The Economics of Government
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Economics students at one time studied the economics course, Comparative Economic Systems that examined capitalism and communism. After the Soviet Union had collapsed in 1991, colleges removed this course from the curriculum. However, we argue the political system is not important. For instance, communism in Russia did not fail because of politics; it failed because the government controlled all its markets. Thus, the same disastrous failure would occur if a republic controlled all of its markets. Importance lies how a government defines its relationship between government institutions, markets, and the people. Consequently, this textbook helps fill a niche market and provides a clear and comprehensive view of the economics of government and its interaction with its economy.

The 2008 Financial Crisis, furthermore, has plunged the world into a precarious position. Economic recovery is sputtering, and many countries, such as Greece, Ireland, Italy, Spain, and the United Kingdom entered a recession in 2012, while the Chinese and Indian economies are slowing down. Consequently, the economic crisis has given people and college students a renewed interest in economics, and the role of government during downturns in the economy. The financial crisis has awakened the famous debates between Maynard Keynes and Friedrich Hayek, and the debates rage forward. Friedrich Hayek believed in free markets with little interference from government, while Maynard Keynes believed government should use its power and resources to push the economy towards full employment.

This textbook does not resolve Keynes’ and Hayek’s debates and avoids political debates. Instead, we focus on the economic behavior of government in this textbook, and its impact on an economy. Although many examples throughout the book use the United States as examples, we can apply principals of this book to all governments. Furthermore, this book has a broad appeal to all college students and educated people, especially for students who reside outside the United States. We removed and replaced the names of the U.S. government agencies by the generic label U.S. government. We focus on economics and market behavior and not test students’ knowledge of U.S. institutions. After students had finish reading this book, they should understand why some countries prosper and grow, while other countries stagnate and wither.

This book is an intermediate textbook for undergraduate students. Students should understand all concepts explained throughout this book after they successfully completed their introductory courses in microeconomics and macroeconomics. Furthermore, instructors could use this textbook as a main textbook for a course on the economics of government, or they could use it as a supplement for other undergraduate courses in economics.

Students should tackle this book by starting sequentially and read and understand all the chapters beginning with Chapter 1. Although each chapter hones a specific theme, we group several chapters together. Students can omit some group chapters from their studies.

Chapter 1 introduces the economics and concepts of capitalism and private property rights. Then we study the arguments from Karl Marx and Vladimir Lenin to explain the shortcomings of capitalism. Finally, we explain the similarities and differences between government and markets.
Chapter 2 is the regulation of markets because all governments create bureaucracies to enforce regulations and ensure the public complies with a country’s laws. Consequently, we explain the market control types, and total costs of regulations along with shortcomings and problems of creating large bureaucracies.

We introduce the supply and demand analysis in Chapter 3 and show how markets with minimal interference from the government are stable. Chapter 3 is an important chapter because many chapters throughout the book build upon the demand and supply analysis. Next, we explain in Chapter 4 why a government imposes a price control, a quantity restriction, a quality standard, a tax, or a subsidy on a market, and we study the short-run and long-run economic consequences.

We review a firm’s cost functions in Chapter 5. Then we apply the cost functions to a competitive market in Chapter 6. Economists use the competitive market as the benchmark to measure the efficiency of the other market structures such as a monopolist controlling a market. Finally, we use cost functions in Chapter 7 to explain why monopolies yield the lowest social welfare, and why a government intervenes to break up or regulate a monopoly.

Chapters 8 and 9 complement each other and are specialized chapters. We examine in Chapter 8 why a government provides a good or service instead of a private firm. Furthermore, we explain the optimal size of government and how public enterprises become corrupt. Then we discuss why a government deregulates a market and privatizes public companies or government departments in Chapter 9. Finally, students learn a summary of Russia’s and China’s transition to a capitalistic market.

Chapters 10, 11, and 12 form a group on international trade. We review in Chapter 10 the theories on international trade and use supply and demand analysis to predict foreign-currency exchange rates. Subsequently, we explain in Chapter 11 why government imposes trade barriers, joins trade blocs, and imposes trade sanctions on other countries. Finally, we examine mercantilism in Chapter 12, and how a country uses trade to develop its economy. For example, Japan used mercantilism to rise from the ashes after World War II to become the second richest country within one generation.

Chapters 13, 14, and 15 switch the economic analysis to macroeconomics. We explain in Chapter 13 the aggregate demand and aggregate supply analysis. Then we analyze in Chapter 14 how a national government can use its fiscal policies, i.e. government spending and taxes to influence the entire economy. Subsequently, we examine in Chapter 15 how a central bank can use monetary policy to affect a whole economy through manipulating the money supply.

Chapter 16 is a specialized chapter on the regulation of a banking system. This chapter applies to the U.S. banking system and some of the U.S. banking institutions. Finally, we explain in this chapter why a government must regulate one of the most important sectors of the economy.

Chapter 17 is another macroeconomics chapter that examines why a government, especially in developing countries uses tourism for economic development. A government becomes the main developer and driver of a tourist destination. This chapter provides a succinct analysis of the economics of tourism.
Chapters 18 and 19 are microeconomics analysis that deals with the economics of environmental and natural resources. When a firm extracts a resource or pollutes the environment, that action impact today’s markets, but affects all future markets. Thus, a government can regulate a market to conserve and extend the life of natural resources or minimize pollution that harms future generations.

Chapter 20 introduces students to game theory. We can structure any situation where two parties can make two or more choices as a game theory problem. After students learn elementary game theory, students analyze games where government becomes a player. For example, the public responds to a change in government policy.
1. Economic Systems and the Role of Government

What is economics? Economics is the study of choice under conditions of scarcity. Although humans have infinite wants and needs, society produces a limited amount of products and services. Thus, humans must make choices. Consequently, economists have expanded economics to many fields spanning across many ideas, concepts, and disciplines. For example, *macroeconomics* is the study of a country’s economy in broad sectors. The sectors include government, consumers, businesses, and international trade. On the other hand, *microeconomics* is the study of a specific economic unit, such as a person, firm, or market. Of course, macro means large, and micro means small.

We focus on microeconomics in this textbook because we study how a government influences a firm, person, or market. Thus, we introduce students in this chapter to the basic concepts and definitions that we use later in this book.

Economic Systems

An economic system arranges and organizes a society’s institution. Every society has a government that dominates its society. A government specifies who owns property, who makes products, and who gets to consume the products.

Two broad economic systems are socialism and capitalism. Under socialism, government owns and controls all society’s property, land, buildings, and machines. Moreover, a central government committee determines production levels and prices that it calls “collective decision making.” Literally, the state produces and distributes all goods and services to citizens. **Communism** is the extreme form of socialism, and the governmental controls all aspects of their citizens’ lives. Soviet Union used Communism, and China, Cuba, and North Korea use it currently. Socialism can also include a system where government maintains private property, but extensively uses taxes, subsidies, price controls, and regulations to control an economy indirectly.

Other extreme is laissez-faire capitalism. *Laissez-faire* is a French term that means leave it alone. Laissez faire, of course, refers to a government’s proclivity to interfere with its economy. Capitalism allows citizens to own property, land, buildings, and machines, and the citizens produce and distribute goods and services to other citizens.

Capitalism is synonymous with free markets. Free means minimal interference from government, and a **market** brings together many private sellers and buyers, where they exchange products and services for money. However, capitalism still needs a government. Government establishes the legal structure or the “rules of the game.” Furthermore, a government helps people reduce conflicts, protects private property from invaders, prints money, establishes a military for national defense, and builds and maintains the infrastructure, such as roads, highways, ports, canals that help commerce flourish.

Socialism and capitalism are opposites, and we graph them as a continuum in Figure 1. The United States was a market economy before the 1900s, while the Soviet Union was quite socialistic. Many European countries are less capitalistic than the United States.
Economists assess a country’s level of capitalism by measuring its economic freedom. Economic freedom comes in several forms. First, entrepreneurs and businesses need *freedom of enterprise*. They can purchase resources to produce products and services freely. Second, businesses, consumers, and laborers need *freedom of choice*. They have the freedom to make economic choices. Consumers buy products and services freely. Businesses are free in which products they manufacture while workers have freedom for which employer, they work for or which careers they choose.

![Figure 1. Continuum of economic systems](image)

Economic freedom does not constitute political freedom. For example, Singapore and Kazakhstan have market-oriented economies, but citizens may not be wise to criticize the government publicly. Consequently, democracy and freedom went together hand to hand in European countries, while Asian countries have capitalistic markets with strong, authoritarian governments.

Some analysts and researchers measure a country’s legal structure and the level of control a government exerts over its economy. They call one measure, the *Index of Economic Freedom*. Researchers rank the freedom level of people and businesses in terms of the level of free trade, levels of taxation, government expenditures, and ease of obtaining licenses for a business. Then they compute an average of all characteristics. We show three Indices of Economic Freedom in Table 1. Researchers consistently ranked Hong Kong the freest economically while they ranked Venezuela not free. The Venezuelan President, Hugo Chavez, was a socialist who suppressed economic freedom. One must be careful of these indices because researchers assign "judgment" values to various characteristics of a country’s economic system.

### Table 1. Two Indices of Economic Freedom

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Sources: Fraser Institute, Heritage Foundation, and Gwartney & Lawson
Characteristics of Capitalism

Private property rights form the foundation of capitalism and are an individual’s right to use, control, and obtain benefits from a good, service, or resource. Usually we associate private property rights with equipment, land, and buildings. However, they include intangible assets like patents, trademarks, and copyrights. A patent gives an inventor the exclusive right to produce his invention for 17 years; a trademark is a company’s logo or brand name, and a copyright protects musicians, writers, movie directors, and software programmers from people enjoying their works without paying. For property rights to be well defined, the owner has the right to exclusive use of property, has legal protection against invaders, and has the right to transfer property to another. Countries with strong property rights require a good, honest judicial system, where judges and magistrates ensure they protect property rights.

Private property rights create incentives for the owners. Owners can use private property for self-interest, and this self-interest could benefit others. For example, an owner constructs and operates a restaurant on his property because he or she wants to earn a profit. For the surrounding area, people benefit because they have a new place to eat. Moreover, owners possess a strong incentive to care for their property. For instance, the government owned all property in the Soviet Union. Thus, the people had no incentives to care for property, and stealing was rampant. Stealing is becoming a large problem in the United States too. Some claim the federal and state governments in the United States have weakened property rights through numerous regulations, expropriation, and lawsuits.

Property rights are a “bundle of rights.” A “bundle of rights” refers to restrictions or regulations on property. An owner cannot just do anything with his property. For example, city governments impose zoning laws, where the government defines regions for businesses, residences, and industry. Consequently, a landowner cannot construct a large factory in the center of a residential neighborhood. Thus, zoning laws restrict factories to particular zones and areas. Other restrictions imposed on private property include pollution, traffic flows, noise, and endangered species.

People who own their land has an incentive to take good care of their property. Government ownership of land poses several problems. Governments in China and Australia own agricultural land and lease the land to farmers. Hence, the farmers do not own the land. Farmers overuse the land and not let the land fallow to replenish its nutrients. Fallow means farmers let a pasture grow to rebuild nutrients. Furthermore, farmers do not invest in capital to prevent soil erosion, and they overuse fertilizers and pesticides. After the agricultural land has become unproductive, the farmers leave and stick the governments with infertile, useless land. Australia has another severe problem. Shepherders raise too many sheep in a pasture. Sheep eat all the grass, and they constantly trample on the fields, damaging future grass growth. Again, government ends up owning unproductive, agricultural land (Diamond 2005).

Capitalism builds upon self-interest because it directs activities of people and businesses. For instance, consumers want cheap prices and high-quality products and services. Entrepreneurs, who takes the risk and introduces new products, want to maximize profits;
workers want high wages, fringe benefits and do less work, and property owners want the highest value for their land. Unfortunately, many people label self-interest as greed because people and businesses pursue money as self-interest. For example, an entrepreneur wants to become rich and invents a hot, new cell phone that everyone wants. Society still benefits because consumers buy and use his cell phone. Thus, greed is not necessarily bad. Greed helps people channel their self-interests to activities that benefit society.

Capitalism is synonymous with markets. A market is an institution that brings buyers and sellers together. All countries have markets, even socialistic countries. Socialistic countries either heavily regulate or control their markets, or government is the sole buyer or seller in a market.

Capitalistic countries have competitive markets, where the markets have a large number of buyers and sellers. With a large number of buyers and sellers, no particular buyer or seller can manipulate the market. Competitive markets ensure consumers pay the lowest market prices and buy the largest market quantity. Moreover, competitive firms have incentives to implement new technology or create new products. Key word is competitive because the first government intervention in the United States occurred in non-competitive markets. For example, the U.S. government started regulating during the 20th century as the U.S. government broke up monopolies and regulated market prices. A monopoly is a sole supplier to a market. Thus, a monopolist can earn substantial profits by reducing its production level, which raises the market price.

Property rights, economic freedom, and competitive markets lead to specialization. First form of specialization is the division of labor. Division of labor is a business breaks down a product’s manufacturing into specific tasks each performed by a different worker. Workers become more skilled over time, and they choose occupations that they are good at. One worker is an excellent welding, while another worker assembles parts the best. Division of labor forms the foundation of mass-production technology, and workers boost their production. For example, workers working on assembling lines in factories can produce millions of products for consumers cheaply.

Countries specialize in products and services that they are good at. The Law of Comparative Advantage states countries specialize in production of goods where they have low costs relative to other countries, and then they engage in international trade. David Ricardo wrote this Law in the 19th century, and it still applies today. For example, Asian countries produce computers and cars. The United States grows corn and soybeans, while Columbia grows premium coffee. Thus, these countries produce these products cheaply and trade with each other.

Even regions within a country can specialize. This is not the Law of Comparative Advantage because regions specialize within a country and not between countries. For example, the United States is a large country, and regions specialize in products and services. Energy companies operate in Texas. Dairy companies produce milk and cheese in Wisconsin, while farmers grow oranges in Florida. The United States has constructed a large, efficient transportation system that allows sellers to transport quickly and cheaply products and services.
to anywhere within the country. Finally, companies can specialize in products and services. Microsoft specializes in computer software while Honda builds motor vehicles.

Specialization and Law of Comparative Advantage lead to gains in production. Consequently, people trade and move products and services to those who want them the most. Thus, businesses and people need the freedom to engage in voluntary exchange. **Voluntary exchange** is one person sells goods to another person who places a greater value on them. Thus, voluntary exchange forms the foundation of trade. For example, a person owns a 1968 Ford Mustang. This person places a $4,500 value on a car, but a buyer would pay $5,000. Both parties benefit by trading, and the seller gains $500 in value. Both parties to a voluntary exchange benefit. However, trade and exchanges have transaction costs. **Transaction costs** are buyers and sellers need time, effort, and other resources to search and negotiate an exchange. Transaction costs reduce gains from potential trades. For instance, a homebuyer spends time and effort to find the perfect house, and then pays various fees to switch the property title in his/her name. In the United States, transaction costs range from 3 to 9% of a property’s value.

