly output and sell at the monopoly price is called a cartel.

Collusion versus cartels: How to differentiate

In the United States, as well as many other countries, it is illegal for firms to collude since collusion is anti-competitive behavior, which is a violation of antitrust law. Both the Antitrust Division of the Justice Department and the Federal Trade Commission have responsibilities for preventing collusion in the United States.

The problem of enforcement is finding hard evidence of collusion. Cartels are formal agreements to collude. Because cartel agreements provide evidence of collusion, they are rare in the United States. Instead, most collusion is tacit, where firms implicitly reach an understanding that competition is bad for profits.

Economists have understood for a long time the desire of businesses to avoid competing so that they can instead raise the prices that they charge and earn higher profits. Adam Smith wrote in *Wealth of Nations* in 1776: "People of the same trade seldom meet together, even for merriment and diversion, but the conversation ends in a conspiracy against the public, or in some contrivance to raise prices."

Even when oligopolists recognize that they would benefit as a group by acting like a monopoly, each individual oligopoly faces a private temptation to produce just a slightly higher quantity and earn slightly higher profit—while still counting on the other oligopolists to hold down their production and keep prices high. If at least some oligopolists give in to this temptation and start producing more, then the market price will fall. A small handful of oligopoly firms may end up competing so fiercely that they all find themselves earning zero economic profits—as if they were perfect competitors (Principles of Economics, 2011).

Game theory

Oligopoly presents a problem in which decision makers must select strategies by taking into account the responses of their rivals, which they cannot know for sure in advance. The Start up feature at the beginning of the last section suggested the uncertainty eBay faces as it considers the possibility of competition from Google.

A choice based on the recognition that the actions of others will affect the outcome of the choice and that takes these possible actions into account is called a strategic choice. Game theory is an analytical approach through which strategic choices can be assessed.

Among the strategic choices available to an oligopoly firm are pricing choices, marketing strategies, and product-development efforts. An airline's decision to raise or lower its fares—or to leave them unchanged—is a strategic choice. The other airlines' decision to match or ignore their rival's price decision is also a strategic choice (Greenlaw & Shapiro, 2017).

The prisoners' dilemma

The prisoner's dilemma is a scenario in which the gains from cooperation are larger than the rewards from pursuing self-interest. It applies well to oligopoly. The story behind the prisoner's dilemma goes like this:

Two co-conspiratorial criminals are arrested. When they are taken to the police station, they refuse to say anything and are put in separate interrogation rooms. Eventually, a police officer enters the room where Prisoner A is being held and says: "You know what? Your partner in the other room is confessing. Your partner is going to get a light prison sentence of just one year, and because you're remaining silent, the judge is going to stick you with eight years in prison. Why don't you get smart? If you confess, too, we'll cut your jail time down to five years, and your partner will get five years, also." Over in the next room, another police officer is giving exactly the same speech to Prisoner B. What the police officers do not say is that if both prisoners remain silent, the evidence against them is not especially strong, and the prisoners will end up with only two years in jail each.

The game theory situation facing the two prisoners is in *Table 6.1*. To understand the dilemma, first consider the choices from Prisoner A's point of view. If A believes that B will confess, then A should confess, too, so as to not get stuck with the eight years in prison. However, if A believes that B will not confess, then A will be tempted to act selfishly and confess, so as to serve only one year. The key point is that A has an incentive to confess regardless of what choice B makes! B faces the same set of choices, and thus will have an incentive to confess regardless of what choice A makes. To confess is called the dominant strategy. It is the strategy an individual (or firm) will pursue regardless of the other individual's (or firm's) decision. The result is that if prisoners pursue their own self-interest, both are likely to confess, and end up doing a total of 10 years of jail time between them.

***Table 6.1*: Game theory & the prisoners' dilemma**

	Prisoner B	
Prisoner A	Remain silent (cooperate with other prisoner)	Confess (do not cooperate with other prisoner)
Remain silent (cooperate with other prisoner)	A gets two years, B gets two years	A gets 8 years, B gets 1 year
Confess (do not cooperate with other prisoner)	A gets 1 year, B gets 8 years	A gets 5 years, B gets 5 years

The game is called a dilemma because if the two prisoners had cooperated by both remaining silent, they would only have had to serve a total of four years of jail time between them. If the two prisoners can work out some way of cooperating so that neither one will confess, they will both be better off than if they each follow their own individual self-interest, which in this case leads straight into longer jail terms (Principles of Economics, 2011).

Key takeaways

Perfect competition

- The central characteristic of the model of perfect competition is the fact that price is determined by the interaction of demand and supply buyers and sellers are price takers.
- The model assumes: a large number of firms producing identical homogeneous goods or services, a large number of buyers and sellers, easy entry and exit in the industry, and complete information about price in the market.

Monopoly

- An industry with a single firm, in which entry is blocked, is called a monopoly.
- A firm that sets or picks price depending on its output decision is called a price maker. A price maker possesses monopoly power.
- A monopoly firm produces an output that is less than the efficient level. The result is a deadweight loss to society, given by the area between the demand and marginal cost curves over the range of output between the output chosen by the monopoly firm and the efficient output.
- A firm that achieves economies of scale over the entire range of output demanded in an industry is a natural monopoly.

Monopolistic competition

- A monopolistically competitive industry features some of the same characteristics as perfect competition: a large number of firms and easy entry and exit.
- The characteristic that distinguishes monopolistic competition from perfect competition is differentiated products; each firm is a price setter and thus faces a downward-sloping demand curve.

Oligopoly

- The key characteristics of oligopoly are a recognition that the actions of one firm will produce a response from rivals and that these responses will affect it. Each firm is uncertain what its rivals' responses might be.
- One way to avoid the uncertainty firms face in oligopoly is through collusion. Collusion may be overt, as in the case of a cartel, or tacit, as in the case of price leadership.
- Game theory is a tool that can be used to understand strategic choices by firms.

Part III: Macroeconomics

Defining macroeconomics

Macroeconomics is a branch of economics that studies how an overall economy—the market or other systems that operate on a large scale—behaves.
Macroeconomics studies economy-wide phenomena such as inflation, price levels, rate of economic growth, national income, gross domestic product (GDP), and changes in unemployment.

Macroeconomics attempts to measure how well an economy is performing, to understand what forces drive it, and to project how performance can improve.
Macroeconomics deals with the performance, structure, and behavior of the entire economy, in contrast to microeconomics, which is more focused on the choices made by individual actors in the economy (like people, households, industries, etc.).
Macroeconomics focuses on the economy as a whole (or on whole economies as they interact).

Chapter 7

Economic Indicators & Business Cycles

After reading this chapter, students should be able to do the following:

- Define gross domestic product (GDP) and its four major spending components.
- Distinguish between GDP and gross national product (GNP).
- Define three different types of unemployment.
- Demonstrate the redistributive effects and macroeconomic effect of inflation.
- Identify the phases of a business cycle.

In this chapter:

Section 1

Start up: The lock up

It is early morning when a half-dozen senior officials enter the room at the Commerce Department in Washington. Once inside, they will have no communication with the outside world until they have completed their work later that day. They will have no telephone, no computer links. They will be able to slip out to an adjoining restroom, but only in pairs. It is no wonder the room is called “the lockup.”

The lockup produces one of the most important indicators of economic activity we have: the official estimate of the value of the economy’s total output, known as its gross domestic product (GDP).

When the team has finished its computations, the results will be placed in a sealed envelope. A government messenger will hand carry the envelope to the Executive Office Building and deliver it to a senior adviser to the President of the United States. The adviser will examine its contents, then carry it across the street to the White House and give it to the President. The senior officials who meet in secret to compute GDP are not spies; they are economists. The adviser who delivers the estimate to the President is the Chairman of the Council of Economic Advisers.

The elaborate precautions for secrecy do not end there. At 7:30 the next morning, journalists from all over the world will gather in an electronically sealed auditorium at the Commerce Department. There they will be given the GDP figure and related economic indicators, along with an explanation. The reporters will have an hour to prepare their reports, but they will not be able to communicate with anyone else until an official throws the switch at 8:30 am. At that instant their computers will connect to their news services, and they will be able to file their reports. These will be major stories on the Internet and in the next editions of the nation’s newspapers; the estimate of the previous quarter’s GDP will be one of the lead items on television and radio news broadcasts that day.

The clandestine preparations for the release of quarterly GDP figures reflect the importance of this indicator. The estimate of GDP provides the best available reading of macroeconomic performance. It will affect government policy, and it will influence millions of decisions in the private sector. Prior knowledge of the GDP estimate could be used to anticipate the response in the stock and bond markets, so great care is taken that only a

handful of trusted officials have access to the information until it is officially released. The GDP estimate took on huge significance in the fall of 2008 as the United States and much of the rest of the world went through the wrenching experience of the worst financial crisis since the Great Depression of the 1930s. The expectation that the financial crisis would lead to an economic collapse was widespread, and the quarterly announcements of GDP figures were more anxiously awaited than ever.