Specialists evolve who become the experts in trade. We call these experts middlemen. A **middleman** is a person who buys, sells, or arranges trades. Middlemen reduce transaction costs because they use their expertise to bring the buyers and sellers together. For example, car dealerships are the intermediaries between car manufacturers and customers. Grocery stores serve as intermediaries between farmers and customers. Stockbrokers are middlemen, assisting investors in buying and selling stock. Finally, the internet became the ultimate intermediary because Ebay and Craig's List help buyers and sellers find each other throughout a nation or the world. Consequently, a country with more middlemen becomes a wealthier nation.

A country’s money boosts specialization and voluntary exchange because money has one important function. People, businesses, and government use money as a **medium of exchange**. Thus, money allows people, businesses, and government to pay for products and services. If a society did not have money, then people would use barter. **Barter** is an extremely inefficient form of trade. For example, if a person makes shoes and wants to buy bread, he must find a person who makes bread and wants shoes. A buyer must find a seller, who wants the buyer’s product, which we call the **double coincidence of wants**. Imagine a teacher, scientist, or musician who wants bread. They must find a seller who wants services from these professionals. Thus, money leads to specialization and simplifies trade.

Barter is returning. Internet allows people to find each other. Although barter is inefficient, a business may have cash-flow problems and uses barter to obtain products and services that it needs to sell products. Furthermore, barter helps people avoid taxes because the buyer and seller do not exchange money, and they place no monetary value on the trade. Hence, they do not pay taxes.

**Criticism of Capitalism**

Karl Marx studied the poor working conditions in the British factories during the 19th century. He believed all societies experience transitions of class struggles because every society has two classes: the privileged class and exploited class. During Roman society, the two classes were the slaves and slave owners. During the Middle Ages, they were the lords and the serfs.
For the industrial revolution, the owners of capital and the workers would clash and fight. Owners of the capital are few and rich while the workers are numerous and poor.

Over time, tension builds between the two classes, which leads to a revolution and then society evolves to a higher level. Although Karl Marx criticized capitalism, he considered capitalism a necessary stage in development. Consequently, capitalism builds upon a nation’s wealth and increases the amount of capital, like machines and equipment.

Marx criticized capitalism on three grounds:

**Law of the Falling Rate of Profit** – the capitalists search for new technologies that reduce labor and boost productivity. However, businesses implementing modern technologies and installing new machines and equipment displace labor; boosting the unemployed. Thus, capitalists produce more output, employ less labor, and indirectly fewer workers earn wages. Hence, companies have fewer consumers, which cause their profits to fall over time.

**The Law of Disproportionality** – capitalistic systems are plagued by bust and boom cycles. Businesses go through cycles when they cannot sell all their products and services, while workers cannot afford to buy all the products and services they need. Thus, it plants the seeds of a revolution. For example, the 2008 Financial Crisis was a bust cycle that still is affecting the United States and Europe in 2013.

**The Law of Concentration** – firms in capitalistic societies grow in size by merging or buying smaller firms. Powerful capitalists prey on the weaker, smaller capitalists. Over time, society’s wealth becomes concentrated into the hands of a few people. Then the monopolies and trusts dominate and control an industrial society.

These three laws pave the road to a revolution, and then society would evolve to its highest form, communism. Communism is a utopian society with no class struggle. Of course, the government must control all society’s resources and help during the transition. However, only a handful of countries became communistic.

Vladimir Lenin explained this anomaly by adding the fourth law. Industrial countries are imperialistic and always conquer and add new colonies. Industrial country exports manufactured goods to the colonies, and in turn, the colonies ship raw materials and food to the industrial country. Capitalism leads to imperialism that lets the industrial country survive and send the class struggle across the world. Imperialism extends the life of capitalistic countries as these countries exploit the poorer countries.

The United States went through cycles. At the turn of the 20th century, monopolies formed in many industries in the United States. However, the U.S. government busted and broke up the monopolies like Standard Oil. Furthermore, the U.S. government let workers organize and form labor unions.

Labor unions organize labor and negotiate wages and working conditions on labor’s behalf. Capitalists and labor unions bargain and fight over workers’ wages and benefits, like pension plans and health insurance. If the capitalists and labor union cannot reach an agreement, the workers can strike. As the workers stop working and leave their work, the factories shut down. Disruption of production hurts the business’s profits until the labor unions, and management reaches an agreement. Starting in the 1980s, the U.S. government curbed union power and opened up the U.S. economy to free trade. Now Marx’s predictions are becoming true again.
The Similarities between Government and the Market

Government and competitive markets share similar characteristics. Both government and market participants can use cost-benefit analysis. Before a firm, consumer, or government makes a decision on a future activity, the benefit of the activity should exceed the costs. Thus, society obtains the most value from its resources. Net benefit equals the total benefits minus total costs. Economists call a positive net benefit efficient because society obtains the most benefit from resources. For example, the net benefits for firms are profits. If a firm continually earns a loss, then that firm should move resources to another industry. Furthermore, the benefit for consumers is utility. A consumer gains utility or satisfaction from consuming a product or service. Each time a consumer consumes a product; the consumer weighs the level of satisfaction to the product’s price relative to his or her income. Consequently, a consumer only consumes a product if his or her utility increases. Unfortunately, government should use cost-benefit analysis, but in many cases, it does not.

Both government and markets compete. In a market, sellers compete for the consumers. For a government, government agencies compete for tax dollars while politicians compete for office. Unfortunately, both the market and government have limited resources. Consumer income limits consumer’s spending, while a business’s profits limit a firm’s growth. For instance, if a firm continually earns a loss, the firm eventually bankrupts, unless a government subsidies it. Likewise, a government’s tax collections limit its spending. Government can increase borrowing, but again, the future tax hikes limits a government debt because a government must repay the debt with interest. Economists call this “No free lunch,” because every choice entails benefits and costs, and the goal of efficiency is to maximize the benefits relative to its costs.

The Differences between Government and Market

Government and markets have differences. For instance, a government creates institutions that allow firms and consumers to interact peacefully. Thus, firms and consumers must follow the rules and regulations, while a government establishes and changes the legal system. Furthermore, government institutions help firms and consumers settle disputes and protect private property from aggressors. Usually civil courts handle disputes, while the police protect owners of private property. Moreover, a government uses force to modify human behavior. Government can impose the death penalty, limit freedom by imprisoning people in jails and prisons, or seize property. Finally, a government can impose fees, fines, and taxes, or pay subsidies.

Consumers and producers are limited in modifying human behavior. For example, an employer cannot incarcerate its worker if he comes to work every day late. However, an employer can fire his worker, which effectively motivates employees.

A government and a market differ in transactions. For example, consumers voluntarily pay for market transactions. Even if a monopoly dominates a market, consumers can choose whether to buy the service or not. Nevertheless, a government differs because it can force consumers and firms to pay taxes. Unfortunately, collecting taxes place government in a unique situation because a government can raise fees, fines, and taxes if a government has financial trouble. If a
firm or consumer experiences financial problems, either they fix their financial problems, or they bankrupt. Unfortunately, the ability to raise taxes may cause a government to delay reforms or prevent much-needed re-structuring.

For another difference, a government can redistribute wealth, and the redistribution can be efficient. For instance, a government finances education, such as public schools and universities. Then a government subsidizes the students because students receive more funds from government than what they pay in taxes. However, society benefits in the long run because it has a more educated workforce.

Government is political as political parties fight for a government’s control. The United States has two major political parties: Democrats and Republicans. Supposedly, Democrats help disadvantaged groups with governmental programs, while Republicans are pro-business and lower taxes. However, some Republicans were good at raising taxes and increasing regulations, while some Democrats imposed restraints on government spending.

Finally, government income and power are distributed differently than the market. In the market, people who supply highly valued goods and services can earn high incomes. For example, half the millionaires in the United States earned their fortunes from real estate, while politicians use campaigning, fundraising, and public relations to capture votes, strengthening their power.

**Key Terms**

- macroeconomics
- microeconomics
- economic system
- socialism
- communism
- laissez faire capitalism
- markets
- freedom of enterprise
- freedom of choice
- Index of Economic Freedom
- property rights
- patent
- trademark
- copyright
- bundle of rights
- self interest
- entrepreneurs
- competitive markets
- specialization
- division of labor
- Law of Comparative Advantage
- voluntary exchange
- transactions costs
- middleman
- medium of exchange
- barter
- double coincidence of wants
- Law of the Falling Rate of Profit
- The Law of Disproportionality
- The Law of Concentration
- cost-benefit analysis
- efficiency

**Chapter Questions**

1. Where would you place the United States today on the continuum in Figure 1?

2. Referring to the Indices of Economic Freedom in Table 1, Mexico became freer while
Russian and Venezuela became less free. What is occurring?

3. Some countries and the State of Hawaii have 99-year leases on land. A person buys and owns the land, but after 99 years, the government reclaims the land. Do you see any problems in this arrangement?

4. You design a hot, new cell phone that everybody wants. You also hold a patent where you prevent competitors from duplicating your phone. Which price would you charge?

5. Identify an example of barter, where two people avoid paying taxes.

6. Is Karl Marx correct when he assumed government and the capitalists would conspire together?

7. Government plans to build a new highway. However, the highway’s cost exceeds its benefits. Should government proceed with this project?

8. Government has the power to print money. Is it a “free lunch” if government prints money to cover budget shortfalls?

9. Identify an example where government tries to modify people’s behavior.

10. Does government force consumers to pay for specific products or services?
2. Government Regulation of Markets

A capitalistic society still needs a government because the government establishes a society’s legal system. Legal system informs citizens the rules and regulations, and the consequences if citizens break the rules. Furthermore, a legal system encourages citizens to interact peacefully and harmoniously and protects its citizens’ property. Moreover, a government coins money and helps establish a society’s infrastructure that connects cities, markets, and ports by a network of roads, canals, and railroads. Consequently, an infrastructure allows regions within a country to specialize, and producers and suppliers rapidly transport goods and services from one market to another.

Government can intervene in a market and correct a market failure. Either the government supplies a product or service or government fixes the market failure by imposing a regulation or a government control. Regulations can be complex, but we provide in this chapter a foundation of government regulations and introduce the common theories, the total economic costs, and problems of government regulations.

Why Does Government Regulate or Control a Market?

Definition of a regulation is a government limits the behavior of individuals or organizations. Consequently, a regulatory agency is the institution that monitors and enforces the limitation. Moreover, a country’s President and legislature create the regulatory agencies and enact laws that the agencies must abide by. Legislature is Congress for the United States, and Parliament for many European countries. In addition, all levels of government in the United States can impose regulations, which are the federal, state, county, and city governments.

Some examples of regulations are:

Example 1: Government can set a price for the market. For example, many governments set the retail price for electricity, and natural gas.

Example 2: Government could impose a limit on market quantity. For instance, the city government of New York City sets the maximum number of taxicabs that can operate within the city.

Example 3: Government mandates a quality standard. For example, the U.S. federal government imposes a standard on drinking water. Water companies must reduce contaminants in water, such as metals, toxic chemicals, and microorganisms below the maximum allowable limit. A mandate is government tells market participants what to do, but does not pay for the costs. Furthermore, government may impose penalties on violators for noncompliance, and usually does not pay for the cost of mandates.

Example 4: A government restricts market entry. For instance, the United States government grants patents. When an inventor designs a new product, the inventor files for a patent, and he has exclusive control over his product for 17 years. A patent encourages people and businesses to design brand new products. Consequently, the patent grants monopoly power to the inventor, which helps the inventor recoup his research costs and award him for his hard work and dedication.
Example 5: Government bans or prohibits an activity. Thus, if a government finds anyone supplying or using the product or service, then government imposes severe penalties. For example, many governments ban the sale and use of drugs, such as marijuana, cocaine, and heroin.

Government regulates or controls a market for five reasons. First, a government intervenes in a market that has little competition. This was the first growth spurt in government regulations in the United States at the turn of the 20th century. When one firm supplies the whole market, then economists call this firm a monopoly. Consequently, a monopoly has market power because it can reduce its production level, causing both the market price and profits to increase.

A natural monopoly must be large to supply the good or service to the market cheaply. Natural monopolies, such as telephone, electricity, natural gas, railroad, and water companies require massive investments in infrastructure. For instance, a railroad company lays a network of railroads that connect the cities throughout a country. Furthermore, the company must maintain this system. Consequently, the U.S. government can break up a monopoly or regulate its price. For example, the U.S. government broke up Standard Oil into smaller companies at the turn of the 20th century. John Rockefeller founded Standard Oil, and at its peak, he controlled over 90% of the petroleum market. Government wanted to limit Standard Oil’s market power. An unregulated monopoly can increase its profits by reducing production and causing the market price to rise.

For the second reason, government intervenes to correct an externality. An externality is a firm or person affects a third party without the third party’s consent. Unfortunately, the third party experiences either a cost or benefit. For example, a firm freely pollutes the air. Polluted air negatively affects people who live around it, and the firm does not pay for the damage to these people. Economists call this a market failure and property rights are not well defined.

We can define property rights as abstract. Polluting firm treats the air or water as a free resource, and it damages this resource without anyone’s consent. Consequently, a government has two strategies. Government can convert the air or water into a property right, and the firm buys the right to pollute the resource, or government could impose taxes and regulations. Firm still pollutes, but it pollutes less. Refer to Chapter 19 for more information on correcting market failures resulting from environmental damage.

An externality could be a benefit, and a market system would undersupply it. For example, inoculations help prevent the spread of diseases and prevent epidemics. A private doctor would administer vaccines for paying customers. However, the people who are not vaccinated could still spread diseases to other non-inoculated people. Hence, a government could prevent epidemics by inoculating everyone freely, or it subsidizes the inoculations. Government drives the market price down for inoculations as consumers increase their quantity demanded for inoculations. Hence, doctors inoculate more people. Positive externalities include research and technology. After a firm had designed a new product using new technology, other firms can quickly duplicate the technology.

For the third reason, government enters a market to provide a public good. A public good requires two conditions. First, public goods are non-rival. One person consuming the good does not prevent other people from consuming the good. Second, the good is non-excludable.
Producers cannot restrict a good to paying customers. Thus, private businesses and sellers undersupply public goods because *free riders* will consume public goods. Unfortunately, they have no incentive to pay for the goods. Moreover, businesses cannot restrict consumption of public goods. Some examples of public goods include clean air, flood control projects, national defense (military), public safety (police), public television, and streetlights.

**Urbanization**

Urbanization aids in the growth and intrusiveness of government. People living in the country migrate to the cities, searching for work, and escaping the misery and poverty in rural communities. Unfortunately, urbanization always leads to a larger government and more bureaucracies.

Imagine living in a rural community, raising cattle. Which services could government provide, especially if the ranchers are self-sufficient? Wide-open spaces separate the people from each other, reducing conflict and problems.

In cities, millions of people live closely to each other, enlarging the population density. This closeness creates conflict and problems. For example, urban areas require large quantities of fresh water. Therefore, people overuse fresh water near urban areas, placing stress on the environment. People generate large amounts of garbage, wastewater, and pollution. Crime, noise, and traffic congestion become severe problems in cities. Consequently, a government expands to reduce these problems and to lessen conflict. Finally, the urban dwellers must pay for these government services and pay higher taxes than people who live in the suburbs or in the country.

Public goods come in another form called *quasi-public goods*, which are products and services that a private, unregulated market could supply. Producers can restrict access to paying customers. However, producers may not supply enough of them, and government steps in to supply them. Some examples include postal service, highways, libraries, and education. Private companies can deliver mail and packages. However, mail companies would give good service to the urban customers while the companies would neglect rural customers. Mail companies do not have enough consumers in rural communities to earn profits. Furthermore, private schools cater to parents who can afford their tuition. Nevertheless, students from poor families cannot afford an education. Consequently, public schools allow any students to enter and obtain an education, regardless of social class and background. For a government to provide public goods, it must levy a tax on a market. For instance, the state and local governments finance public schools through property taxes.

For the fourth reason, a government regulates and intervenes in markets with asymmetric information problems. *Asymmetric information* is either the buyer or seller has more information than the other party. For example, a person who buys fire insurance knows he has faulty wiring in his home. Thus, the homeowner has more information than the insurance
company. For another example, many consumers do not know how to calculate loan payments. Finance companies and banks can take advantage of consumers’ lack of knowledge and charge higher payments. Asymmetric information occurs in markets, where consumers have difficulty inspecting the good, or they seldom purchase the good from the same producer. Consequently, some producers make and sell low-quality, defective, or even harmful goods.

Government can regulate markets with asymmetric information to protect the buyers or sellers. Some forms of asymmetric information may be illegal that government prosecutes. For instance, a person sets his house on fire, hoping to collect the insurance money. Arsonist has more information than the insurance company. For another method, a government establishes a weights and measures agency. Thus, government employs inspectors who check gas pumps and supermarket scales, ensuring they are accurate. Finally, government imposes standards on occupational licenses. A license grants a professional the right to practice his specialty, and ensures professionals have a high competence level. Doctors, lawyers, mechanics, hair stylists, etc. need licenses from the state government to practice. Hence, the government requires them to pass a comprehensive exam and continually update their skills.

A market could minimize asymmetric information without government intervention. For instance, a consumer buys the good regularly, or a firm creates a brand name, franchise, or product warranty to guarantee a quality level. For example, McDonald’s is a franchise and theoretically, a Big Mac tastes the same anywhere around the world. Moreover, consumers can use information, like Consumer Reports, to aid in buying a product or service. Finally, credit bureaus created databases containing information about customers and their credit worthiness, such as Experian, Equifax, and TransUnion. A person who knows he will not repay a credit card and has a poor payment history will have trouble obtaining a credit card because banks check people’s credit records and histories. Thus, these methods strive to equalize information between buyers and sellers.

For the last reason, a government imposes social regulation; government sees a societal problem and regulates it. Social regulation includes the previous four reasons for regulation, and the number of regulations has exploded in the United States during the last 40 years. For example, people can legally buy cigarettes in U.S. if he or she is 18 or older. However, state governments heavily tax cigarettes, won large lawsuits against tobacco companies in 1990s, and passed laws restricting tobacco use. Many states and city governments ban cigarette smoking in restaurants, bars, near building entrances, schools, et cetera. Government could simplify things simply by making tobacco illegal than having hundreds of regulations and laws restricting tobacco’s use.

**The Theories of Regulation**

Different theories explain the relationship between regulatory agencies, their regulated industries, and the public. Process of implementing regulations can be a complex process because politicians, interest groups, industries, and regulatory agencies become involved and have different interest. Furthermore, various groups in society strive for control or influence over regulatory agencies and the politicians. Consumer groups want lower prices. New companies want more liberalized markets. Larger, older companies want high stable profits,
restrictions on international trade, and restrictions on labor unions, while labor unions strive for higher workers’ wages that increase a firm’s costs.

Bureaucrats’ personalities can further complicate regulatory agencies. We define three types of bureaucrats. First, a careerist wants the regulatory agency to exist and grow. Careerist wants simple rules in order to avoid problems. Second, the politician is a temporary bureaucrat who will leave the agency for another office. Politicians please the interest groups and establish political connections. Finally, the professionals will move on to other work. Professionals like complex rules because they are educated and demand greater salaries.

We discuss six theories of regulations that define the role and purpose of the regulatory agency.

First Theory: Public Interest Theory is government corrects a problem in society or in a market. Consequently, government creates a regulatory agency that fixed the problem. For example, one firm, a monopolist, controls a market. Monopolist reduces production, increases market price, and prevents market competition. Government regulates the market to curb the monopolist’s power. For another example, firms are producing contaminated foods. Government establishes a health regulatory agency to reduce contaminated foods as health inspectors inspect the food ensuring producers meet the minimum standards. Health agency can fine, penalize, or sue a firm if it is caught producing contaminated food. Consequently, regulations increase a society’s welfare in these cases.

Second Theory: Corporatism is the bureaucrats, political leaders, and the businesses work together as if the whole country is one large corporation. Government usually forms associations with businesses and bureaucracies. Thus, the government forms the top management of a corporation, while individual businesses are branches or departments of the corporation. A government wants to retain control over business activity, although government allows people to own the businesses and/or resources. China, Dubai, Japan, Taiwan, and South Korea use corporatism as a growth strategy. These countries experienced rapid economic growth and swift industrialization as government determined the best path and strategies for economic development and growth.

Corporatism comes in a variety of forms. In some cases, government dominates the relationship and regulates its industry. This management style is a top to bottom approach and is similar to the way communistic countries control their industries. Other forms of corporatism allow some autonomy and independence of businesses. Government creates associations that become the intermediaries between government and the industry. In some cases, the association becomes advocates for the industries, and they persuade a government to reduce its regulatory control (Unger and Chan 1995).

Third Theory: Capture Theory is industry “captures” a regulatory agency (Stigler 1971). For example, an industry wants a new regulation, and the industry controls the regulators. In turn, the regulators strongly influence the President and legislature. Thus, government passes favorable regulations for the industry and regulatory agency. Furthermore, the industry could influence the President and legislature directly. Specifically, political campaigns are expensive in the United States, and corporations and businesses contribute to the political campaigns and buy the politician’s vote. Other countries use a direct approach. Business owners bribe the
politicians and bureaucrats directly. Then the politicians help the industry by passing favorable laws and regulations. Consequently, laws and legislation help redistribute wealth from consumers to industry.

Capture Theory could include interest groups other than industry (Becker 1983). An interest group is a political organization that influences government, and they form around for any purpose or cause. For example, environmentalists form an interest group that wants lower pollution and a cleaner environment. Consequently, interest groups can capture government in the United States. Politicians want to remain in office, but political campaigns cost millions of dollars. Thus, interest groups can “buy” influence through campaign contributions. Remember that old joke, “Talking to politicians is fine, but with a little money, politicians hear you better.”

Fourth Theory: Principal Agent View is government bureaucracies do not serve the purpose that government created them for. Bureaucrats of regulatory agencies become more concerned about maximizing their power, influence, and prestige. Moreover, they can be corrupt or dysfunctional, serving their own self-interest. Dysfunctional means a government agency is not performing its true function. For instance, some police officers want high arrest numbers. Thus, some officers “planted” drugs on innocent people to enhance arrest records. This tends to be a problem in the State of Texas. Several incidences occurred in Dallas, Tulia, and along the Texas-Mexican border, where police officers arrested innocent people for drug possession and distribution.

Fifth Theory: Parkinson’s Law is C. Northcote Parkinson observed the regulatory agencies expand in size each year without any relationship to amount of work the regulatory agency does. Northcote noticed as the British Empire shrank, the number of employees in the Colonial Office rose. The Colonial Office administered the British Empire, and a smaller empire implies less work. Thus, the number of employees should decrease over time and not increase!

Parkinson’s Law is universal and applies to all government agencies. Government agencies increase their scope, mission, and influence over time. Parkinson observed “the total of those employed inside a bureaucracy rose by 5-7% per year irrespective of any variation in the amount of work (if any) to be done.” Northcote explained the regulatory agency’s growth using three statements.

Statement 1: “Expenditures rise to meet income.” A government’s funding level for a regulatory agency is not important because the agency always spends the money. If a government agency had saved money, the legislature would notice and would lower future funding. Thus, government bureaucrats always request more funding and find ways to spend it.

Statement 2: “Work expands so as to fill the time available for its completion.” If a bureaucrat needs 4 hours to complete a task and has an 8-hour workday, then the bureaucrat stretches the task into 8 hours. Therefore, the bureaucrats will create work. Whether creating new forms or causing citizens to jump through new hoops for permits, approvals, or other documents.

Statement 3: Bureaucrats “multiply subordinates, not rivals.” If a bureaucrat had hired a rival, then that rival would compete for the same promotions. However, a bureaucrat can elevate himself to manager by hiring subordinates. In order to hire subordinates, bureaucrats need to
“create work for each other.” Over time, regulatory agencies expand paperwork and broaden regulations.

**Sixth Theory:** Technology leads to the growth of government bureaucracies. As technology improves for communication, transportation, and record keeping, bureaucracies become larger. Bureaucrats use technology to improve monitoring and ensure compliance with the rules and regulations (Kiser and Kane 2001). For example, smugglers secretly import products and avoid paying duties and taxes to government. Government uses several methods to combat this. Customs agents use planes, ships, radar, and satellites to track ships and airplanes that do not enter the ports. If a government does not catch the smugglers, and the smugglers sell their products to stores and merchants, then government agents can backtrack and trace the products back to the smugglers through record keeping. Stores and merchants record their transactions that government agents can scrutinize. Records allow government agents to match what a merchant sells to what he purchased. If a merchant claimed he bought all his merchandise from one distributor, then the agents can check the distributor’s records for discrepancies. Finally, tax agents will investigate anyone who has too much cash, and they cannot explain where they got it.

Technology has a bad side effect. National government can use technology to dominate its economy. National government uses the bureaucracies to control cities, villages, and communities far away (Kiser and Kane 2001). For example, government maintains large computer databases on people and businesses. If a government agent thinks someone has violated a rule or regulation, he or she can have a team of agents there within hours by plane, helicopter, or cars. It is no coincidence. U.S. government is usurping power away from the states and has bombarded county and city governments with numerous rules and regulations. Without the use of technology, the bureaucracies would not have the power to force compliance with its rules and regulations.

Parkinson’s Law and technology make it seem a larger bureaucracy harms the economy more. This is not entirely true. Size of the bureaucracy is not the problem, but how efficient the bureaucracy supplies public goods or how well the bureaucracy manages the legal system. A more developed country requires more bureaucrats, and thus, the bureaucracies become larger. Good bureaucracies require the bureaucrats are competent, adhere to written rules, participate in training, and earn an adequate salary relative to their job duties (Goldsmith 1999).

Many African countries reduced the size of their bureaucracies after becoming independent. Consequently, the quality of government deteriorated rapidly. African governments lay off government workers and forced some workers to retire early. Governments stopped maintaining buildings and reduced wages for the secretaries, clerks, and typists. Staff fled the bureaucracies and found better-paying jobs in the private sector. Then the managers in the bureaucracies could not do their jobs efficiently, closed down their offices, and began not following orders. Of course, they may not have the resources to follow orders. Moreover, embezzlement, nepotism, and corruption took over. Although the African countries have smaller bureaucracies, the public has lost respect for the bureaucrats, and they view them as corrupt. Businesses refuse to invest or operate businesses in those countries. Hence, it is not the level of government, but the quality of government. A good government offers public goods and fosters an efficient legal system.
(Goldsmith 1999). African bureaucracies are an interesting case because the U.S. federal and state governments are decimating their bureaucracies in a similar fashion. Governments received lower tax revenues after the 2008 Financial Crisis, and government is reducing the government’s size.

**Costs of Government Regulations**

Government regulations hurl many economic costs upon a society. We know some costs and can quantify such as taxes, fines, and fees, while a society suffers from other costs indirectly from regulations. Total costs of regulations are:

- **Cost 1:** Government diverts resources from the private sector to pay a regulatory agency’s budget. Largest budget cost is salaries. If a government did not employ staff, then they would work in the private markets. Furthermore, regulators become good at justifying their programs and importance to legislators because legislatures are a funding source.

- **Cost 2:** Government finances regulatory agencies through taxes. Consequently, government creates another government agency known infamously as the tax authorities. Tax authority is another bureaucracy that employs staff and consumes resources.

- **Cost 3:** Taxes and regulations destroy the market because they increase market prices and decrease market quantities. Therefore, taxes and regulations lower economic activity. If a government imposes mandates, businesses and producers pay greater costs to comply with the government’s mandates. Then these companies hire compliance specialists or invest in new machines and equipment.

- **Cost 4:** Taxes and regulations create violators. When government creates regulations or imposes taxes, some market participants will violate these regulations or evade taxes. Consequently, government consumes resources to enforce and punish violators. Government also expands government agencies like courts and prison systems. Courts determine whether the people had violated the law. Then a court sentences the guilty to prison. Judges can impose fines to offset the government’s costs. Some criminals will never pay.

**Problems of Regulations**

Government regulations can create many problems for society. For instance, government and its bureaucrats can make poor investment decisions. For example, the U.S. government passed a law, Nuclear Waste Policy Act, to locate a disposal area for the nation’s nuclear waste. Government found and developed a site in Yucca Mountain, Nevada and bored a 5-mile long U-shaped tunnel into the mountain. Moreover, this site is next to where the U.S. government tests its nuclear weapons, and it is geographically stable. However, political opposition and lawsuits have delayed the opening of this facility for decades. Meanwhile, the U.S. military and nuclear electric power plants are stockpiling nuclear waste at their facilities. As of 2008, the government has wasted roughly $9 billion on this project.

The Federal Emergency Management Agency (FEMA) made a bad investment. It purchased 10,770 trailers that sit vacant at a deserted military airport in rural Hope, Arkansas. FEMA stockpiled trailers as temporary housing for victims of natural disasters. Unfortunately,
FEMA did not make the trailers available to Hurricane Katrina’s victims because federal law prohibits people residing in trailers in a flood plain. Instead, some victims lived in tents. Government has paid $431 million for the vacant trailers (Neuman 2006). Consequently, government is a unique institution. It can waste taxpayer money, and then turn around and raise taxes and fees to cover budget shortfalls. No other institution in our society has that power.

Other problems of regulations include:

**Problem 1:** Bureaucracies can be political.

**Problem 2:** Bureaucrats have self-interest. Bureaucrats are concerned about maintaining their jobs and importance and not necessarily helping people. Moreover, they design long-term programs and expand their size, scope, and mission. Thus, regulations become more complex over time, creating job security for the bureaucrats.

**Problem 3:** Regulatory agencies and their regulated companies become “too friendly” over time. Thus, regulators become lenient on their regulated companies. Extreme form of “too friendly” is corruption, where the regulated companies pay bribes to regulators. Furthermore, regulators often retire from their bureaucracy and go to work for their regulated companies, earning greater salaries. Regulators use and maintain their political connections to government.