The primary measure of the ups and downs of economic activity —the business cycle—is real GDP. When an economy's output is rising, the economy creates more jobs, more income, and more opportunities for people. In the long run, an economy's output and income, relative to its population, determine the material standard of living of its people.

Clearly, GDP is an important indicator of macroeconomic performance. It is the topic we will consider in this chapter. We will learn that GDP can be measured either in terms of the total value of output produced or as the total value of income generated in producing that output. We will begin with an examination of measures of GDP in terms of output.

Our initial focus will be on nominal GDP: the value of total output measured in current prices. We will turn to real GDP—a measure of output that has been adjusted for price level changes—later in the chapter. We will refer to nominal GDP simply as GDP. When we discuss the real value of the measure, we will call it real GDP (Saylor Academy, n.d).

Section 2

Gross domestic product (GDP)

Macroeconomics is an empirical subject, so the first step toward understanding it is to measure the economy.

How large is the U.S. economy? Economists typically measure the size of a nation's overall economy by its gross domestic product (GDP), which is the value of all final goods and services produced within a country in a given year. Measuring GDP involves counting the production of millions of different goods and services—smart phones, cars, music downloads, computers, steel, bananas, college educations, and all other new goods and services that a country produced in the current year—and summing them into a total dollar value. This task is straightforward: take the quantity of everything produced, multiply it by the price at which each product sold, and add up the total. In 2020, the U.S. GDP totaled $20.93 trillion, the largest GDP in the world.

Each of the market transactions that enter into GDP must involve both a buyer and a seller. We can measure an economy's GDP either by the total dollar value of what consumers purchase in the economy, or by the total dollar value of what is the country produces. There is even a third way, as we will explain later.

There are three ways of measuring GDP. These are those approaches:

Image 7.1: Growth arrows

1. Expenditure method: Spending by consumers (*C*) + spending by businesses (*I*) + spending by government (*G*) + net spending by foreign sector (*NX*). This is the most used approach to estimate the GDP.
2. Production method: Measure the value added summed across all firms (value added = sale price less cost of raw materials)
3. Income method: labor income (wages/salary) + materials + capital income (rent, interest, dividends, profits) + government income (taxes) (Lumen Learning, n.d.).

Components of GDP

Even if there are three different, approaches to measure the GDP the expenditure method is the most widely used for estimating GDP.

Spending in an economy takes many forms. At any moment, the Lopez family may be having lunch at Burger King; Ford may be building a car factory; the U.S. Navy may be procuring a submarine; and British Airways may be buying an airplane from Boeing. GDP includes all of these various forms of spending on domestically produced goods and services.

To understand how the economy is using its scarce resources, economists study the composition of GDP among various types of spending. To do this, GDP (which we denote as *Y*) is divided into four components: consumption (*C*), investment (*I*), government purchases (*G*) , and net exports (*NX*):

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

This equation is an identity—an equation that must be true because of how the variables in the equation are defined. In this case, because each dollar of expenditure included in GDP is placed into one of the four components of GDP, the total of the four components must be equal to GDP.

Let's look at each of these four components more closely.

Consumption

Consumption is spending by households on goods and services, with the exception of purchases of new housing. Goods include durable goods, such as automobiles and appliances, and nondurable goods, such as food and clothing. Services include such intangible items as haircuts and medical care. Household spending on education is also included in consumption of services (although one might argue that it would fit better in the next component).

Investments

Investment is the purchase of goods (called capital goods) that will be used in the future to produce more goods and services. Investment is the sum of purchases of business capital, residential capital, and inventories. Business capital includes business structures (such as a factory or office building), equipment (such as a worker's computer), and intellectual property products (such as the software that runs the computer). Residential capital includes the landlord's apartment building and a homeowner's personal residence. By convention, the purchase of a new house is the one type of household spending categorized as investment rather than consumption.

As mentioned earlier, the treatment of inventory accumulation is noteworthy. When Apple produces a computer and adds it to its inventory instead of selling it, Apple is assumed to have

"purchased" the computer for itself. That is, the national income accountants treat the computer as part of Apple's investment spending. (When Apple later sells the computer out of inventory, the sale will subtract from Apple's inventory investment, offsetting the positive expenditure of the buyer.) Inventories are treated this way because GDP aims to measure the value of the economy's production, and goods added to inventory are part of that period's production.

Note that GDP accounting uses the word investment differently from how you might hear the term in everyday conversation. When you hear the word investment, you might think of financial investments, such as stocks, bonds, and mutual funds—topics that we study later in this book. By contrast, because GDP measures expenditure on goods and services, here the word investment means purchases of goods (such as business capital, residential structures, and inventories) that will be used to produce other goods and services in the future.

Government purchases

Government purchases measure spending on goods and services by local, state, and federal governments. This component includes the salaries of government workers as well as expenditures on public works. Recently, the U.S. national income accounts have switched to the longer label government consumption expenditure and gross investment, but here we will use the traditional and shorter term government purchases.

The meaning of government purchases requires some clarification. When the government pays the salary of an Army general or a schoolteacher, that salary is included in government purchases. But when the government pays a Social Security benefit to an elderly person or an unemployment insurance benefit to a recently laid off worker, the story is very different: These are called transfer payments because they are not made in exchange for a currently produced good or service. Transfer payments alter household income, but they do not reflect the economy's production. (From a macroeconomic standpoint, transfer payments are like negative taxes.) Because GDP is intended to measure income from, and expenditure on, the production of goods and services, transfer payments are not counted as government purchases.

Net exports

Net exports equal the foreign purchases of domestically produced goods (exports) minus the domestic purchases of foreign goods (imports). A domestic firm's sale to a buyer in another country, such as Boeing's sale of an airplane to British Airways, increases net exports.

The net in net exports refers to the fact that imports are subtracted from exports. This subtraction is made because other components of GDP include imports of goods and services. For example, suppose that a household buys a $50,000 car from Volvo, the Swedish carmaker. This transaction increases

consumption by $50,000 because car purchases are part of consumer spending. It also reduces net exports by $50,000 because the car is an import. In other words, net exports include goods and services produced abroad (with a minus sign) because these goods and services are included in consumption, investment, and government purchases (with a plus sign). Thus, when a domestic household, firm, or government buys a good or service from abroad, the purchase does not affect GDP because it reduces net exports by the same amount that it raises consumption, investment, or government purchases (Mankiw, 2021).

GNP: an alternative measure of output

While GDP represents the most commonly used measure of an economy's output, economists sometimes use an alternative measure. Gross national product (GNP) is the total value of final goods and services produced during a particular period with factors of production owned by the residents of a particular country.

The difference between GDP and GNP is a subtle one. The GDP of a country equals the value of final output produced within the borders of that country; the GNP of a country equals the value of final output produced using factors owned by residents of the country. Most production in a country employs factors of production owned by residents of that country, so the two measures overlap. Differences between the two measures emerge when production in one country employs factors of production owned by residents of other countries.

Suppose, for example, that a resident of Bellingham, Washington, owns and operates a watch repair shop across the Canadian-U.S. border in Victoria, British Columbia. The value of watch repair services produced at the shop would be counted as part of Canada's GDP because they are produced in Canada. That value would not, however, be part of U.S. GDP.

But, because the watch repair services were produced using capital and labor provided by a resident of the United States, they would be counted as part of GNP in the United States and not as part of GNP in Canada.

Because most production fits in both a country's GDP as well as its GNP, there is seldom much difference between the two measures. The relationship between GDP and GNP is given by the following equation:

GDP + net income received from abroad by residents of a nation = GNP

In the third quarter of 2010, for example, GDP equaled $14,750.2 billion. We add income receipts earned by residents of the United States from the rest of the world of $706.0 billion and then subtract income payments that went from the United States to the rest of the world of $516.1 billion to get GNP of $14,940.0

billion for the third quarter of 2010. GNP is often used in international comparisons of income; we shall examine those later in this chapter.

GDP and economic well-being

GDP is the measure most often used to assess the economic well-being of a country. Besides measuring the pulse of a country, it is the figure used to compare living standards in different countries.

Real GDP vs. nominal GDP

When examining economic statistics, there is a crucial distinction worth emphasizing. The distinction is between nominal and real measurements, which refer to whether or not inflation has distorted a given statistic. Looking at economic statistics without considering inflation is like looking through a pair of binoculars and trying to guess how close something is: unless you know how strong the lenses are, you cannot guess the distance very accurately.

Similarly, if you do not know the inflation rate, it is difficult to figure out if a rise in GDP is due mainly to a rise in the overall level of prices or to a rise in quantities of goods produced. The nominal value of any economic statistic means that we measure the statistic in terms of actual prices that exist at the time. The real value refers to the same statistic after it has been adjusted for inflation. Generally, it is the real value that is more important (Lumen Learning. n.d).

Real GDP: a macroeconomic statistic that measures the value of the goods and services produced by an economy in a specific period, adjusted for inflation.