**Problem 4:** Regulations may conflict between different regulatory agencies because regulations differ between countries and between levels of government. For example, the State of California legalized marijuana for medicinal purposes. However, the U.S. federal government considers marijuana use illegal. For another example, the U.S. Department of Energy wanted electric power plants to use more coal, to reduce the U.S. economy’s reliance on petroleum during the 1970s. Nevertheless, the U.S. Environmental Protection Agency considered coal a dirty fuel and penalized its use (Palmer 1978).

**Problem 5:** Regulations become rigid because bureaucrats become accustomed to regulating in a certain manner and do not change when society changes.

**Problem 6:** Different government workers interpret the laws and regulations differently. Some government workers strictly enforce the law while others are lax. For example, the Internal Revenue Service (IRS) workers can give conflicting information to taxpayers because everyone interprets the complex, tax laws differently.

**Problem 7:** Regulations can do the opposite than intended. For example, U.S. government passed laws to preserve historical buildings. However, the law had the opposite impact because historical homes are more expensive to renovate, and government places many restrictions on historic homes. For example, if a homeowner wants to paint his historic home another color, he must ask a bureaucracy for approval, known as Historic Preservation. Some people do not want to buy or restore historic homes because they must deal with onerous government restrictions and high repair costs.

**Problem 8:** Regulators process documents slowly. For example, the State of Indiana in 1999 needed six months to inform whether a home in Indiana was historic or not. Author worked for an economic development agency in Indiana.

**Problem 9:** People with agendas and hidden motives can penetrate and become leaders of government bureaucracies. For example, an environmentalist who despises corporations becomes a director of an environmental agency, creating red tape and problems for businesses.
A woman who hates men becomes a judge or prosecutor for a domestic violence court or a family court. Consequently, she denies justice to a man.

**Key Terms**

<table>
<thead>
<tr>
<th>Term</th>
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<tbody>
<tr>
<td>Mandate</td>
<td>asymmetric information</td>
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<tr>
<td>patents</td>
<td>license</td>
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<tr>
<td>monopoly</td>
<td>social regulation</td>
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<tr>
<td>natural monopoly</td>
<td>Public Interest Theory</td>
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<td>externality</td>
<td>corporatism</td>
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<td>public good</td>
<td>Capture Theory</td>
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<td>non-rival</td>
<td>interest group</td>
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<td>Principal Agent View</td>
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<td>free riders</td>
<td>Parkinson’s Law</td>
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<td>quasi-public goods</td>
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**Chapter Questions**

1. U.S. government is proposing tougher emission standards for cars and trucks. Identify the market control and the regulation.

2. Why would a market and government agency protect buyers from purchasing defective, used cars?


4. Some people want the government to place strict limits on campaign fund contributions. They believe government has created too many laws and regulations that benefit the interest groups. Which theory of regulation would explain this?

5. Government bans the use and production of marijuana. Evaluate the total cost of this ban.

6. If government regulations cause so many problems, why do government officials continually expand regulations?
3. Demand, Supply, and the Market Process

Before students can study how government regulates the market, students must learn what a market is, and which factors influence market prices and quantities. A market has two opposing forces: Supply and demand. They form the foundation of economics. Producers and suppliers supply a product or service to a market and want to charge the highest possible price. On the other hand, consumers buy these products and services, but want to pay the cheapest price. Consequently, a market balances these two opposing forces. Furthermore, markets are inherently stable because a market always gravitates to a price that balances these two forces.

Demand Function and Consumers

A demand function represents the consumers in a market. A demand function shows the quantity and price of a good, which consumers are willing to buy, ceteris paribus. Ceteris paribus is a Latin term that means we allow one factor to change, but keep all other factors constant. In this case, we examine consumers’ demand for tea per year and allow the tea price to change. Therefore, we can determine the impact of price changes on quantity demanded. Ceteris paribus in this case means we hold all the other factors constant that influence the consumer, such as a consumer’s income, price of other goods, tastes and preferences, et cetera. We show a consumer’s demand for tea in Table 1 and Figure 1.

Table 1. A Consumer’s Demand for Tea per Year

<table>
<thead>
<tr>
<th>Price ($ per kilogram)</th>
<th>Quantity Demanded (kilograms)</th>
</tr>
</thead>
<tbody>
<tr>
<td>$2.50</td>
<td>5</td>
</tr>
<tr>
<td>$2.00</td>
<td>10</td>
</tr>
<tr>
<td>$1.50</td>
<td>15</td>
</tr>
<tr>
<td>$1.00</td>
<td>20</td>
</tr>
<tr>
<td>$0.50</td>
<td>25</td>
</tr>
</tbody>
</table>

Did you notice the slope of the demand function? It has a negative slope, which represents the Law of Demand. Law of Demand is consumers increase their quantity demanded as when a market price falls, ceteris paribus. Thus, market price and quantity move in opposite directions. Economists have three reasons to explain the Law of Demand:

**Reason 1:** Common sense – when products become cheaper, people buy more. Many businesses use consumer discounts and sales. For example, a person sees laundry detergent on sale and buys a year’s supply.

**Reason 2:** Law of Diminishing Marginal Utility. When a consumer consumes a product, he or she obtains satisfaction, which economists call utility. As a consumer keeps consuming additional units of the same good, the consumer gains less and less additional utility. This is the Law of Diminishing Marginal Utility. For example, a person drinks his first Pepsi of the day and
gains 100 utils. We use utils as a hypothetical unit for utility because economists cannot measure a consumer’s satisfaction level. Thus, the consumer values the Pepsi at $1 per bottle. Then this person consumes a second Pepsi and gains 50 utils. So, he values that Pepsi at $0.75. Every Pepsi the consumer drinks, yields less utility, so he values the product less until he stops drinking Pepsi.

\[ \text{Figure 1. Consumer’s demand function} \]

**Reason 3:** Law of Demand consists of the income and substitution effects. *Income Effect* occurs from a product’s price change. If a product's price falls, a consumer with a constant income can buy more. Thus, the consumer’s real income increases. For instance, a consumer earns $1,000 per month in income. If the beef price equals $2 per pound, the consumer can buy 500 pounds of beef. However, if the beef price falls to $1 per pound, the consumer can buy 1,000 pounds. Thus, the consumer sees his real income rise. *Substitution Effect* occurs from the change in consumer’s behavior. As a market price of a product decreases, people start buying it and substituting away from more expensive, similar goods. For example, if the market price for beef falls, and price for chicken remains the same, then the consumers substitute beef for chicken.

Figure 1 illustrates a demand function for one consumer in a market, while a market demand function represents all consumers in a market. Consequently, we derive a market demand function from the individual consumers in a market, which we depict in Figure 2. For example, two consumers are in the market, and each person has a demand function. We denote a person’s demand function by \( d \) while capital \( D \) represents market demand. Likewise, we denote the quantity demanded by \( q \) for a person, while \( Q \) represents the total market quantity. All consumers see the same market price. Thus, a market demand is the horizontally summation of quantity that each consumer buys at each market price. For example, at a market price of $2, Person 1 buys 10 units while Person 2 buys 15. Thus, the market demand is 25 units at $2 because we add 10 and 15. Then we select another market price and add the quantity consumers until we find enough points that define the shape of the market demand function.
Economists can measure the aggregate benefit to all consumers in a market, which we call consumers’ surplus. Consumers’ surplus consists of the area below the demand curve and above the market price. Using the tea market, if the market price equals $1.50 per kilogram, consumers’ surplus becomes the shaded triangle in Figure 3. We rank the consumers and by what they are willing to pay for the tea. First consumer gladly would pay $2.75 but only pays $1.50. Second consumer would pay $2.70 while the fifth consumer would pay $2.50, but they pay the market price, $1.50. Thus, these consumers benefit from the lower market price. If the market price falls to $0.50, then consumers’ surplus increases, which we show in Figure 4. Consumers’ surplus corresponds to a measure of social welfare. Social welfare is the total benefits that accrue to buyers and sellers in a market. Consequently, social welfare increases for consumers when a market price drops because consumers pay cheaper prices and consumers pay more quantities.
Demand functions have another characteristic - elasticity. *Elasticity* measures the sensitivity of consumers’ quantity demanded to changes in a market price. If consumers are sensitive to changes in a market price, then the demand function is *elastic*, and the demand function is relatively flat, which we depict in Figure 5. Furthermore, we compare the change in the quantity demanded to the change in the price. A small price change leads to a large change in quantity demanded. Elastic demand functions usually have many substitutes or a large income effect. Consequently, consumers are sensitive to the market price if the product has many substitutes or comprises a large portion of their income. Examples of elastic demand functions include air travel, private education, and expensive clothes. If consumers are not sensitive to price changes, then they have an *inelastic* demand function. These demand functions are relatively steep because these markets have few substitutes or a small income effect. We show an inelastic demand function in Figure 6. Again, did you notice the change in quantity compared to the change in price? Change in quantity is small. Examples of inelastic demand functions include alcohol, cigarettes, and gasoline.
Economists distinguish between “quantity demanded” and “change in demand.” Change in quantity demanded follows a movement along the same demand function because the product’s market price is changing. We depict a movement along the demand function in Figure 7. After we introduce the supply function, a changing supply function can cause consumers to move along a demand function.

Other factors influence consumers’ demand for products other than market price. When other factors change, then the demand function increases or decreases. We show an increase in demand in Figure 8, where the demand function shifts rightward. Nevertheless, factors can decrease the demand function, shifting the function leftward. We show a demand decrease in Figure 9. We do not violate the ceteris paribus because we let one factor change to determine the impact on the market.
We list seven factors that shift the demand function rightward.

**Factor 1:** If consumers’ income rises, and they buy more, we define the good as *normal*, ceteris paribus. Economists classify most products and services as normal goods. Consequently, consumers with greater incomes will more products. On the other hand, some products are *inferior*, whereas consumers buy fewer products when their incomes increase. Examples of inferior goods include rice, Ramen noodles, and bus travel.

**Factor 2:** If more consumers enter the market, then consumers buy more, ceteris paribus. Thus, more consumers mean they buy more, increasing demand.

**Factor 3:** Price of other products shifts demand functions. If a product is a *substitute* and the substitute’s price increases, then consumers buy more, ceteris paribus. For example, if the price of chicken increases, then consumers boost their demand for beef, ceteris paribus. Consumers substitute away from the more expensive chicken. If one product is a *complement*...
and the complement’s price decreases, then consumers increase their demand for the good. For instance, if the price of DVD players falls, consumers increase their demand for DVDs, ceteris paribus. A consumer cannot watch DVDs without the DVD player, so a cheaper player encourages consumers to buy more DVDs. As an illustration, Sony sells the PlayStation 3 console for a loss but earns profits from the games.

**Factor 4:** Consumers expect changes in future prices, future availability, or future income can shift demand. If people believe tea will become more expensive in the future, then people buy more tea today to stock up, increasing the demand of tea, ceteris paribus.

**Factor 5:** Demographic changes shift demand functions. For example, the average age in the U.S. is increasing. Thus, older people increase their demand for health care as the U.S. population ages, ceteris paribus. On the other hand, Malaysia largest age group is children. So, parents have large demands for kids clothes, toys, and school supplies.

**Factor 6:** Consumers change their tastes and preferences. For instance, scientists stated coffee reduces colon cancer and improves health; thus, consumers boost their demand for coffee, ceteris paribus. They want the health benefits from coffee.

**Factor 7:** Weather can shift the demand functions. For example, people drink more cold soft drinks during a hot summer, ceteris paribus.

The same seven factors can decrease the demand function, shifting it leftward. We just reverse the logic. For example, buyers leaving a market decrease the demand function because the market has fewer buyers.

**Supply Function, and the Producers and Sellers**

**Supply function** shows the prices and quantities that producers and sellers are willing to supply, ceteris paribus. For example, tomato producers have the supply schedule in Table 2 and the graph in Figure 10. Did you notice how the supply function has a positive slope? This reflects the **Law of Supply**, where producers and sellers supply more as a good’s price rises, ceteris paribus. A greater market price provides an incentive to producers and sellers. They could earn higher profits by expanding production. In some cases, as production increases, producers pay greater production costs. Thus, the higher market price would offset the greater production costs.

**Table 2. Producers’ Supply of Tomatoes per Year**

<table>
<thead>
<tr>
<th>Price ($ per kilogram)</th>
<th>Quantity Supplied (1,000 kilograms)</th>
</tr>
</thead>
<tbody>
<tr>
<td>$5</td>
<td>100</td>
</tr>
<tr>
<td>$4</td>
<td>80</td>
</tr>
<tr>
<td>$3</td>
<td>60</td>
</tr>
<tr>
<td>$2</td>
<td>40</td>
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<tr>
<td>$1</td>
<td>20</td>
</tr>
</tbody>
</table>
A characteristic of supply functions is producers’ surplus. *Producers’ surplus* represents the area above the supply curve but below the actual market price. We use producers’ surplus to measure social welfare, it benefits all producers in the market. Producers’ surplus equals total fixed costs plus profits that we represent as the shaded area in Figure 11. Some producers can supply tomatoes to the market for $1.00. However, these producers benefit because the market price exceeds their costs. Thus, they earn profits. Market price can change for the producers. For example, if the price of tomatoes increases to $5, the producers benefit and earn more profits as depicted in Figure 12.

![Figure 10. Supply function for tomatoes](image)

**Figure 10. Supply function for tomatoes**

Another characteristic of supply functions is *elasticity*. Elasticity for supply functions is caused by time. In the short run, producers and sellers cannot expand production quickly to price changes. Consequently, producers and sellers are not sensitive to price changes in the short run. Supply functions are relatively steep and are *inelastic* as shown in Figure 13. In the long run,
producers and sellers have time to change plant size and invest in machines and equipment. Thus, long-run supply functions are relatively *elastic*. We depict another example in Figure 14.

![Supply Function](image1.png)

**Figure 12. Producers’ surplus increases for a greater market price**

![Supply Function](image2.png)

**Figure 13. Inelastic supply function**

For example, Intel has short and long run supply functions. If the price of computer chips (microprocessors) rises, Intel can expand its production to the maximum capacity of 100% in the short run, producing at full capacity. Consequently, Intel would employ more labor and resources if it was operating below production capacity. If Intel believes the market price increase is permanent, Intel can build a new factory to produce computer chips. Thus, Intel greatly expands its production capacity to meet the higher demand.

Similar to demand functions, economists distinguish between change in “*quantity supplied*” and “*change in supply*.?” Change in quantity supplied is a movement along a supply function, which results from changes in market prices. We show a movement along a supply function in Figure 15. A change in supply is a decrease or increase of the supply function.
Other factors in the market can change other than a market price. These factors affect the producers’ and sellers’ behavior. Some factors increase supply, shifting the entire supply function rightward. We show a supply increase in Figure 16. Other factors decrease supply, shifting the entire supply function leftward. We depict a supply decrease in Figure 17. Do not think of shifting supply functions “up” or “down.” A supply function shifting upward does not represent an increase. This becomes a decrease in supply!

Following factors shift the supply function rightward:

**Factor 1:** A falling resource prices increase supply functions. If firms and producers pay lower labor wages or price for resource materials, they pay lower production costs and boost their production to supply more, ceteris paribus.

**Factor 2:** Technological advances increase supply functions. Firms and producers adopt new technology. Firms produce more output when they use the same level of resource inputs, ceteris paribus.
Factor 3: Nature and political disruptions can impact greatly supply functions. For example, favorable weather increases agricultural production, thus producers and sellers supply more agricultural products to the markets, ceteris paribus. If politicians resolve a war, producers and sellers supply more to a market, ceteris paribus. Usually producers and sellers flee or hide their resources to protect themselves and property during wars and political disruptions.

Factor 4: Government decreases taxes or increases subsidies for producers and sellers. Decreasing taxes or increasing subsidies decrease business costs, and firms and producers can provide more at each price, ceteris paribus.

Factor 5: Government reduces regulations because firms pay greater cost to comply with regulations. Firms and producers hire specialists who write government reports and ensure employees follow regulations. Regulations force firms and producers to invest into machines
and equipment to comply with regulations. For instance, U.S. electric power companies must lower air pollution by investing in machines that reduce pollution from smokestacks.

**Factor 6:** Price of other goods shifts supply functions. For example, soybean farmers switch production to corn if the corn market price rises, ceteris paribus.

**Factor 7:** Producer's expectations of future prices can shift supply functions. If producers and sellers expect lower sugar prices next year, then some firms quickly sell sugar this year, boosting the sugar supply this year.

**Factor 8:** Number of sellers or producers in the market increases because more sellers in the market produce more, ceteris paribus.

*Equilibrium Market Prices and Quantities*

A market is an institution that brings buyers and sellers together for specific goods and services. Some examples of markets are the foreign currency market, commodity markets, and the New York Stock Exchange. New York Stock Exchange brings buyers and sellers of stock for well-known corporations together.

We assume a market has perfect competition. Market has a large number of independent buyers and sellers. For example, if a market has one seller, that seller can dominate and influence the market price. Likewise, one buyer in a market can affect the market price in his or her favor. We depict a competitive market in Figure 18 for cookies. For instance, a market price for cookies at $2 causes consumers to buy 10 units while producers sell 10 units. Thus, the quantity supplied equals quantity demanded. We refer to this market price and quantity as equilibrium. *Equilibrium* is a state of rest because the market price and quantity do not change as long as another factor does not change.

\[ \text{Figure 18. Cookie market} \]

Unregulated markets are stable, and market prices always gravitate to equilibrium prices and quantities. For example, a price shock occurred that caused the market price for cookies to soar to $3. At this price, quantity supplied exceeds quantity demanded. Market has a *surplus* of
cookies because the producers want to supply more cookies than consumers want to buy. Thus, the store shelves are brimming and overflowing with cookies, so the producers and sellers of cookies must lower the price until the market clears at $2. On the other hand, another shock has occurred, and the market price falls to $1. At this price, quantity supplied is less than quantity demanded. Hence, the market has a shortage because the producers and sellers have empty shelves of cookies. Consumers demand more than the suppliers have in stock, so consumers bid prices up until the market price equals $2. Consequently, a competitive, free market eliminates shortages and surpluses.

**Changes in Supply and Demand**

Factors can shift supply and demand functions, changing equilibrium market prices and quantities. For example, we show the beef market in Figure 19. Consumers eat beef while cattle producers supply it. If the market price of chicken increases, and chicken substitutes for beef, then consumers boost their demand for beef, shifting the demand function rightward. Consequently, consumers substitute the cheaper beef for chicken, and both market price and quantity for beef rise.

![Figure 19. Beef market](image)

For another example, consumers experience an unusual cold summer. Consumers drink soft drinks while producers supply them. We depict a market for soft drinks in Figure 20. Consumers drink fewer soft drinks, decreasing demand. Demand shifts leftward, and both market price and quantity for soft drinks fall.

Computer industry adopts technological advances in making computer chips. We display a computer market in Figure 21. Consumers buy computers while computer companies supply them. Producers and sellers implement the new technology and produce cheaper computers from the cheaper computer chips. Thus, the supply function increases and shifts rightward. Market price falls while market quantity rises for computers.
We show the automobile market in Figure 22. Producers supply automobiles while consumers buy and drive them. Labor unions successfully raise workers’ wages at car factories. As firms pay higher workers’ wages, their production costs rise. Hence, the supply function decreases and shifts leftward. Market price for automobiles increases while market quantity decreases.

Two or more factors can change, shifting both supply and demand functions. For these cases, either we know the change in price or quantity while the other variable is indeterminate. Nevertheless, we do not need to change multiple factors in the market for this textbook.

*The Invisible Hand*

Adam Smith, the Father of Economics, coined the term the *invisible hand*. Prices are an invisible hand that brings “buyers and sellers into harmony.” For instance, the apple market has a surplus of apples. Apple sellers will lower price until sellers sell all surplus of apples. Consequently, sellers’ profits fall from the lower market price. On the other hand, what would
happen if the apple market has a shortage of apples? Sellers will raise the price until the shortage disappears, thus, increasing their profits. When government sets a market price, government bureaucrats are not likely to set prices correctly because persistent shortages plague the Socialist countries.

![Figure 22. Automobile market](image)

A free market hinges on free movement of market prices. Market prices communicate information and affect millions of consumers and producers around the world. Market prices direct individuals to channel their self-interest into productive activities that promote the economic well-being of society. For example, a medical doctor pursues his self-interest to become rich. Thus, the doctor cures people, so people remain productive, and a society benefits.

Firm has a self-interest to earn profits. Firms earn profits when total revenue exceeds total costs. A firm earns revenue as it sells to customers and pays costs to use resources to make products. If a firm earns a profit, the consumers value the product more than the resources the firm used to manufacture the product. Therefore, profits cause the industry to expand over time. On the other hand, what would happen if firms earn losses? Consumers value the product less than the resources a firm needs to make it. Losses cause an industry to contract over time as some firms leave the market. Thus, the producers and suppliers transfer resources to another industry to produce goods and services for another market.

Market efficiency depends on competitive markets, well-defined private property rights, and minimal interference from government. Therefore, a society obtains the greatest social welfare. Producers sell their products for the highest price possible while consumers pay the lowest price, maximizing trade between them. Thus, a competitive market maximizes social welfare, which we depict in Figure 23.
Figure 23. Unregulated market maximizes social welfare

Key Terms

demand function

ceteris paribus

Law of Demand

Law of Diminishing Marginal Utility

utility

income effect

substitution effect

consumers’ surplus

social welfare

elasticity

elastic

inelastic

quantity demanded

change in demand

normal good

inferior good

substitute

complement

supply function

Law of Supply

producers’ surplus

quantity supplied

change in supply

equilibrium

surplus

shortage

invisible hand

Chapter Questions

1. A large hurricane hits Central America, destroying the coffee plants and increasing the coffee’s world price. What happens to consumers’ surplus?

2. A private college raises tuition, and many students transfer to another college. Identify whether education from a private college is an elastic or inelastic product.

3. The 2007 Great Recession has reduced consumers’ incomes. Evaluate the demand for consumer products.
4. Government expands a small road into a highway. Evaluate the change to the stores and restaurants that lie located along this road.

5. A scientific study concludes the artificial sweetener, aspartame, causes cancer. Evaluate the change to consumers’ demand for aspartame.

6. Price for Sony PlayStation 3 consoles decreases. Appraise the change in the demand for Sony PlayStation games.

7. An unusually cool summer causes consumers to decrease their demand for cold drinks, reducing their market price. Evaluate the changes to producers’ surplus for cold drinks.

8. When gasoline prices were high in the summer of 2007, consumers wanted fuel-efficient cars and paid high prices for hybrid cars. Appraise the supply elasticity of hybrid cars.

9. Government mandates the gasoline suppliers add ethanol to gasoline, and producers make ethanol from corn. What do you expect to happen to the supply function for soybeans if the mandate causes greater corn prices?

10. Government imposes a mandate, requiring all businesses and producers to offer free health care to all employees. What happens to the supply function for products and services?

11. Genetic engineering creates a new strain of corn. This new strain lets farmers double their corn harvest rate, even when they use the same level of fertilizer, water, etc. What happens to the supply function for corn?

12. Government hikes the tax on cigarettes. What happens to the supply function for cigarettes?

13. Socialistic countries tend have shortages for many products. Does this violate the assumption of stable markets, where markets eliminate any shortages and surpluses?

14. The 2007 Great Recession has lowered consumers’ incomes. If cars are a normal good, appraise the changes to the market for new cars.

15. Labor market for automobile workers experienced trouble during the 2007 Great Recession. Businesses and producers demand labor while workers supply labor. Price of labor is the wage rate. Automobile companies earned massive losses as consumers reduced their purchases of new cars. What happens in the labor market for automobile workers?

16. We assume tea and coffee are substitutes. What happens in the coffee market if the tea price falls?

17. Consumers prefer the LCD and plasma flat-screen TVs, but they shun the traditional tube TVs. What do you predict is occurring in the T.V. industry?
4. Government Interference of the Market

Government can enter a market and impose a regulation because government sees a problem and wants to correct it. Government can step into a market and imposes a new price, impose a quantity limit or a quality standard on a market. However, these regulations can cause long-term economic consequences that the government did not foresee, or the government completely ignored. We study the economic impacts of these regulations and controls. Furthermore, government must finance a bureaucracy to enforce its regulations and controls. Thus, government must impose taxes on a market to finance its bureaucracies. Unfortunately, taxes affect the markets negatively, lowering the economic activity. Finally, government may grant a subsidy to expand a market. We examine the economic impact of taxes and subsidies on the market. Finally, if a government imposes excessive regulations, taxes, and subsidies, then black markets thrive and expand. Consequently, we study the characteristics of black markets.

**Government Price Controls**

Price controls are government-mandated prices. Government either thinks a market price is too high or too low and intervenes in a market. For instance, government imposes a *price ceiling*, which is a legally established maximum price that sellers can charge to buyers. For example, the New York City government imposes rent controls on the rental market. A rent control is the maximum price that property owners can charge for apartment rent. We show a market for rental properties in Figure 1. Equilibrium market price is \( P^* \) while quantity is \( Q^* \). Renters represent the demand function while the property owners and landlords represent the supply function.

![Figure 1. Shortage in the rental market](image)

Government believes the apartment rent is too expensive and sets a price ceiling at \( P~ \). Price ceiling is lower than the market price. Direct effect is the quantity demanded is greater
than quantity supplied, thus creating a **shortage** of rental properties in the market. If the market were unregulated, then a shortage would cause the market price to increase. However, the government locks the price at its maximum, and the shortage never disappears.

Secondary effects from price ceiling occur over time that exacerbates the rental shortage. First, renters could wait for a long time for available apartments. Second, renters may pay “under the table” payments to the property owners. Third, property owners do not invest in new rental housing because they receive low market rents and earn lower profit. Fourth, property owners may lower costs by decreasing maintenance and repairs, causing the quality of housing to deteriorate over time. Finally, the landlords convert the apartments into condominiums and sell them, reducing the supply of rental housing over time. Consequently, the secondary effects could compound and become worse over time.

If a price ceiling exceeds the market price, then the price control has no effect on the market. This is a very good trick question on exams. A government could set intentionally the price ceiling too high. Then it informs its citizens that it has done something, but its policy has no impact on the market.

A price ceiling lowers social welfare in a market. Producers manufacture $Q_S$ units while consumers want to buy $Q_D$ units. We show the consumers’ and producers’ surpluses in Figure 2. Consumers’ surplus represents the lightly shaded region while the producers’ surplus is the medium shaded triangle. Consequently, producers are hit harder by price ceilings. Black triangular region represents the **deadweight loss** to society, and nobody gets this! This becomes a loss to society because the government has intervened in the market.

![Figure 2. Social welfare for a market with a price ceiling](image)

A price control can be a price floor. A **price floor** is a government set the legally established minimum price that buyers must pay. Many countries impose minimum wage laws on labor markets, boosting workers’ wages. We depict a labor market in Figure 3. Market price is $P^*$ and market quantity is $Q^*$. Market price is the wage rate while quantity is the number of labor working hours. People supply labor while businesses demand labor.
Government believes workers’ wages are too low and passes a law requiring employers to pay a minimum wage. Government sets the price control higher than the market price. Price control creates a direct effect, causing the quantity supplied to exceed quantity demanded. Thus, the labor market has more workers than available jobs, creating a surplus of workers. This surplus of labor has a special term for the labor market, which we call “unemployment.” Moreover, market forces should cause the market price to fall, causing the surplus to disappear. However, the government control “locks” the price at its minimum. Consequently, the surplus never disappears.

**Figure 3. Surplus in the labor market**

Secondary effects occur over time. Employers are hit with higher costs. Thus, they reduce costs such as reducing or eliminating benefits, such as health insurance, job training, or pension plans. Moreover, minimum wage laws tend to hurt unskilled labor, the poor, and teenagers more because they have more trouble finding jobs. Usually, employers pay skilled labor greater wages that exceed the minimum wage, and they pay unskilled workers lower wages.

If the price control is lower than the market price, then the price control has no effect on the market. For instance, professional jobs tend to pay more than minimum wage. Thus, a minimum wage law would not affect professional jobs. This is a good trick question on exams.

A price floor reduces social welfare in a market. Consumers buy $Q_D$ units while producers supply $Q_S$ to the market. We show the consumers’ and producers’ surpluses in Figure 4. Consumers’ surplus is the lightly shaded triangular region while the producer surplus is the darker region. Consequently, the consumers are hit harder by price floors. Black triangular region represents the deadweight loss to society, and nobody gets this! Society loses this because the government intervened in the market.

**Quantity Restrictions**

Government can impose quantity restrictions upon the markets. We discuss a variety of quantity restrictions in this book. For example, government can limit the quantity of imports...
from a foreign country. During the 1980s, U.S. government limited the number of cars the Japanese could export to the United States. We discuss import restrictions in Chapter 11. For another example, a government can restrict the quantity of pollution that firms can discharge into the environment. We discuss pollution restrictions in Chapter 19. Finally, a government can restrict the number of fish that fishermen can catch. We discuss restrictions for renewable resources in Chapter 18.

![Figure 4. Social welfare for a market with a price floor](image)

For this chapter, we can illustrate a simple quantity restriction. For instance, a government restricts the number of taxi drivers that can operate in a city. We show the market for taxi services in Figure 5. We denote the market quantity by \( Q^* \) and the market price by \( P^* \). Government believes the city has too many taxis driving along the streets, and it limits the number of taxis to \( \bar{Q} \). For the quantity restriction to affect the market, government must set the quantity restriction below the market quantity. If the government imposes a quantity restriction that exceeds the market quantity, the restriction will have no effect on the market. Consequently, consumers pay a higher price to ride in taxis, and they lose consumers’ surplus of the medium shaded rectangle above the market price, \( P^* \). Government’s quantity restriction creates a deadweight loss equal to the black triangle. Taxi drivers may benefit from the quantity restriction if they gain producers’ surplus from the medium shaded rectangle that exceeds their deadweight loss. Taxi drivers’ deadweight loss is the bottom, black triangle below \( P^* \).