Nominal GDP: gross domestic product (GDP) evaluated at current market prices (Investopedia, n.d.).

Of course, to use GDP as an indicator of overall economic performance, we must convert nominal GDP to real GDP, since nominal values can rise or fall simply as a result of changes in the price level. For example, the movie *Titanic*, released in 1997, brought in $601 million—the highest amount ever in gross box office receipts, while *Gone with the Wind*, released in 1939, earned only $199 million and ranks 49th in terms of nominal receipts. But does that mean that *Titanic* actually did better than *Gone with the Wind*?

After all, the average price of a movie ticket in 1939 was 25 cents. At the time of Titanic, the average ticket price was about $5.

A better way to compare these two movies in terms of popularity is to control for the price of movie tickets— the same strategy that economists use with real GDP in order to determine whether output is rising or falling. Adjusting the nominal box office receipts using 1998 movie prices to obtain real revenue reveals that in real terms *Gone with the Wind* continues to be the top real grosser of

all time with real box office receipts of about $1.3 billion. As illustrated by this example on revenues from popular movies, we might draw erroneous conclusions about performance if we base them on nominal values instead of on real values. In contrast, real GDP, despite the problems with price indexes that were explained in another chapter, provides a reasonable measure of the total output of an economy, and changes in real GDP provide an indication of the direction of movement in total output.

Real GDP is the nominal GDP adjusted for changes in prices. The equation is the formula used to calculate Real GDP:

Real GDP in current year = nominal GDP in current year/(1 + % change in the average price from a base year to the current year)

Table 7.1: Change in real GDP from 2011 to 2012		
	2011 (in billions)	**2012 (in billions)**
Nominal GDP	$13,800	$14,800
Real GDP	$13,800	$14,095.20
Change in real GDP	N/A	$295.20

Example: Suppose prices have increased by 1.5% from 2011 to 2012.

There are some drawbacks to using real GDP as a measure of the economic welfare of a country. Despite these shortcomings, we will see that it probably remains our best single indicator of macroeconomic performance.

Measurement problems in real GDP

There are two measurement problems, other than those associated with adjusting for price level changes, in using real GDP to assess domestic economic performance.

Revisions

The first estimate of real GDP for a calendar quarter is called the advance estimate. It is issued about a month after the quarter ends. To produce a measure so quickly, officials at the U.S. Department of Commerce must rely on information from relatively few firms and households. One month later, it issues a revised estimate, and a month after that it issues its final estimate. Often the advance estimate of GDP and the final estimate do not correspond. The recession of 2001, for example, began in March of that year. But the first estimates of real GDP for the second and third quarters of 2001 showed output continuing to rise. It was not until later revisions that it became clear that a recession had been under way.

But the revision story does not end there. Every summer, the Commerce Department issues revised figures for the previous

two or three years. Once every five years, the department conducts an extensive analysis that traces flows of inputs and outputs throughout the economy. It focuses on the outputs of some firms that are inputs to other firms. In the process of conducting this analysis, the department revises real GDP estimates for the previous five years. Sometimes the revisions can paint a picture of economic activity that is quite different from the one given even by the revised estimates of GDP. For example, revisions of the data for the 1990– 1991 recession issued several years later showed that the recession had been much more serious than had previously been apparent, and the recovery was more pronounced.

The service sector

Another problem lies in estimating production in the service sector. The output of goods in an economy is relatively easy to compute. There are so many bushels of corn, so many pounds of beef. But what is the output of a bank? Of a hospital? It is easy to record the dollar value of output to enter in nominal GDP, but estimating the quantity of output to use in real GDP is quite another matter. In some cases, the Department of Commerce estimates service sector output based on the quantity of labor used.

For example, if this technique were used in the banking industry and banking used 10% more labor, the department would report that production has risen 10%. If the number of employees remains unchanged, reported output remains unchanged. In effect, this approach assumes that output per worker—productivity—in those sectors remains constant when studies have indicated that productivity has increased greatly in the service sector. Since 1990, progress has been made in measurement in this area, which allows in particular for better estimation of productivity changes and price indexes for different service sector industries, but more remains to be done in this large sector of the U.S. economy.

Conceptual problems with real GDP

A second set of limitations of real GDP stems from problems inherent in the indicator itself. Real GDP measures market activity. Goods and services that are produced and exchanged in a market are counted; goods and services that are produced but that are not exchanged in markets are not.

GDP does not measure:

- Non-market activity (home production, leisure, black market activity)
- Environmental quality/natural resource depletion
- Life expectancy and health
- Income distribution
- Crime/safety

Section 3

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 utilized. Failure to fully utilize 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 labor.

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 labor rather than on capital and natural resources.

Measuring unemployment

The U.S. Bureau of Labor Statistics defines a person as unemployed if he or she is not working but is looking for and available for work. The labor force is the total number of people working or unemployed. In other words, the labor force is the fraction of total population who want to and legally can work, and either have a job or are looking for a job.

The unemployment rate is the percentage of the labor force that is unemployed.

***Image 7.2*:** Hired/fired

To estimate the unemployment rate, government surveyors fan out across the country each month to visit roughly 60,000 households. At each of these randomly selected households, the surveyor asks about the employment status of each adult (everyone age 16 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 labor force. *Figure 7.1* 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 labor force—the sum of the number of people not working but available and looking for work plus the number of people working. In November 2010, the unemployment rate was 9.8%.

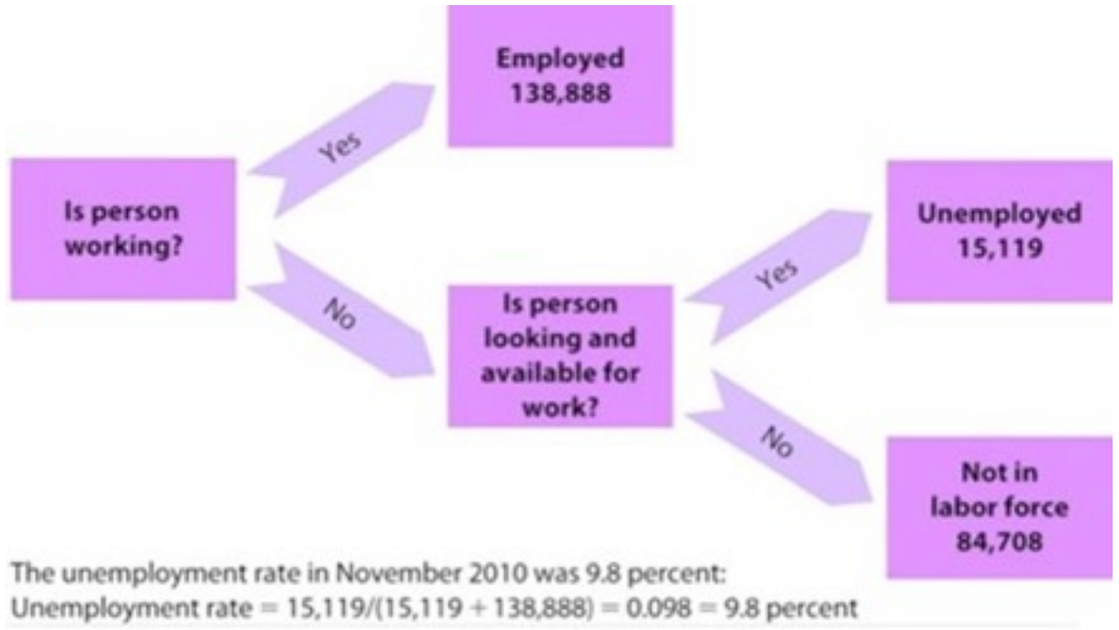


***Figure 7.1*:** Computing the Unemployment Rate

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 labor 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. Values are for November 2010. All numbers are in thousands.

The following formula is used to measure the unemployment rate:

Unemployment rate = number of unemployed people/labor force x 100

There are several difficulties with the survey. 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.

The rate of unemployment in the United States is obtained from a telephone survey of households in which the proportion of the labor force actively seeking and unable to find employment is determined. (In other countries, statistics are based on those registered with the unemployment office; thus international comparison may be inaccurate).

Unemployment rates may be distorted by underemployment (part- time work), discouraged workers, and underground economy.

Discouraged workers

The presence of discouraged workers causes the official rate of unemployment to be understating the real extent of unemployment. This is an especially serious problem during recessions because a larger number of discouraged workers will be leaving the labor force.

Natural rate of employment

The natural rate of unemployment corresponds to the combination of frictional and structural unemployment which cannot be avoided even in a very high level of economic activity. This natural rate of unemployment has historically been around 4%, but it has risen slightly in recent years because of changes in labor force which now includes more women and young people (who take often more time to find jobs) (Saylor Academy, n.d).

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.