Quantity restriction can have unintended effects. For example, City of New York City created the medallions in 1937. Medallion serves as a license that allows a taxi driver to operate a taxi in the city. Every taxi drivers must possess a medallion. Problem is the city limited the medallions to 13,150. Since New Yorkers have a large demand for taxi services while the medallions limit the taxi supply, the market price for a medallion has exceeded a million dollars in 2013. If a new taxi driver wanted to enter the market, he or she would need to collect a large amount of taxi fares to cover a medallion’s cost.
Figure 5. Government imposes a quantity restriction on the market

Quality Mandates

Government imposes quality standards on food, children’s toys, cars and trucks, and many more products and services. It wants to improve product safety or reduce health hazards. For example, government imposes quality standards on drinking water. Producers and suppliers remove the metals and salts from drinking water that meet the government’s standard. Some communities, water companies must add fluoride in the water because fluoride strengthens teeth.

We start with the water drinking market in Figure 6, where we denote equilibrium quantity as Q* and market price as P*. Government passes a law requiring the water suppliers to remove more salts and metals from the water. Suppliers must process the water more and invest in machines and equipment. Thus, the water suppliers must pay additional costs, shifting the supply curve leftward and reducing supply. Consequently, the consumers pay a greater market price and buy less quantity. Producers gain some consumers’ surplus, which is the medium shaded rectangle above the original market price. However, society loses the black triangle that represents the deadweight loss of the quality standard. Therefore, producers can benefit from the quality standard if the producers’ surplus they gain exceeds their deadweight loss. Producers’ deadweight loss is the bottom black triangle below P*.

We assume the water companies pay greater costs to improve the quality. If a water company pays lower costs to supply a higher quality drinking water, then the company already would be producing the drinking water. However, a firm’s cost could fall if the quality standard leads to innovation. Firm discovers new technology where the firm can meet the government’s quality standard for a lower cost. In this case, the quality standard would improve social welfare because supply increases and shifts rightward, reducing the market price as suppliers produce more units. We study this possibility under the Porter’s Hypotheses in Chapter 19.
Economists distinguish between two ideas: *Economic tax incidence* and *statutory tax incidence*. Economic tax incidence illustrates the economic burden of a tax, and how buyers and sellers would share the tax burden. A statutory tax incidence identifies the party the government selects to pay a tax. In other words, a government determines who collects and sends the taxes to the government. Economic tax and statutory tax incidences always differ.

We show an example of a tax in a pizza market in Figure 7. Original equilibrium market price is $P^*$. Market quantity is $Q^*$, and the market has no taxes. Government imposes a $1 tax on each pizza and places the statutory incidence on the pizza producers. Thus, the producers collect and remit the taxes to the government. We define the tax rate as $s$ per-unit tax. We could expand this analysis to include a percentage sales tax, but a percentage tax would change the slope of the supply function. A $1 per unit tax only shifts the supply function leftward.

Pizza tax shifts the supply function leftward by exactly $1. If the original market price were $10 per pizza ($P^*$), the new price would not be $11. New price lies between $10 and $11 because the tax changed consumers’ behavior. Tax caused a higher market price, so fewer consumers buy pizza. (Do not forget the Law of Demand). New quantity of pizzas is $Q_T$, which we call the tax base. *Tax base* is the total amount of goods in a market, which government taxes. As government increases the tax rate, the tax base always fall. Tax creates a price wedge because consumers pay $P_T +$ tax for each pizza while pizza producers keep $P_T$. Remember; the pizza producers must send the tax to the government. Size of the price wedge is the tax.

Government collects tax revenue from pizza, which is the tax multiplied by the tax base, or the rectangle, $Q_T \cdot tax$. Tax revenue equals the lightly shaded plus the darkly shaded rectangles in Figure 7. Lightly shaded rectangle is the economic tax burden on consumers while the darkly shaded rectangle is the economic tax burden on producers. Furthermore, the black triangle is the deadweight loss of taxation, and nobody receives this revenue. This becomes a loss to society because government interfered with the market. Remember, the government decreased the size
of the market because it increased the market price. Deadweight loss of taxation reduces social welfare.

Figure 7. Government taxes the pizza market, and the producers remit taxes to government

What happens to the market if government switches the statutory tax incidence to the buyers? Using the same example with the pizza market, government imposes a $1 pizza tax on the buyers that we show in Figure 8. In this case, the buyers send the tax to the government, and the demand function shifts leftward by $1.

Figure 8. Government taxes the pizza market, and the consumers remit taxes to government
Consumers pay pizza producers the market price, $P_T$ and then remit the one-dollar tax to the government. Thus, consumers pay $P_T + \text{tax}$ while firms receive $P_T$. Tax burdens the consumers by the lightly shaded rectangle while the tax burdens the producers by the darkly shaded rectangle. Black triangle is the deadweight loss to society. Consumers and producers do not share the tax burden equally because the rectangles appear equal in size.

Theoretically, it makes no difference, who sends the tax to the government. We have shown the economic tax incidences are the same whether the consumers send the taxes to the government or the producers. However, consumers usually outnumber the pizza producers. Consequently, government must monitor the producers and ensure they pay taxes to the government. A government would not depend on the consumers’ honesty to send the tax to the government. Tax evasion will be greater if government had placed the statutory incidence on the consumers because the government would have more people to monitor.

Economists use elasticities of demand and supply to predict which party has the larger tax burden. For example, gasoline, beer, liquor, and cigarettes are inelastic demand functions relative to supply functions. Thus, the consumers are not sensitive to price changes, so a rising price causes little drop in quantity demanded. Hence, these are perfect products for a government to tax because the burden falls on consumers, and the tax has little impact on the market. If government taxes a product with an elastic demand function, the higher price from the tax causes a market to shrink, or the market goes underground.

**Tax Rates, Tax Revenue, and the Laffer Curve**

A family pays an *average tax rate*, which we compute in Equation 1. If a family pays $5,000 in income taxes and earns $20,000 of income per year, then the family has paid an average tax rate of 25%. Economists use the average tax rate to classify a country’s income tax system.

\[
\text{Average tax rate} = \frac{\text{tax liability}}{\text{taxable income}} \cdot 100\% = \frac{.000}{.000} \cdot 100\% = 25\% 
\]  

(1)

We use the average tax rate to classify which tax a government imposes on its society, which are:

**Type 1:** A *progressive tax rate* has an average tax rate that rises with income. Low-income households pay small average tax rates while high-income households pay higher tax rates. U.S. federal and state governments impose progressive tax rates on family and business income.

**Type 2:** A *proportional tax rate* is the average tax rate stays the same across all income levels. For example, Russian government imposes a 13% tax on income. Rich or poor Russians pay the same proportion of their income to the government.

**Type 3:** A *regressive tax rate* is the average tax rate falls with income. As a person’s income increases, his average tax rate declines. Regressive taxes economically harm the poor and people living on fixed incomes. Property taxes, sales taxes, and excise taxes are regressive taxes because income does not determine the rate. An excise tax is a government imposes a tax
on a particular good, such as excise taxes on cigarettes, alcohol, and gasoline while a government applies a sales tax to goods that consumers buy in a store.

Social Security and Medicare taxes are regressive taxes because once income exceeds a threshold, a government stops collecting the tax on income. For example, a wealthy person earned $1 million in salary. U.S. federal government would collect Social Security taxes on the first $113,700 of income in 2013, and a government does not collect taxes on the remaining $886,300 in income. Government imposes a 12.4% tax for Social Security, so this wealthy person would pay $14,099 in taxes, which is 1.4% of the person’s income. A person earning $113,700 pays 12.4% of his or her income.

Many economists consider a sales tax on food a regressive tax. For instance, two families spend $10,000 each on food per year. If the sales tax equals 7%, then government collects $700 from each family per year. If the first family has an income of $50,000, then their average tax rate on food is 1.4% while a second family with an income of $20,000 pays 3.5% of their income for the food tax.

**Laffer Curve** shows the relationship between tax rates and tax revenues. We show a Laffer Curve in Figure 9, and we know two points. If a government sets the tax rate to 0%, then the government collects zero tax revenues. If a government imposes a tax rate of 100%, then the government collects zero tax revenue. Nobody would work if a government took all a person’s income.

![Image of Laffer Curve](image.png)

**Figure 9. Laffer Curve**

Laffer Curve imbeds the behavior of consumers and producers. As a government raised the tax rate, the tax base decreases. Tax base is the activity a government taxes. However, if tax rates are low, and a government increases the tax rate, government collects more revenue. A government collects more in revenue per item taxed than the amount the tax base falls. Similarly, if taxes are high and government raises tax rates, the tax base plummets more than the amount...
government collects a larger tax on each item. Thus, we show a particular tax rate maximizes government revenue in Figure 9. A government imposing a 40% tax rate maximizes its tax collections. If government increases or decreases the tax rate, then tax revenue falls. Figure 9 is only an example because economists do not know the exact shape of these curves (Becsi 2000; Laffer 2004).

President Ronald Reagan used the Laffer Curve as his economic plan, which he called Reaganomics. President Reagan lowered tax rates during the 1980s in the United States, decreasing the average tax rates for the ‘rich.’ Between 1980 and 1990, the top 1% of income earners paid a whopping 51.4% more in taxes because the economy grew rapidly. Usually rich people hire consultants or pay bribes to lower their tax payments in high-tax countries. Consequently, government collects little taxes, making high tax rates ineffective (Laffer 2004).

**Government Subsidies**

A subsidy is a government pays suppliers and producers to expand production and increase employment. Thus, a subsidy is the opposite of a tax. Usually, governments subsidize their agricultural producers. We depict a dairy market in Figure 10. Consumers who drink milk represent the demand function while dairy farmers represent the supply function. Equilibrium market price is $P^*$. Market quantity is $Q^*$, and the government pays no subsidies.

![Figure 10. Government subsidizes the milk market](image)

Government believes the low dairy prices are economically harming the dairy farmers, and the government pays them a subsidy. Consumers pay the price, $P_S$ while dairy farmers receive the price plus the subsidy, which equals the $P_S + \text{subsidy}$. Consequently, the subsidy creates a price wedge with the difference being the subsidy in $\text{s per unit}$. Similar to a tax, this subsidy shifts the supply function rightward and does not alter the slope. Consequently, the subsidy
expands milk production to $Q_S$ while a government pays a total subsidy of the rectangular region. We compute the government’s subsidy by multiplying the subsidy times the $Q_S$ units, which is the lightly shaded, darkly shaded, and black areas. Black rectangle represents the deadweight loss to society because government interfered with the market. Lightly shaded area is the benefit to consumers while the darkly shaded area is the benefit to dairy farmers.

Subsidy expands the dairy market and the dairy industry could hire more employees. However, for the government to pay a subsidy, the government must assess taxes on another market. Thus, the subsidies and taxes both create deadweight losses on society. Subsidies can create large deadweight losses because government must impose taxes on other markets to pay the subsidies.

**Black Markets**

Price controls, regulations, and taxes can lead to black markets. Black markets are markets that operate outside the legal system. Economists also refer black markets as the shadow or hidden economy. Black markets exist for five reasons:

**Reason 1:** Black markets supply illegal products and services including drugs, prostitution, gambling, and smuggling.

**Reason 2:** People use black markets to avoid high taxes. People can use barter to avoid high taxes. Barter is two people trade goods or services with each other, and they do not exchange money. Thus, they place no value upon the trade and hence, pay no taxes. Other ways to avoid high taxes is people and businesses underreport income and assets or overstate debt and liabilities. Another example is taxpayers in the United States can claim children on U.S. federal taxes. More children mean lower taxes. Some people claimed their animals as children to reduce their taxes. People no longer get away with this practice because the government verifies children’s identities.

**Reason 3:** People circumvent price controls. People participate in “under the table” payments or ignore the price controls.

**Reason 4:** People or businesses avoid costly regulations. Governments tend to regulate highly labor markets in many countries. For instance, many U.S. employers hire foreigners from Mexico who do not have proper documents to work legally in U.S. Employers pay foreigners lower wages. Moreover, the illegal workers may not turn in their employers for violating labor laws and regulations.

**Reason 5:** A country has a declining civic loyalty to the government. People lose respect for their government institutions because they are tired of the widespread political corruption. If people have little respect for government, subsequently, they evade or stop paying their taxes.

Supply and demand analysis works the same for black markets. Black markets have a supply and demand function. However, producers in black markets can supply more defective products, earn higher profits, and entail greater risk. Producers face risks because a government arrests them, assesses fines and fees, and/or sentences them to jail or prison. Moreover, black market participants face greater violence as criminal leaders enforce contracts, renegotiate, or break contracts.
U.S. government initiated the War on Drugs policy in the 1960s. We show a market for marijuana in Figure 11. Suppliers of marijuana are the drug dealers while the demand represents the users. We denote the equilibrium market price and quantity as $P^*$ and $Q^*$. Government begins a policy of tracking down and incarcerating the drug dealers, decreasing the market supply and shifting it leftward. Consequently, the market price increases while the market quantity decreases. Unfortunately, the higher drug price attracts new suppliers to the market. Consequently, the government’s drug policy fails because government continuously builds new prisons to house the drug dealers and new criminals.

**Figure 11. Black market for marijuana**

Black markets can create secondary effects. Since the government made drugs illegal, it boosted market prices for drugs. Where do the consumers or drug users get the money to finance their habits? Many drug users may not work at steady jobs especially drug users addicted to hard-core drugs such as cocaine, meth, and heroin. They steal, commit fraud, break into homes or rob people to obtain money. Thus, a high market price for drugs may force more users to commit crimes to pay for their habits, boosting the crime rate. Consequently, government must expand its police, courts, and prisons to tackle and imprison the drug users.

If a demand exists for a product or service, someone will always supply it. For the government’s War on Drugs to work, it must focus on the demand side. If government imposed harsh sentences on the users, then demand would fall, and the market price would decrease. Then suppliers are not attracted to the market. For example, China inherited the opium drug problem from the British Empire. Then the Chinese government solved it drug problem by executing any opium users on the spot, extinguishing the opium drug trade quickly. Most countries are not willing to go this extreme to eliminate its drug problem.

Government intervening in a society can encourage black markets to form. Societies plagued by sizable black markets have two problems. First, black markets reduce the tax base, which could cause a government to hike taxes, making up for the lower tax collections. Furthermore, lower tax collections cause the government to reduce investment in infrastructure, such as roads and bridges. Second, government statistics are inaccurate. For example,
government reports a higher unemployment rate than the actual rate. Black market participants do not report they are working, raising suspicion about their illegal activities.

Table 1. Size of Hidden Economy for Several Countries

<table>
<thead>
<tr>
<th>Size of Hidden Economy</th>
<th>% of Real GDP 1990 – 1993</th>
<th>% of Real GDP 1999</th>
<th>% of Real GDP 2007</th>
</tr>
</thead>
<tbody>
<tr>
<td>China</td>
<td>13.2%</td>
<td>11.9%</td>
<td></td>
</tr>
<tr>
<td>Hong Kong</td>
<td>17.0%</td>
<td>16.0%</td>
<td></td>
</tr>
<tr>
<td>Japan</td>
<td>11.4%</td>
<td>11.0%</td>
<td></td>
</tr>
<tr>
<td>Nigeria</td>
<td>58%</td>
<td>53%</td>
<td></td>
</tr>
<tr>
<td>Malaysia</td>
<td>32.2%</td>
<td>29.6%</td>
<td></td>
</tr>
<tr>
<td>Mexico</td>
<td>30.8%</td>
<td></td>
<td>28.8</td>
</tr>
<tr>
<td>Russia</td>
<td>47.0%</td>
<td>40.6%</td>
<td></td>
</tr>
<tr>
<td>United States</td>
<td>8.8%</td>
<td>8.4%</td>
<td></td>
</tr>
</tbody>
</table>

Source: Schneider and Williams. 2013

Black markets thrive in countries with high taxes, regulations, subsidies, and price controls (Ioan 2009). We show in Table 1 the approximate size of hidden economies for several countries. Be careful of results because economists have difficulties measuring the size of the hidden economy because many participants in black markets are not honest about their participation.

Size of black markets shrinks if government removes price controls, lowers tax rates, reduces regulations, and fosters competition. Moreover, corruption could fall as well. Corruption thrives whenever sources of power emerge, such as tyrants leading the government, or monopolies dominating a market.

Key Terms

- price ceiling
- shortage
- social welfare
- deadweight loss
- price floor
- surplus
- economic tax incidence
- statutory tax incidence
- tax base
- average tax rate
- progressive tax rate
- proportional tax rate
- regressive tax rate
- Laffer Curve
- subsidy
- black markets
- shadow economy
- hidden economy
- barter
Chapter Questions

1. Government sees health insurance companies charge high prices for medical insurance. Market price equals $500 per month for the insurance premiums, but government imposes a price ceiling of $300. Appraise the economic consequences of this price control.

2. Government plans to boost the low salaries for computer programmers. Computer programmers earn $3,000 per month on average, but the government imposes a price floor of $2,000 per month. Identify the price floor’s impact on the market for computer programmers.

3. Government plans to help the corn farmers. Market price for corn is $3 per bushel, but government sets a price floor at $5 per bushel. Identify the economic impact of the price floor on the market.

4. Government imposed a tax on people who own luxury boats and yachts. Government estimated the market has 1 million yachts and sets the yacht tax at $1,000 per year. How much tax revenue would the government receive?

5. Government imposed a $1 tax per bottle on wine. Evaluate the economic impact upon the wine market.

6. U.S. government assesses roughly a 6.2% tax rate on a worker’s income for Social Security. Worker’s employer must match the dollar amount the worker pays. Government stops collecting the social security tax after a taxpayer’s income exceeds $113,700 per year. Appraise whether the Social Security tax is a regressive tax.

7. Some politicians and interest groups want the federal government to eliminate the complicated tax code and replace it with a flat tax. A flat tax is government taxes the same percentage of income. Why do politicians and interest groups fight this?

8. Economists argue a head tax has the least impact on markets. A head tax is each person pays the same amount of tax, regardless of income, market prices, and market quantities. Judge whether this would be a great tax system.

9. Identify the economic consequences if a government subsidizes the Florida orange growers. What happens to the non-Florida orange growers?

5. Production Cost Functions

A business firm purchases resources from other firms and households and transforms them into products and services. Then the firms sell products and services to consumers. All countries have business firms, but a country’s government limits the firms’ freedom in making decisions. Specifically, socialist countries give their firms little freedom and can impose many constraints over their businesses. Furthermore, all firms pay for resources that include land, labor, and capital. Consequently, this chapter reviews and derives the cost functions for a business. We add a business’s revenue function in Chapter 6 and 7 because market structure influences the revenue function. Although both monopolies and competitive firms strive for profits and have similar cost functions, they have different impacts on a market’s price and quantity.

Business Firms

Purpose of firms is to earn profits. If a business does well, the owners earn profits. If the business performs poorly, the owners earn a loss. Thus, a firm has a strong incentive to produce at low-cost, offer good service, or provide a quality product.

Business people organize a firm into proprietorship, partnership, or corporation.

A proprietorship is a single individual owns a business firm. Business owner is liable for his business debts, and the business is dissolved when the owner dies. Proprietorships account for 72% of business firms in the United States and collect 5% of the business revenue. Farms, grocery stores, and restaurants are usually proprietorships.

A partnership is two or more people acting as co-owners of a business firm. A partnership has a greater risk because all partners are responsible for debts incurred by one partner. Extreme case is one partner secretly applies for a bank loan, steals the money, and flees the country. Other partners are responsible for the bank loan. If one partner dies, then the partnership must be reorganized. Partnerships account for 8% of business firms in the United States and collect 11% of the business revenue. Law and accounting firms are usually partnerships.

Founders organize a corporation under state laws as a separate legal person. However, the corporation is not alive. Corporate managers determine the business activity and act on behalf of the corporation. Theoretically, a corporation could live forever. Stockholders own a corporation by purchasing a corporation’s stock. Hence, a stock share represents a piece of ownership. Stockholders can easily buy and sell stock; thus, they transfer corporate ownership smoothly. Each stock share entitles a shareholder one vote at a shareholders’ meeting. During the shareholders’ meeting, the stockholders elect the board directors, who in turn, select the corporation’s president and managers to run the corporation. Consequently, the majority shareholder controls the corporation.

A corporation has limited liability. If a corporation bankrupts, the creditors cannot sue the stockholders. Thus, the stockholders only lose the value of their stocks. Moreover, a corporation may borrow money in its name. One form of borrowing is bonds, and investors can easily buy and sell them in the financial markets. Issuing of stock and bonds allows the corporation to accumulate large amounts of capital. Corporations account for 20% of business firms and collect
84% of the business revenue in the United States. Thus, corporations can become extremely large by merging and buying other corporations. Furthermore, corporations could dominate several markets, and economists categorize corporations in three ways:

1. **Vertically integrated**: A firm takes over another firm in the supply chain. Thus, a company gains a cost advantage over its competitors. Consequently, it has control over its supply and can adjust the quality of its products and services. For example, many oil companies extract the petroleum from the ground, transport it to refineries, refine it into a variety of fuels and chemicals, and sell the petroleum products directly to consumers through the gas stations.

2. **Horizontally integrated**: A firm controls production and sales across a market. Firm could reduce its costs by eliminating redundancies in its organization. Furthermore, it can increase its market share or maximize the impact of advertising. Unfortunately, a firm with increasing market share can evolve into a monopoly. For example, the Microsoft Corporation controls over 95% of operating systems in the computer market, and it eliminates competition by buying and merging with new companies that have innovative products and uses new technology.

3. **Conglomerates**: A firm takes over other firms in different, unrelated markets, widening the corporation’s focus. Consequently, a firm could diversify its product and services, and reduce the risk from changing markets. Moreover, a firm may use a conglomerate to leave a dying market and enter a new, thriving market. For example, General Electric (GE) owns or is a majority shareholder in NBC Universal, electric utility companies, finance companies, and medical equipment manufacturers.

All firms use either contracting or team production to organize workers. First, a firm uses **contracting** where it contracts with individual workers who work independently. Contracting takes time and planning that entails high transaction costs. For example, construction companies use contracting to build houses and office buildings. Second, a firm organizes workers in **team production**. A firm hires workers to work together under supervision. Team production reduces transaction costs. However, the firm must monitor its employees to prevent shirking. **Shirking** is employees working at less than their normal rate of productivity. They take long coffee and bathroom breaks or surf the internet during work hours.

**Economic Costs**

A business firm pays for resources, and economists classify payments into explicit and implicit costs. First, **explicit cost** is a firm pays for a resource or service using cash or a bank account transfer. As an illustration, a business firm pays workers’ salaries, taxes, interest payments, utilities like electricity, water, and natural gas, and other resources. Second, **implicit costs** remain a cost to do business, but the business does not exchange cash for a service or resource. For example, accountants depreciate machines and equipment. After a business had paid for machines and equipment, they wear out and become old. Accountants use depreciation to reduce the value of those machines and equipment. Depreciation does not involve a transfer of cash, but depreciation affects a business’s finances and its financial statements.
Economists use another implicit cost called opportunity costs. *Opportunity cost* is the value or costs from the second best alternative after an individual had made a decision. Opportunity costs look into the future, and inform a company where to concentrate its resources. Accountants usually omit opportunity costs, but they are important to make efficient decisions. For example, if you had enrolled into college, what are your opportunity costs? Being a college student, your next, best alternative is working. Thus, the foregone salary becomes the opportunity cost of college. Furthermore, if you withdrew your savings to pay for tuition and books, then you gave up the interest you could have earned, which is an opportunity cost.

We show an example of a business in Table 1. An employee resigned from his job and withdrew his money from his bank to open his own business – a lemonade stand. Proprietor sold 30,000 lemonades at a mall for $1 each. He received $30,000 in revenue, or 30,000 × $1. However, the proprietor pays for materials, taxes, labor, and leasing space costs. Thus, he earns an *accounting profit* of $10,000, which we calculate in Equation 1. As you can tell from the example, accountants do not include opportunity costs.

\[
\text{Accounting Profit} = \text{Total Revenue} - \text{Explicit Costs} - \text{Implicit Costs (excluding opp. costs)}
\]  

(1)

**Table 1. Income Statement for a Proprietor**

<table>
<thead>
<tr>
<th>Lemonade Stand at the Mall</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>First Year Income Statement</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Total Revenue</strong> (30,000 lemonades @$1)</td>
<td>$30,000</td>
</tr>
<tr>
<td><strong>Explicit Costs</strong></td>
<td></td>
</tr>
<tr>
<td>Lemons, sugar, paper cups, etc.</td>
<td>$10,000</td>
</tr>
<tr>
<td>Taxes</td>
<td>$2,000</td>
</tr>
<tr>
<td>Labor – employees</td>
<td>$5,000</td>
</tr>
<tr>
<td>Leasing space</td>
<td>$3,000</td>
</tr>
<tr>
<td>Accounting profit</td>
<td>$10,000</td>
</tr>
<tr>
<td><strong>Opportunity Costs</strong></td>
<td></td>
</tr>
<tr>
<td>Salary</td>
<td>$20,000</td>
</tr>
<tr>
<td>Foregone interest</td>
<td>$500</td>
</tr>
<tr>
<td>Economic profit</td>
<td>($10,500)</td>
</tr>
</tbody>
</table>

Accounting profit does not include the proprietor’s opportunity cost. He had quit his job that earned $20,000 per year, and he used his savings of $5,000 to open a business. He could earn 10% per year or $500 in interest, $5,000 × 0.1. We calculate *economic profits* using Equation 2. Economists subtract his opportunity costs, yielding the proprietor an economic profit of -$10,500. If a firm earns a negative economic profit, then it does not use resources efficiently. According to an economist, the proprietor does not use all his resources efficiently because he could earn more money by remaining employed. However, the decision to open a business may still be efficient if the business owner places a $10,500 value to be his own boss.
Economic profit = total revenue – explicit costs – implicit costs (including opportunity costs) \hspace{1cm} (2)

Accounting profit always exceeds economic profit because economists subtract more costs to calculate economic profits. If firms earn zero economic profit, then they earn a normal rate of return. Although economic profit equals zero, firms would earn an accounting profit. Businesses earn accounting profits as a normal return for providing a product or service to the market.

We did not include sunk cost in our profit equations, but sunk costs do provide information. Sunk cost is a company had paid a historical cost, and it cannot change or undo the cost. Sunk cost is firms investing in machines, equipment, and buildings, and firm cannot sell the assets without taking large losses. For example, a university buys a printing machine to publish a magazine. Machine costs $20,000 and we depreciate it over 10 years, yielding a depreciation expense of $2,000 per year, $20,000 \div 10$. In Year 3, the magazine receives subscription revenue of $3,000. If the magazine pays a depreciation expense of $2,000 while paper and ink costs $2,000, then the magazine earns a $1,000 loss, or $3,000 – $2,000 – $2,000.

What should the university do? If you ask an economist, and the university knew this would be the outcome, then the university should have never purchased the machine in Year 1. However, we are in Year 3. Machine cost became a sunk cost, and we do exclude this cost from the analysis. Although the revenue is $3,000, and the paper and ink cost are $2,000, the university should keep the machine operating because the activity contributes $1,000. If the university shut down the magazine, then the university would earn a loss of $2,000 from the depreciation costs. Consequently, the university is minimizing a loss.

**Short-run Output and Costs**

*Short run* is a period so short that at least one factor of production becomes fixed. Fixed factor is usually the physical capital such as buildings, large machines, and equipment. Short run gives rise to several cost functions. We describe each cost function in detail.

**Total fixed costs (TFC)** are costs that do not change when the production level changes. Businesses and firms pay insurance premiums, property taxes, salaries for administrators, and loans for factory buildings or machines that do not vary with the production level. **Average fixed costs (AFC)** are fixed costs per good produced. As the production level increases, the average fixed cost becomes smaller and smaller. Firm spreads fixed costs over more units, and we refer to as “spreading the overhead.” We depict total fixed costs in Figure 1 in the left panel while we show average fixed costs in the right panel. We compute the average fixed costs in Equation 3 while Q denotes the production level.

\[
AFC = \frac{\text{TFC}}{Q} \hspace{1cm} (3)
\]

**Total variable costs (TVC)** vary, when the production level changes. Firms and producers pay for resource inputs such as labor, raw materials, and utilities including electricity, natural
gas, and water. **Average variable costs (AVC)** are variable costs per unit of a good produced. Left panel in Figure 2 shows total variable costs while the right panel depicts average variable costs. Total variable cost function has two “kinks,” which result from the marginal cost function, and we will explain later while the average variable cost shows a “U-shape.” We calculate the average variable costs in Equation 4.

\[
AVC = \frac{TVC}{Q}
\]  

(4)

**Figure 1.** Total fixed cost (TFC) and average fixed cost (AFC) functions

**Figure 2.** Total variable cost (TVC) and average variable cost (AVC) functions

**Marginal cost (MC)** is the increase in cost as a firm produces one more unit. Marginal cost has a “U-shape.” We depict a marginal cost function in Figure 3. At first, the marginal cost function declines, reaches a minimum, and then rises.

We use an example to explain why a marginal cost function has this shape. You bought a factory and started hiring workers. Initially, the factory started with zero workers. You hire one worker who produces 10 units of output. Average output per worker is 10 because you divide 10
units of output by one worker. You hire a second worker, increasing the total output to 30 units, or 15 units per worker. This additional worker has caused a production gain through the **specialization of labor**. Workers, who specialize on an assembly line, create more products than each worker building one product by himself. You hire a third worker, boosting total output to 60 units or 20 units per worker. These production gains cause the marginal cost function to decrease initially. As you produce one more unit, your marginal cost falls.