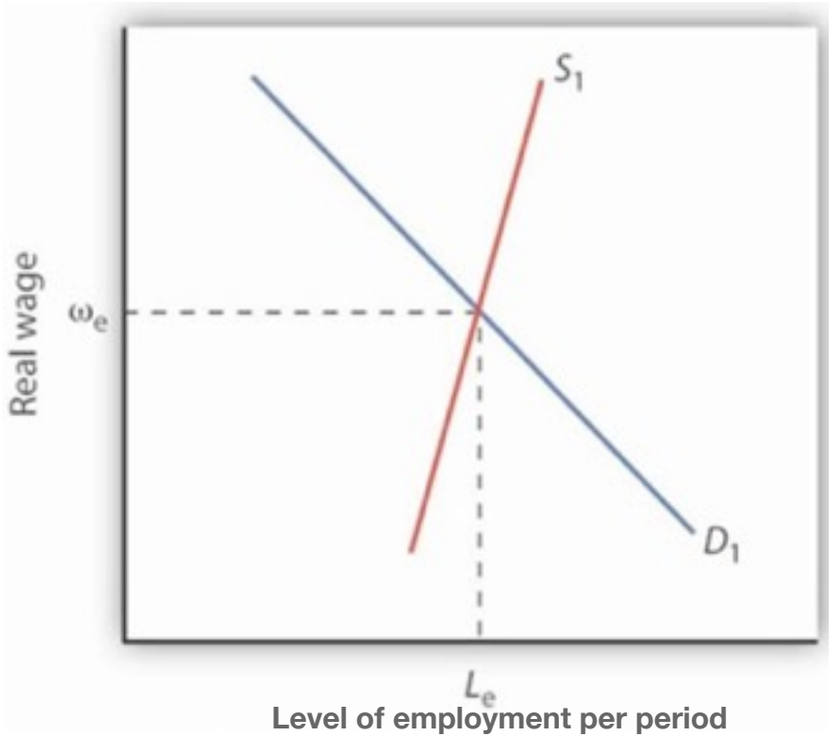


***Figure 7.2*:** Natural level of employment

The employment level at which the quantity of labor 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.

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.

Frictional unemployment

Even when the quantity of labor demanded equals the quantity of labor 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 labor 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.

The government may attempt to reduce frictional unemployment by focusing on its source: information costs. Many state agencies, for example, serve as clearinghouses for job market information. They encourage firms seeking workers and workers seeking jobs to register with them. To the extent that such efforts make labor-market information more readily available, they reduce frictional unemployment.

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 lack 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 labor-market information, helping to inform unemployed workers of where jobs can be found.

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 at 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 7.3 on the following page 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 labor 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 7.3*, the part of unemployment that is cyclical unemployment grows.

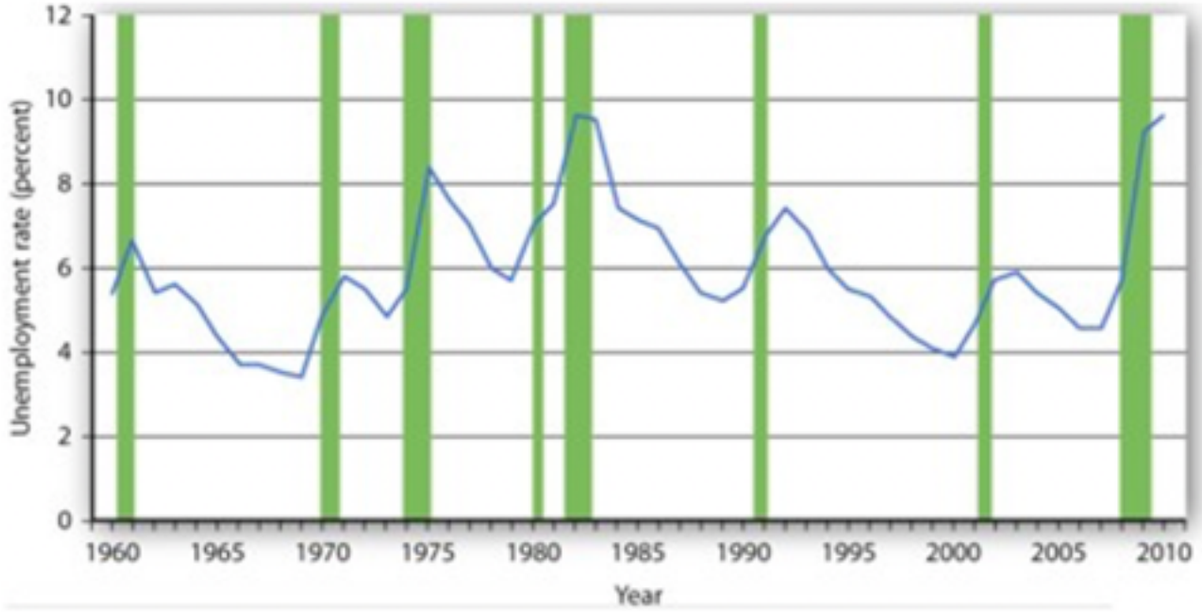


***Figure 7.3*:** Unemployment rate from 1960-2010

Figure 7.3 shows the unemployment rate for each year from 1960 to 2010. Recessions are shown as the green shaded areas.

This adjustment gives a more accurate estimate of the unemployment rate (Lumen Learning, n.d.).

Seasonal unemployment

As its name suggests, seasonal unemployment results from regular changes in the season. Workers affected by seasonal unemployment include resort workers, ski instructors, and ice cream vendors. It could also include people who harvest crops. Construction workers are laid off in the winter in most parts of the country. School employees can also be considered seasonal workers.

The BLS does not measure seasonal unemployment. Instead, it adjusts its unemployment estimates to rule out seasonal factors.7

Section 4

Inflation

Inflation is a rise in the average level of prices. Inflation is measured by comparison between the average price in current period to the average price in a base period. A rise in the average price is called inflation. A decline in the average price is called deflation.

Main effects of inflation

Redistributive effects of inflation

Inflation has a redistributive effect; it affects people differently. Some lose because of inflation while some gain to different degrees. The effect of inflation (if it is not anticipated) is to redistribute wealth and income from savers and those on fixed income to debtors and those on variable income.

This happens because the purchasing power of a fixed money amount decreases, and because borrowers repay lenders their debt in cheaper dollars.

A borrower who pays an interest rate lower than the inflation rate, is in fact paying back less in purchasing power to the lender than what he had borrowed. The borrower gains and the lender loses as long as the interest rate is not adjusted for the rate of inflation.

***Image 7.3*:** Inflation

Decrease in purchasing power

Real income is nominal income adjusted for the rate of inflation: real interest is equal to nominal interest less rate of inflation.

What income can really buy in terms of the quantity of goods and services, also known as purchasing power, is real income. If prices increase while income is unchanged, fewer and fewer goods can be purchased.

Wealth effects

The values of assets change differently in inflationary times causing different effects on the owners.

Causes of inflation

Inflation is a widespread pattern of price increases. The rate of inflation is equal to the rate of change in a price index such as the Consumer Price Index (CPI). Historically, inflation has been considered serious when it has approached or exceeded 10% per year.

Going to the store and finding higher prices is inflation. Some countries are accustomed to very high rates of inflation: in excess of 100%, which means that prices would double within one year.

Demand-pull inflation

One of the possible explanations of inflation is that it is caused by excessive demand on the part of consumers while firms are unable to expand output beyond their productive capacity. This is referred to as demand-pull inflation.

During the late 1960s, the United States experienced a period of high economic activity brought about by overall economic growth and the Vietnam war. Producers could not increase their production, while customers were eager to buy more with their higher income. The result was a period of demand-pull inflation.

Cost-push inflation

A common cause of increases in prices are increases in costs. For instance, demands by unions for higher wages have been labeled as wage- push inflation. At other times, increases in commodity prices are attributable for inflation, to instance, in the case of the oil crisis of the 1970s.

The oil crisis of 1979-1980 caused oil prices to jump drastically in the early 1980s. The increased energy costs were passed on to consumers in the form of higher prices. In great part, that inflationary period was of cost-push inflation nature.

Hyperinflation & deflation

Hyperinflation

Hyperinflation is the most severe and destructive form of inflation. When money decreases in value so fast that it ceases to be a medium of exchange, the economy returns to barter and the economic activity may come to a halt. Such danger may be present even in a moderate inflation because inflation expectations may produce spirals of cost-push and demand-pull inflation, leading to hyperinflation. However, some countries manage with very high inflation.

The classical example of hyperinflation is that of Germany during the 1920s. It is reported that money was losing so much of its value that the weight of money paper needed to buy products exceeded the weight of products that could be bought. It is no wonder that people preferred to avoid using money in their transactions when they could (Petroff, 2002).

Deflation

Deflation is a widespread pattern of price decreases. Historically, deflation is less common than inflation, but it is also more feared because the loss of revenues of a large number of firms may result in widespread bankruptcies and decrease in economic activity (as happened, for instance, during the great depression of the 1930s). Periods of deflation have been rather rare in most countries of the world. During the great depression of the 1930s, prices did go down. The consequences were quite devastating: Many companies went out of business for lack of revenues.

Measuring Inflation

The U.S. Bureau of Labor Statistics (BLS) measures the inflation rate by the following three approaches:

Consumer Price Index

Inflation is commonly measured with the Consumer Price Index (CPI). The Bureau of Labor statistics constructs a basket of 300 goods and services that consumers buy. The CPI reports the percentage change in average price of the consumer basket. CPI measures the rate of increase in the average price of the consumer basket that is an estimation of the inflation rate.

The cost of the consumer basket also reflects the relative importance of a product by computing the weighted average cost of the basket. CPI measures the inflation rate by using this formula:

[(Average price of consumer basket in current period - average price of consumer basket in base period)/(average price of consumer basket in base period)] x 100

Producer Price Indexes

Producer Price Indexes (PPI) measure the change in the average prices received by producers. PPI include the following:

1. Raw materials index
2. Intermediate products
3. Finished products

The above product price indexes respectively measure the change in the average price of raw materials, intermediate products, and finished products from a base period to a current period. The PPIs are used as a forecasting tool for expected changes in CPI.

GDP Deflator Index

The GDP Deflator Index measures the change in the average price of consumer goods and services, price of capital goods and services between two periods.

The GDP deflator index is used in calculating the Real Gross Domestic product.

Note: A balanced policy approach to the unemployment and inflation rate has resulted in a 3% inflation rate and 4%-6% unemployment rate objectives for the macro-policies (Lumen Learning, n.d).

Section 5

Business cycles

Definition of business cycles

Market economy is not stable and suffers from periods of expansion and contraction. Business cycles are recurring periods of recession (slow down) and expansion (prosperity). They must be distinguished from seasonal variations (lack of sales of coats in the summer) and long- run secular trends (especially related to population, e.g., baby boom). Depression is a severe recession. The phases of a business cycle are peak, contraction, recession, trough, recovery, and expansion.

The existence of a business cycle can be best observed in the number of people who are laid off and have a difficult time to find a job. During peak periods of economic activity, this is less likely to happen, but in a period of recession, this is very common.

Phases of Business Cycles

Figure 7.4 on the following page shows a stylized picture of a typical business cycle. It shows that economies go through periods of increasing and decreasing real GDP, but that over time they generally move in the direction of increasing levels of real GDP. A sustained period in which real GDP is rising is an expansion; a sustained period in which real GDP is falling is a recession.

***Image 7.4*:** Cycle

Typically, an economy is said to be in a recession when real GDP drops for two consecutive quarters, but in the United States, the responsibility of defining precisely when the economy is in recession is left to the Business Cycle Dating Committee of the National Bureau of Economic Research (NBER). The Committee defines a recession as a “significant decline in economic activity spread across the economy, lasting more than a few months, normally visible in real GDP, real income, employment, industrial production, and wholesale-retail sales.”

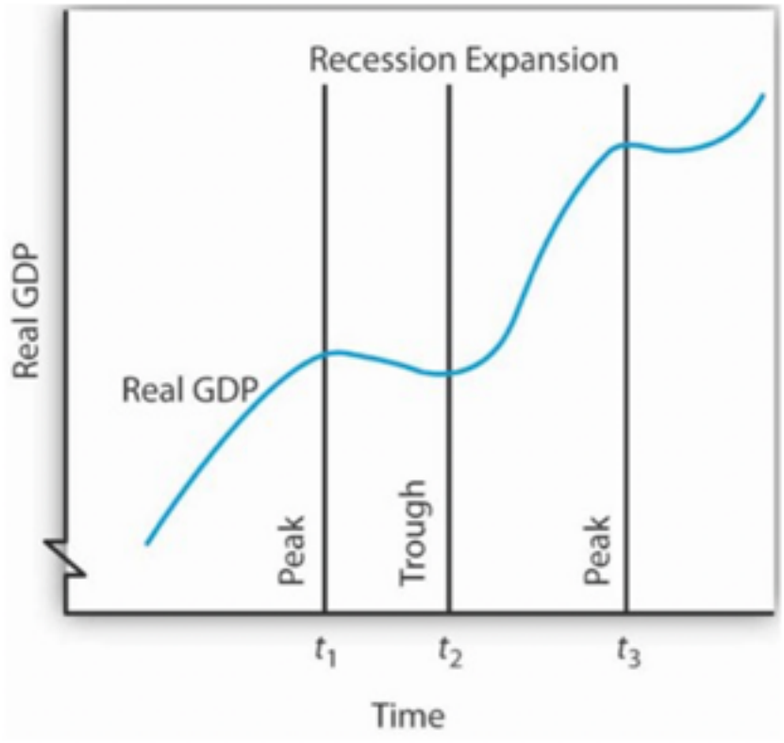


***Figure 7.4*:** Phases of the business cycle

The business cycle is a series of expansions and contractions in real GDP. The cycle begins at a peak and continues through a recession, a trough, and an expansion. A new cycle begins at the next peak. Here, the first peak occurs at time t_1, the trough at time t_2, and the next peak at time t_3. Notice that there is a tendency for real GDP to rise over time.

At time t_1 in *Figure 7.4*, an expansion ends and real GDP turns downward. The point at which an expansion ends and a recession begins is called the peak of the business cycle. Real GDP then falls during a period of recession. Eventually it starts upward again (at time t_2). The point at which a recession ends and an expansion begins is called the trough of the business cycle. The expansion continues until another peak is reached at time t_3. A complete business cycle is defined by the passage from one peak to the next during a period of recession. Eventually it starts upward again (at time t_2). The point at which a recession ends and an expansion begins is called the trough of the business cycle. The expansion continues until another peak is reached at time t_3. A complete business cycle is defined by the passage from one peak to the next.

Interestingly, real GDP fell in the fourth quarter of 2007, grew in the first and second quarters of 2008, and shrank in the third quarter of 2008, so clearly the committee was not using the two consecutive quarters of declining GDP rule of thumb. Rather, it was taking into account the behavior of a variety of other variables, such as employment and personal income.

Business cycles & real GDP growth in the United States

Figure 7.5 on the following page shows movements in real GDP in the United States from 1960 to 2010. Over those years, the economy experienced eight recessions (including the current one), shown by the shaded areas in the chart.

Although periods of expansion have been more prolonged than periods of recession, we see the cycle of economic activity that characterizes economic life.

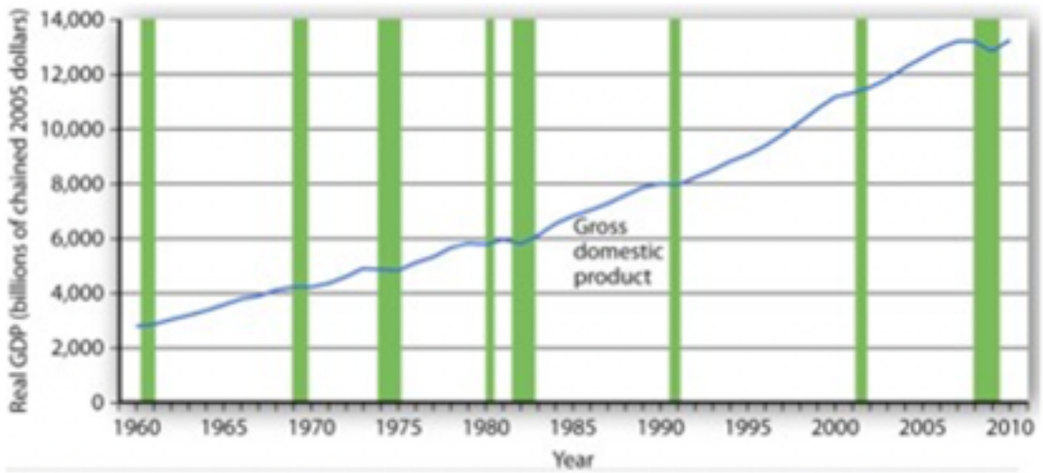


***Figure 7.5*:** Expansions and recessions from 1960–2010

The chart shows movements in real GDP since 1960. Recessions —periods of falling real GDP—are shown as green shaded areas. On average, the annual rate of growth of real GDP over the period was 3.2% per year (Bureau of Economic Analysis, 2005).

Real GDP clearly grew between 1960 and 2010. While the economy experienced expansions and recessions, its general trend during the period was one of rising real GDP. The average annual rate of growth of real GDP was about 3.2%.

During the post-World War II period, the average expansion has lasted 58 months, and the average recession has lasted about 11 months. The 2001 recession, which lasted eight months, was thus slightly shorter than the average. The 2007-2009 recession lasted 18 months; it was the longest of the post-World War II period.

Economists have sought for centuries to explain the forces at work in a business cycle. Not only are the currents that move the economy up or down intellectually fascinating but also an understanding of them is of tremendous practical importance. A business cycle is not just a movement along a curve in a textbook. It is new jobs for people, or the loss of them. It is new income, or the loss of it. It is the funds to build new schools or to provide better health care—or the lack of funds to do all those things. The story of the business cycle is the story of progress and plenty, of failure and sacrifice. During the 2010 recession, the job outlook for college graduates deteriorated.

According to a National Association of Colleges and Employers study, 20% of college graduates seeking jobs had one waiting after graduation in 2009. In 2010, that percent rose to 24% but the average salary had slipped 1.7% from the previous year. The unemployment rate for college graduates under age 25 rose from 3.7% in April 2007 to 8% in April 2010.

The unemployment rate for high school graduates who never enrolled in college went from 11.4% to 24.5% over the same two-year period.

The effects of recessions extend beyond the purely economic realm and influence the social fabric of society as well. Suicide rates and property crimes— burglary, larceny, and motor vehicle theft tend to rise during recessions.

In our study of macroeconomics, we will gain an understanding of the forces at work in the business cycle. We will also explore policies through which the public sector might act to make recessions less severe and, perhaps, to prolong expansions. We turn next to an examination of price-level changes and unemployment (Investopedia, 2021).

Key takeaways

GDP

- Real gross domestic product (real GDP) is a measure of the value of all final goods and services produced during a particular year or period, adjusted to eliminate the effects of price changes.
- The economy follows a path of expansion, then contraction, then expansion again. These fluctuations make up the business cycle.
- The point at which an expansion becomes a recession is called the peak of a business cycle; the point at which a recession becomes an expansion is called the trough.
- Over time, the general trend for most economies is one of rising real GDP. On average, real GDP in the United States has grown at a rate of over 3% per year since 1960 (The Princeton Review, 2020).
- GDP is the sum of final goods and services produced for consumption (C), private investment (I), government purchases (G), and net exports (X_n). Thus GDP = $C + I + G + X_n$.

Unemployment

- 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 labor force that is unemployed.
- When the labor 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 (Mankiw, 2021).

Inflation

- Inflation is a rise in the average level of prices.
- Hyperinflation is the most severe and destructive form of inflation.
- Deflation is a widespread pattern of price decreases. Deflation is less common than inflation, but it is also more feared because the loss of revenues of a large number of firms may

result in widespread bankruptcies and decrease in economic activity.

- Depending on its severity, inflation may have a mild simulative effect (called forced saving) or a serious recessionary effect (especially in hyperinflation) (Lumen Learning, n.d).

Business cycles

- The economy follows a path of expansion, then contraction, then expansion again. These fluctuations make up the business cycle.

- The point at which an expansion becomes a recession is called the peak of a business cycle; the point at which a recession becomes an expansion is called the trough (Greenlaw & Shapiro, 2017).

Chapter 8

Fiscal & Monetary Policy

After reading this chapter, students should be able to do the following:

- Identify the necessary policies when recession or inflation are present, and the limitations of each.
- Detail non-discretionary fiscal policies.
- Illustrate money creation and money supply.
- Discuss various monetary policy tools.
- Analyze the impacts of money supply on the economy.

In this chapter:

- Section 1: Start up: Clamping down on money growth
- Section 2: Fiscal policy
- Section 3: Monetary policy

Section 1

Start up: Clamping down on money growth

For nearly three decades, Americans have come to expect very low inflation, on the order of 2% to 3% a year. How did this expectation come to be? Was it always so? Absolutely not.

In July 1979, with inflation approaching 14% and interest rates on three-month Treasury bills soaring past 10%, a desperate President Jimmy Carter took action. He appointed Paul Volcker, the president of the New York Federal Reserve Bank, as chairman of the Fed's Board of Governors. Mr. Volcker made clear that his objective as chairman was to bring down the inflation rate—no matter what the consequences for the economy. Mr. Carter gave this effort his full support.

Mr. Volcker wasted no time in putting his policies to work. He slowed the rate of money growth immediately. The economy's response was swift; the United States slipped into a brief recession in 1980, followed by a crushing recession in 1981–1982. In terms of the goal of reducing inflation, Mr. Volcker's monetary policies were a dazzling success. Inflation plunged below a 4% rate within three years; by 1986 the inflation rate had fallen to 1.1%. The tall, bald, cigar-smoking Mr. Volcker emerged as a folk hero in the fight against inflation. Indeed he has returned 20 years later as part of President Obama's economic team to perhaps once again rescue the U.S. economy.

The Fed's seven-year fight against inflation from 1979 to 1986 made the job for Alan Greenspan, Mr. Volcker's successor, that much easier. To see how the decisions of the Federal Reserve affect key macroeconomic variables—real GDP, the price level, and unemployment—in this chapter we will explore how financial markets, markets in which funds accumulated by one group are made available to another group, are linked to the economy.

This chapter provides the building blocks for understanding financial markets. Beginning with an overview of bond and foreign exchange markets, we will examine how they are related to the level of real GDP and the price level. The second section completes the model of the money market. We have learned that the Fed can change the amount of reserves in the banking system, and that when it does the money supply changes. Here we explain money demand—the quantity of money people and firms want to hold—which, together with money supply, leads to an equilibrium rate of interest (Saylor Academy, n.d).

Section 2

Fiscal policy

Fiscal policy is the use of government spending and taxation to influence the economy. Governments typically use fiscal policy to promote strong and sustainable growth and reduce poverty. The role and objectives of fiscal policy gained prominence during recent global economic crisis, when governments stepped in to support financial systems, jump-start growth, and mitigate the impact of the crisis on vulnerable groups.

Historically, the prominence of fiscal policy as a policy tool has waxed and waned. Before 1930, an approach of limited government, or laissez-faire, prevailed. With the stock market crash and the Great Depression, policymakers pushed for governments to play a more proactive role in the economy. More recently, countries had scaled back the size and function of government—with markets taking on an enhanced role in the allocation of goods and services—but when the global financial crisis threatened worldwide recession, many countries returned to a more active fiscal policy (IMF, 2020).

Main fiscal policy tools

Government spending increase

***Image 8.1*:** Taxes

Government spending is an additional component of aggregate expenditure. The benefit of the multiplier effect can be derived as a one time increase in government spending to deal with a recession. Such was the case of the New Deal under Roosevelt. In the leakage-injection analysis, government spending is an injection and contributes to move the economy to a higher level of equilibrium.

Tax increase

A tax increase reduces income, and thus, aggregate expenditure. If the tax increase is assumed to be a lump sum tax, the

aggregate expenditure will move downward in a parallel fashion. A tax increase may be warranted in the case of excessive demand causing inflation. In the leakage-injection analysis, the tax increase is a leakage and is added to saving.

In 1981, the tax changes voted by Congress were given the name of Economic Recovery Tax Act. This clearly shows that the government uses taxes as a method of controlling the economy. Along with spending, tax changes are what fiscal policy is.

The Tennessee Valley Authority created in the 1930's was a combination of numerous major projects with thousands of new jobs. This new source of income, and thus aggregate expenditure, was a significant impetus for taking the economy out of the Great Depression. In the late 1960's, a tax surcharge was enacted in the United States. Its purpose was to decrease the amount going to aggregate expenditure, i.e., create a negative multiplier effect, because the economy was experiencing increasing inflation.

Transfer payments

A transfer payment is a one-way payment to a person or organization which has given or exchanged no goods or services for it. This contrasts with a simple "payment," which in economics refers to a transfer of money in exchange for a product or service.

Generally, the phrase "transfer payment" is used to describe government payments to individuals through social programs such as welfare, student grants, and even Social Security. However, government payments to corporations—including unconditional bailouts and subsidies—are not commonly described as transfer payments.

The government has programs in place in many different areas that are meant to support a specific national goal. The funding for these programs comes from taxes (some programs have their own tax revenue, like Social Security, funded through the FICA tax, while others come from the general fund.) Recipients qualify for the program and this receive income from the government. For instance, when you reach a certain age, you receive Social Security income, or if you lose your job you receive unemployment benefits to supplement the income you lost when you lost your job. When these transfers change, national income changes, and therefore consumer spending will change (Saylor Academy, n.d).

Expansionary fiscal policy

An expansionary Fiscal policy meant to deal with a recession. It involves the federal government increasing government spending (*G*), increasing transfer payments, or decreasing income tax rates (*T*). It used to reduce unemployment.

Increase in government spending: Congress and the president pass a law agreeing to spend more federal dollars to build bridges, roads, and other public works (often referred to as

infrastructure) and / or buying military equipment, textbooks, computers, etc. When the government spends money, all of the spending impacts the economy just as in an increase in spending by consumers and business firms—it is the G of GDP = *C* + *I* +*G*. This government spending becomes income for the business firms and forces business firms to increase their spending (a change in private investment spending), to meet the increase in demand for products from the government, which in turn increases aggregate demand again:

How it works: increase in *G* = increase in demand = increase in GDP = decrease in unemployment

Increase in transfer payments: Congress and the president pass a law agreeing to spend more federal dollars to provide medical services (health insurance), retirement benefits (Social Security), and/or money to those who cannot provide for themselves (welfare/unemployment insurance benefits). First, this will alter income, of which a portion will be saved, then spent, which increases the consumer spending portion of aggregate demand:

How it works: increase in transfer payments = increase in income = increase in consumer spending = increase in GDP = decrease in unemployment

Decrease in income taxes: Congress and the president pass a law agreeing to reduce the amount of income taken from workers and business firms' income. For example, reducing each income tax bracket by 2% or simply mailing rebate checks on taxes already paid. First, this will alter income, of which consumer spending portion of aggregate demand:

How it works: decrease in tax rates = increase in income = increase in consumer spending = increase in GDP = decrease in unemployment

Contractionary fiscal policy

A contractionary policy meant to deal with high inflation. Involves the federal government decreasing government spending (*G*), decreasing transfer payments, or increasing income tax rates (*T*). It used to reduce high inflation (to moderate/acceptable levels).

Decrease in government spending: Congress and the president pass a law agreeing to reduce the spending of federal dollars on building bridges, roads, and other public works (often referred to as infrastructure) and/or military equipment, textbooks, computers, etc. When the government reduces spending, all of the decrease in expenditures impacts the economy just as in a decrease in spending by consumers and business firms: It is the *G* of GDP = *C* + *I* + *G*. This decrease in government spending results in a decline in income for business firms and forces

business firms to decrease their spending (a change in private investment spending), to meet the decrease in demand for products from the government, which in turn decreases aggregate demand again:

How it works: decrease in *G* = decrease in demand = decrease in GDP = decrease in inflation

Decrease in transfer payments: Congress and the president pass a law agreeing to spend less federal dollars to provide medical services (health insurance), retirement benefits (Social Security), and/or money to those who cannot provide for themselves (welfare/unemployment insurance benefits). First, this will alter income, of which a portion will be saved, then spent, which increases the consumer spending portion of aggregate demand:

How it works: decrease in transfer payments = decrease in income = decrease in consumer spending = decrease in GDP = decrease in inflation

Increase in income taxes: Congress and the president pass a law agreeing to increase the amount of income taken from workers and business firms' income. For example, increasing each income tax bracket by 2%. First, this will reduce income, which will cause aggregate demand to decline (West Senior High School, n.d.):

How it works: increase in income taxes = decrease in income = decrease in consumer spending = decrease in GDP = decrease in inflation

Section 3

Monetary policy

Monetary policy refers to the actions of central banks to achieve macroeconomic policy objectives such as price stability, full employment, and stable economic growth.

The U.S. Congress established maximum employment and price stability as the macroeconomic objectives for the Federal Reserve; they are sometimes referred to as the Federal Reserve's dual mandate. Apart from these overarching objectives, the Congress determined that operational conduct of monetary policy should be free from political influence. As a result, the Federal Reserve is an independent agency of the federal government.

The Federal Reserve uses a variety of policy tools to foster its statutory objectives of maximum employment and price stability. Its main policy tools is the target for the federal funds rate (the rate that banks charge each other for short-term loans), a key short-term interest rate. The Federal Reserve's control over the federal funds rate gives it the ability to influence the general level of short-term market interest rates. By adjusting the level of short-term interest rates in response to changes in the economic outlook, the Federal Reserve can influence longer-term interest rates and key asset prices. These changes in financial conditions then affect the spending decisions of households and businesses.

***Image 8.1*:** Federal Reserve Bank of Chicago

The monetary policymaking body within the Federal Reserve System is the Federal Open Market Committee (FOMC). The FOMC currently has eight scheduled meetings per year, during which it reviews economic and financial developments and determines the appropriate stance of monetary policy. In reviewing the economic outlook, the FOMC considers how the current and projected paths for fiscal policy might affect key macroeconomic variables such as gross domestic product growth, employment, and inflation (Board of Governors of the Federal Reserve System, 2017).

Money creation

The purpose of this topic is to outline how banks create money and how this money creation is controlled by the Fed.

Banks

Banks exist to receive deposits from individuals and businesses, and to lend these funds. Banks derive their revenue from the interest they charge on loans (as well as from fees for other services). Deposits, withdrawals and payments by check do not change the money stock, but loans do. A portion of deposits are held in reserves.

Banks are private businesses, just as car manufacturers or retail stores. What they offer is a service. That service is making loans from the deposits they receive. For that service they receive an interest which is higher than the interest they have to pay for the deposits they receive from individuals. The difference provides them with profits and keeps them in business.

Money creation

Money is created when a bank makes a loan: the bank accepts a promissory note from the borrower (which is not money) and gives the borrower the ability to make payments in the form of demand deposits up to the amount of the loan. When a loan is repaid, debt is canceled. In normal circumstances, the volume of new loans exceeds repayment of loans, and thus, the money supply keeps increasing. However, a bank can only loan up to its available excess reserves.

If I withdraw $100 from my checking account, there are $100 more bank notes in circulation, but, there is $100 less check writing ability. Thus, the money stock total does not change. This is also true for a deposit and for a payment by check to another individual.

If I take out a car loan for $10,000 and pay the car dealer that amount (plus the down payment) for a new car I just bought, the transaction has created an additional $10,000 which is now going to be circulating. The bank has accepted my promise to repay in exchange for the loan. My promise to repay is not money but the $10,000 is (Petroff, 2002).

Main monetary policy tools

The term monetary policy refers to the actions undertaken by a central bank, such as the Federal Reserve, to influence the availability and cost of money and credit as a means of helping to promote national economic goals.

The Federal Reserve implements monetary policy using three major tools:

1. **Open market operations:** The buying and selling of U.S. Treasury and federal agency securities in the open market.
2. **Discount rate:** The rate of interest the central bank charges to private banks.
3. **Reserve requirements:** Requirements regarding the amount of funds that depository institutions must hold in reserve against deposits made by their customers.

Using these tools, the Federal Reserve influences the demand for and supply of balances that depository institutions hold on deposit at Federal Reserve Banks (the key component of reserves) and thus the federal funds rate—the interest rate charged by one depository institution on an overnight sale of balances at the Federal Reserve to another depository institution.

Changes in required reserve ratios affect reserves directly but are too authoritarian and not used often. Changes in the discount rate make bank borrowing from the Fed more or less difficult, but the volume of bank borrowing is very small.

It is normal to believe that control over the physical printing of bank notes is the essence of monetary policy, but that is not entirely correct. Since the monetary multiplier shows that banks have the ability to create most of the money, control over reserves which banks can lend is the real focus of monetary policy.

Changes in the federal funds rate trigger a chain of events that affect other short-term interest rates, foreign exchange rates, long-term interest rates, the amount of money and credit in the economy, and, ultimately, a range of economic variables, including employment, output, and the prices of goods and services (Saylor Academy, n.d).

Reserves requirements

Funds held by a bank in its vaults or in its account at the Fed are its reserves. A proportion of its deposits must be kept in reserves, and only the excess are the excess reserves which can be lent out. The portion of reserves which must be kept by the bank are referred to as required reserves.

Note: Reserves are never part of the money supply. They are called "high powered money" because they can permit the creation of a multiple of money stock.

The initial purpose of required reserves when they were instituted was to make sure that banks would have on hand sufficient funds which depositors may withdraw, or at least an adequate proportion. This is no longer true because the required reserves need not be kept on hand. Thus, the purpose of the required reserves is now mostly for monetary policy.

Required reserve ratio

The proportion between required reserves and deposits is the required reserve ratio is called the required reserve ratio. There are actually several different ratios according to the degree of permanency of the deposits. The ratios vary from less than 2% to over 15%. They are occasionally changed by the Fed according to economic needs.

The required reserve ratio on different types of deposits depends on how likely the funds will be withdrawn. For instance, the required reserve ratio on checking account deposits is about 12%. But the required reserve ratio on business certificates of deposit (with maturity of at least two years) is only about 3%.

Discount rate

The discount rate is the interest rate a Reserve Bank charges eligible financial institutions to borrow funds on a short-term basis —transactions known as borrowing at the "discount window." The discount rate is set by the Reserve Banks' boards of directors, subject to the Board of Governors' approval. The level of the discount rate is set above the federal funds rate target. As such, the discount window serves as a backup source of funding for depository institutions. The discount window can also become the primary source of funds under unusual circumstances. An example is when normal functioning of financial markets, including borrowing in the federal funds market, is disrupted. In such a case, the Fed serves as the lender of last resort, one of the classic functions of a central bank (Federal Reserve Bank of San Francisco, 2021).

What is compound interest?

With compound interest, you're not just earning interest on your principal balance. Even your interest earns interest. Compound interest is when you add the earned interest back into your principal balance, which then earns you even more interest, compounding your returns.

Let's say you have $1,000 in a savings account that earns 5% in annual interest. In year one, you'd earn $50, giving you a new balance of $1,050.

In year two, you would earn 5% on the larger balance of $1,050, which is $52.50—giving you a new balance of $1,102.50 at the end of year two.

Thanks to the magic of compound interest, the growth of your savings account balance would accelerate over time as you earn interest on increasingly larger balances. If you left $1,000 in this hypothetical savings account for 30 years, kept earning a 5% annual interest rate the whole time, and never added another penny to the account, you'd end up with a balance of $4,321.94.

Simple interest vs. compound interest

Simple interest works differently than compound interest. Simple interest is calculated based only on the principal amount. Earned interest is not compounded—or reinvested into the principal—when calculating simple interest. Thinking in terms of simple interest, that $1,000 account balance that earns 5% annual interest would pay you $50 a year, period. The earned interest would not be added back into the principal. In year two, you'd earn another $50.

Simple interest is commonly used to calculate the interest charged on car loans and other forms of shorter-term consumer loans. Meanwhile, interest changed on credit card debt compounds—and that's exactly why it feels like credit card debt can get so large, so quickly.

In an ideal world, you'd want your savings and investments to be calculated with compound interest—and your debts to be calculated with simple interest (Ashford & Curry, 2020).

Open market operations

Open market operations consist of buying and selling of government securities by the Fed. It is the most common and most potent tool of monetary policy because it is flexible, subtle, and effective (Petroff, 2002).

Government securities are government debt issuances used to fund daily operations, and special infrastructure and military projects. They guarantee the full repayment of invested principal at the maturity of the security and often pay periodic coupon or interest payments (Investopedia, n.d.).

Banks have a strong preference for government securities because of the safety (as well as liquidity) they offer compared to loans to private businesses. Excess reserves are often held in government securities. When a bank buys a government security from an individual, the transaction is equivalent to a loan and increases money supply. The Fed holds a large stock of government securities and is responsible for their issuance and redemption.

The U.S. Treasury Bills (T.B.'s or Treasurys for short) are considered very safe and held by many U.S. and foreign entities. They are also very liquid: easy to convert into cash. Some of these T.B.'s are redeemed or rolled-over (at the option of the owner) every 90 days. Banks like this safe and liquid type of loan to the government.

Expansionary monetary policy

An easy money policy is intended to increase the excess reserves of banks and, thus, make money creation by banks more possible. This is accomplished by purchasing government securities from banks (since banks commonly hold a large proportion of them). An easy money policy can also be carried out by lowering the required reserve ratios or the discount rate.

Contractionary monetary policy

A tight money policy consists in reducing the excess reserves of banks and, thus, their money creation ability. This is done by selling government securities to banks in the open free market for government securities.

Banks are eager to put some of their excess reserves in government securities because of their safety. Tight money policy can also be carried out by increasing the required reserve ratios or the discount rate (Petroff, 2002).

Key takeaways

- A nation's legislative body determines fiscal policy, for the United States, this is the Congress and the executive branch, which originates the federal budget.
- Fiscal policy tools are government spending and taxes.
- Monetary policy involves changes to interest rates and credit conditions, affecting the amount of borrowing and spending in an economy.
- Monetary policy tools used by the central bank are open market operations and involve buying and selling government bonds with banks; reserve requirements, which determine what level of reserves a bank is legally required to hold; and discount rates, which is the interest rate charged by the central bank on the loans that it gives to other commercial banks.
- The central bank is to conduct monetary policy.

Chapter 9

Appendix

- Addendum
- References
- Image credits

Section 1

Addendum

Financial system

A financial system is a set of institutions, such as banks, insurance companies, and stock exchanges, that permit the exchange of funds. Borrowers, lenders, and investors exchange current funds to finance projects, either for consumption or productive investments, and to pursue a return on their financial assets (Investopedia, 2019).

Banks & bonds

When a firm has a record of at least earning significant revenues, and better still of earning profits, the firm can make a credible promise to pay interest, and so it becomes possible for the firm to borrow money. Firms have two main borrowing methods: banks and bonds.

A bank loan for a firm works in much the same way as a loan for an individual who is buying a car or a house. The firm borrows an amount of money and then promises to repay it, including some rate of interest, over a predetermined period of time. If the firm fails to make its loan payments, the bank (or banks) can often take the firm to court and require it to sell its buildings or equipment to make the loan payments.

A bond (another source of financial capital) is a financial contract: a borrower agrees to repay the amount that it borrowed and also an interest rate over a period of time in the future.

- A corporate bond is issued by firms.
- A municipal bond is issued by cities, a state bond by U.S. states
- A Treasury bond is issued by the federal government through the U.S. Department of the Treasury.

A bond specifies an amount that one will borrow, the interest rate that one will pay, and the time until repayment.

A large company, for example, might issue bonds for $10 million. The firm promises to make interest payments at an annual rate of 8%, or $800,000 per year and then, after 10 years, will repay the $10 million it originally borrowed. When a firm issues bonds, the total amount it divides. A firm seeks to borrow $50 million by

issuing bonds, might actually issue 10,000 bonds of $5,000 each. In this way, an individual investor could, in effect, loan the firm $5,000, or any multiple of that amount. Anyone who owns a bond and receives the interest payments is called a bondholder. If a firm issues bonds and fails to make the promised interest payments, the bondholders can take the firm to court and require it to pay, even if the firm needs to raise the money by selling buildings or equipment. However, there is no guarantee the firm will have sufficient assets to pay off the bonds. The bondholders may recoup only a portion of what it loaned the firm.

Corporate stocks

A corporation is a business that “incorporates”—that is owned by shareholders that have limited liability for the company's debt but share in its profits (and losses). Corporations may be private or public, and may or may not have publicly traded stock. They may raise funds to finance their operations or new investments by raising capital through selling stock or issuing bonds.

Stock represents firm ownership. Those who buy the stock become the firm's owners, or shareholders. The company's stock is divided into shares. Corporate giants like IBM, AT&T, Ford, General Electric, Microsoft, Merck, and Exxon all have millions of stock shares. In most large and well-known firms, no individual owns a majority of the stock shares. Instead, large numbers of shareholders—even those who hold thousands of shares—each have only a small slice of the firm's overall ownership.

A firm receives money from the stock sale only when the company sells its own stock to the public (the public includes individuals, mutual funds, insurance companies, and pension funds). We call a firm’s first stock sale to the public an initial public offering (IPO).

When a firm decides to issue stock, it must recognize that investors will expect to receive a rate of return. That rate of return can come in two forms. A firm can make a direct payment to its shareholders, called a dividend. Alternatively, a financial investor might buy a share of stock in Wal-Mart for $45 and then later sell it to someone else for $60, for $15 gain. We call the increase in the stock value (or of any asset) between when one buys and sells it a capital gain (Greenlaw & Shapiro, 2017).

Mutual funds

Buying stocks or bonds issued by a single company is always somewhat risky. An individual firm may find itself buffeted by unfavorable supply and demand conditions or hurt by unlucky or unwise managerial decisions. Thus, a standard recommendation from financial investors is diversification, which means buying stocks or bonds from a wide range of companies. A saver who diversifies is following the old proverb: “Don’t put all your eggs in one basket.” In any broad group of companies, some firms will do better than expected and some will do worse—but the diversification has a tendency to cancel out extreme increases and decreases in value. Purchasing a diversified group of stocks

or bonds has become easier in the internet age, but it remains something of a task. To simplify the process, companies offer mutual funds.

Mutual funds consist of a variety of stocks or bonds from different companies. The financial investor buys mutual fund shares, and then receives a return based on how the fund, as a whole, performs. In 2012, according to the Investment Company Facebook, about 44% of U.S. households had a financial investment in a mutual fund—including many people who have their retirement savings or pension money invested in this way.

Mutual funds can focus in certain areas: one mutual fund might invest only in company stocks based in Indonesia, or only in bonds issued by large manufacturing companies, or only in biotechnology companies' stock. At the other end of the spectrum, a mutual fund might be quite broad. At the extreme, some mutual funds own a tiny share of every firm in the stock market, and thus the mutual fund's value will fluctuate with the overall stock market's average.

Index funds are mutual fund that seeks only to mimic the market's overall performance. Investors who buy an indexed mutual fund designed to mimic some measure of the broad stock market, like the Standard & Poor’s 500, had better prepare against some ups and downs (Greenlaw & Shapiro, 2017).

Pension funds are pooled monetary contributions from pension plans set up by employers, unions, or other organizations to provide for their employees' or members' retirement benefits. Pension funds are the largest investment blocks in most countries and dominate the stock markets where they invest. When managed by professional fund managers, they constitute the institutional investor sector along with insurance companies and investment trusts. Typically, pension funds are exempt from capital gains tax and the earnings on their investment portfolios are either tax-deferred or tax exempt.

Pension funds are typically exempt from capital gains tax. Earnings on their investment portfolios are tax-deferred or tax-exempt (CFA Institute, 2021).

Section 2

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