![Marginal cost (MC) function](image)

**Figure 3. Marginal cost (MC) function**

As you guess, production gains do not occur indefinitely. Your factory reaches a point, when adding more workers causes production inefficiencies. Your factory now has 50 workers and produces 1,000 units or 20 units per worker. You hire the 51st worker, causing total output to climb to 1,001 units or 19.6 units per worker. Additional worker caused the average output per worker to decrease because the factory has too many workers. For example, managers have problems coordinating and monitoring the workers. We call this inefficiency the **Law of Diminishing Returns**, where the output increases by a smaller and smaller amount as the firm adds more labor (the variable resource) to a factory (the fixed resource). Law of Diminishing Returns can only exist in the short run because all costs are variable in the long run.

We show all relevant cost functions in Figure 4. Total costs equal total fixed plus total variable costs, while average total costs are the sum of average fixed and average variable costs. We show the formulas in Equations 5 and 6:

\[
\text{Total Cost (TC)} = \text{Total Fixed Cost (TFC)} + \text{Total Variable Cost (TVC)} \tag{5}
\]

\[
\text{Average Total Cost (ATC)} = \frac{\text{Total Fixed Cost (AFC)}}{\text{Output}} + \frac{\text{Average Variable Cost (AVC)}}{\text{Output}} \tag{6}
\]

We compute the average total cost by dividing the total cost by output, and total cost is average total cost multiplied by output, which we show in Equations 7 and 8.

\[
\text{ATC} = \frac{\text{AFC}}{\text{Output}} + \frac{\text{AVC}}{\text{Output}} = \frac{\text{TC}}{\text{Output}} \tag{7}
\]
Marginal cost function causes both the average total cost and average variable cost functions to have U-shapes. If $MC < ATC$, then the marginal cost is “pushing” down the ATC function. If $MC > ATC$, then the marginal cost is “pulling” up the ATC function. Consequently, the MC intersects ATC at its minimum point. Moreover, the marginal cost function influences the average variable cost function similarly and intersects the average variable cost at its minimum point.

For example, a female student earns an average grade of 80% after she has completed two exams. We view the 80% as a position on the ATC function. Student will take a 3rd test, which becomes the marginal cost because the student is taking one more exam. If the student scores a 90%, then her average score increases. In other words, the MC exceeds the ATC. If the student scores a 70%, then her average score decreases, or the MC lies below the ATC. This same concept applies to the average variable cost function.

**Long-run Output and Costs**

**Long run** is a period sufficient for the firm to alter all factors of production. Long run depends on the industry. For instance, long run for an automobile factory using massive and numerous machines and equipment may be seven years, while the long run for an internet company may be one year. Capital, such as buildings, equipment, and machines determines the long run. Furthermore, firms can enter and exit the industry in the long run. A firm entering an industry must purchase and finance its machines and equipment.

We depict a long-run average total cost ($ATC_{LR}$) in Figure 5, and firms pay average cost in dollars per output and produces output level, $Q$. The $ATC_{LR}$ is the dark line and shows the firm pays average cost to produce at each output level as it varies all its resources, including factory size. For example, this firm can choose one, two, or three factories in the short run, which we denote by three-small “U-shaped” lines: $ATC_1$, $ATC_2$, and $ATC_3$. The subscript indicates the
number of factories and number of factories entails a level of capital. Factory should produce at the minimum costs in the long run, where the long-run average total cost function is at its lowest point. Consequently, firm should use two factories because ATC$_2$ gives the company the lowest per unit costs. Besides, this firm may produce with one factory or three factories that raise its long-run average total costs.

![Figure 5. Varying factory sizes over the long run](image)

Firm earns profits in the long run, when the market price ($P^*$) exceeds the long-run ATC. Furthermore, a firm bankrupts or leaves the market if the market price ($P^*$) remains below the long-run ATC for a long time. Long-run average total cost has different regions, and every company produces on a specific segment. We show in Figure 6 the three regions for ATC$_{LR}$ and define the three regions as:

![Figure 6. Regions of long-run average total cost](image)

**Region 1: Economies of scale** are per-unit costs fall as factory size and output expand. As a firm becomes larger, it becomes more efficient. We describe six factors that explain the efficiency gain. First, larger firms have access to more financing. They can issue stock, bonds,
Kenneth R. Szulczyk

and other securities while small companies are more limited. Second, a larger firm can buy or sell in bulk, receiving discounts from its suppliers that lower its costs. These discounts can be important for large retail chains with thin profit margins. Third, sizable firms use mass production, which require large investments in capital and machines. Consequently, labor specializes in tasks that they are good at, and they boost their productivity. Fourth, large-firm managers can specialize in finance, personnel, and marketing. Fifth, a larger firm could invest in expensive technology, gaining an edge over its competitors. Finally, a larger firm could weather setbacks because it has diversified its business or has access to more resources. Industries with economies of scale manufacture products and services, such as automobiles, electricity, computer chips, natural gas, and telecommunications.

Region 2: Constant returns to scale are per-unit costs remain constant as the firm alters its plant size. Consequently, small firms are just as efficient as large firms. Constant returns to scale industries include food processing, apparel, publishing, lumber, retail, and wood products.

Region 3: Diseconomies of scale are per-unit costs rise as factory size and output expand. Usually diseconomies occur from bureaucratic inefficiencies. Business becomes so large; the business has trouble monitoring, coordinating, and motivating workers. Some employees may not work and not contribute to the business production. Furthermore, a firm could become bureaucratic and impose stringent paperwork or hinders all progress and advances with complicated rules and regulations or too many layers of management.

Shifting Cost Functions

In Chapter 6, we derive a firm’s supply function from a firm’s marginal cost function. Consequently, any factors that shift a firm’s cost function will also shift the supply function. We list the following factors that shift cost functions:

Factor 1: If the price of a resource used in production increases, the cost curves shift higher. As an illustration, firms pay higher wages, increasing their labor costs. Thus, the average cost function increases and shifts upward that we show in Figure 7. Although the MC shifted upward, the MC also shifted leftward similar to a supply function.

Factor 2: If a government increases its taxes on businesses, then businesses pay more taxes, boosting their costs. Hence, the average cost functions increase, which we depict in Figure 7. Furthermore, the supply function decreases and shifts leftward.

Factor 3: If a government expands regulations on businesses, business pay greater costs. For example, a government imposes numerous and onerous regulations for health and safety, the environment, or labor. Consequently, firms hire compliance specialists, who gather data and information, or the firm invests in new machines or equipment. This could be a huge cost, and thus, the cost functions increase as depicted in Figure 7. Moreover, the supply function would decrease and shift leftward.

Factor 4: Technology allows workers to produce more output while using the same level of resource inputs. Thus, technology reduces a firm’s cost functions. We assume the firm pays the same costs, but it produces more units for the same resource inputs. We show the cost functions in Figure 8, and they shift downward. Moreover, the supply function would increase and shift rightward. For example, a firm installs a new computer system that increases workers’
productivity. Consequently, the workers produce 15% more work. Although firms pay costs to acquire technology, the gains in workers’ productivity is so great that its average cost functions still decrease.

![Figure 7](image1.png)

*Figure 7. Firm’s cost functions increase and shifts upward*

![Figure 8](image2.png)

*Figure 8. Firm’s cost function decreases and shifts downward*

**Key Terms**

- business firm
- proprietorship
- partnership
- accounting profit
- economic profits
- normal rate of return
Chapter Questions

1. DeBeers Corporation controlled approximately 85% of the supply of raw diamonds. How would you categorize this corporation?

2. A father dies, and his three children reorganize their father’s restaurant. Identify this business type.

3. Identify the costs if a company pays for medical insurance for its employees.

4. If a company earns economic profits, what can we infer about his accounting profits?

5. An electric utility company is constructing a new power plant. Half way through the construction, the government changed the rules and regulations that caused the company to tear down the project and start over. Identify this company’s cost.

6. Intel plans to build a new factory by investing $2 billion for buildings and machines. Identify Intel’s cost and how can Intel can reduce its per-unit costs.

7. If average variable costs are increasing and average total costs are falling, what can we say about a firm’s marginal cost function?

8. A company encourages its employees to attain more education. Identify the cost if this company pays for college courses for its employees.

9. One manager at GM claimed his regional manager was only 2 miles away, but in the management chain, the regional manager was on the other side of the world. Where would you place GM on it long-run average total costs?
10. Do fixed costs exist in the long run?

11. If a government lowers business taxes, what happens to a firm’s cost functions?

12. A company invests in new technology, but the workers do not know how to use this new technology. What would happen to this company’s cost functions?
6. Competitive Markets

Why should students study a competitive market? Economists use competitive markets as the benchmark to compare other market structures. Competitive markets give consumers the lowest prices and highest quantities while the consumers in a market with a monopoly pay the highest price and buy the fewest goods. Before we can study why a government intervenes and regulates markets dominated by a monopoly, readers must understand the role of profits and how markets expand and shrink when a market price changes.

Market Structures

We made an assumption in this book that all firms have identical cost functions. They only differ in their interaction with the consumers. Economists define several market structures that we show in Figure 1. Market with pure competition has the greatest social welfare because consumers pay the lowest market price and receive the highest market quantity. On the other hand, a monopoly is one firm supplies a market, and it has the lowest social welfare. Consequently, consumers pay the highest price and receive the lowest market quantity. We explain monopolies in Chapter 7. An oligopoly is a market that has between two and five firms, while monopolistic competition has many firms with a touch of monopoly power.

![Figure 1. Market structures](image)

A purely competitive firm is a price taker. It accepts the market price to sell their products. Thus, a competitive firm cannot influence the market price. Characteristics of a competitive market are:

**Characteristic 1:** All firms have identical cost functions and produce homogeneous products. A homogeneous product is all products in the market are identical, and consumers cannot distinguish one firm’s product from another.

**Characteristic 2:** A large number of firms produce in the market. Consequently, each firm supplies only a small portion of the total market supply. When a firm changes its production level, the firm cannot influence the market price.

**Characteristic 3:** Competitive firms can freely enter or exit the market. Market has no barriers to entry or exit. For example, if one firm earns economic profit, then rival firms can easily enter the market and earn profits. If firms earn a loss in a market, firms can exit the market.

**Characteristic 4:** Firms maximize profit by adjusting production level, but they cannot influence the market price.
Few markets resemble purely competitive markets, except the agricultural markets and international tourist destinations. Agricultural markets have a large number of small farmers, who supply a homogeneous product while tourist destinations compete fiercely for the international travelers.

A monopolistic competitive market is similar to a purely competitive market, but firms have a touch of monopoly power. This monopoly power arises from differentiated products. A differentiated product is consumers can tell where the product came from because producers create real or imaginary differences in their product through promotion, packaging, and brand names. Thus, firms in monopolistic competitive markets use lots of advertising and non-price competition. Non-price competition is producers compete in other areas other than a product’s price. Some producers supply high-quality products, hire friendly, attractive sales clerks, and/or sell at convenient locations. Economists call firms in a monopolistic competitive market as price searchers, and this market still has low entry barriers. If one firm earns an economic profit, then other firms can easily enter the market and compete. Moreover, collusion is impossible for this market. Collusion is the sellers in a market unite, becoming a monopoly. This market has many independent competing firms in the market.

### Contestable Markets

Number of firms in a market does not correlate directly to social welfare. A market could have two firms that compete vigorously. Furthermore, a market can be contestable. A contestable market is a highly competitive market because of potential competition. Contestable markets can have few sellers, but the markets have low entry barriers and low exit costs. For example, the airline industry is a contestable market. Although the airline industry has high entry barriers because airplanes and facilities for tickets, baggage, and maintenance cost millions of dollars, the airline industry can switch airline routes with little cost. If an airline earns economic profits by servicing the route between Salt Lake City and Albuquerque, then other airlines can easily service this route, driving economic profits to zero. Consequently, government could make a market more competitive by reducing entry and exit barriers and encouraging competition.

An oligopoly is the last market structure. This market structure possesses mutual interdependence, which is a firm must consider the actions of its competitors as it decides prices, production levels, or product quality. A few firms supply this market, and every firm can scrutinize and spy on the others. Thus, an oligopoly market can be extremely competitive as firms compete with each other, or they collude together, becoming a monopoly. Consequently, the social welfare in this market depends on the degree these firms compete with each other. Economists use game theory to explain how oligopolistic firms interact with each other. We explain basic game theory in Chapter 20, but government becomes one of the participants.

We list the other characteristics of oligopolistic market:
Characteristic 1: Oligopolistic firms become larger through mergers. A merger is one firm buys other firms and combines them into one company. As a firm controls a larger market share, it gains more monopoly power. For example, the beer industry started as a competitive market but transformed into an oligopoly. In 1947, the U.S. beer industry had over 400 independent breweries. By 1967, the United States had 124 suppliers, and by 1980, the market had 33. Currently, four brewing companies dominate the U.S. market. Anheuser-Busch has 49% of market. SABMiller has 20% of market while Coors and Pabst control the remaining market shares.

Characteristic 2: Oligopolies have market entry barriers. For example, the automobile industry has large economies of scale. To achieve low-per unit costs, a car manufacturer must produce millions of cars. Thus, car manufacturers must be large to lower its average fixed costs.

Characteristic 3: Oligopolies produce homogeneous or differentiated products. Identical products include milk, cement, and gasoline, while differentiated products are sodas, shoes, computers, and clothes. Furthermore, an oligopoly can use product style, quality, and advertising to help consumers distinguish their products from competitors.

Short-Run Output for Competitive Firms

Price takers sell their products to the market, and they only see one price, the market price. We show a competitive market for corn in Figure 2. Left panel represents a corn farmer while the right panel is the corn market. Demand represents the consumers while the supply represents the farmers. For each bushel of corn, a farmer sells and receives the market price of $2 per bushel. Thus, the $2 per bushel becomes his marginal revenue. Marginal Revenue (MR) is the change in revenue when a firm sells one more one unit. Finally, we denote the market quantity by Q while the corn farmer supplies a small fraction of the market, causing his quantity to be little q.

Figure 2. Price taker’s demand function and a market
A competitive market three features:

**Feature 1:** If the farmer sells 1 bushel, he receives $2 or MR. If the farmer sells another bushel, he receives another $2 or MR. Thus, the farmer’s demand for his corn equals the marginal revenue function.

**Feature 2:** If the farmer raises his corn price above the market price to $3, then nobody buys it. Consumers buy the corn for $2 from his competitors.

**Feature 3:** If the farmer lowers his corn price below the market price to $1, then he lowers his revenue and potentially loses money. Consumers will buy his corn for a lower market price, but the farmer could collect $2 instead of $1 for this corn.

A firm maximizes its profit when MR = MC, and this rule applies to all market structures, including markets dominated by monopolies. Farmer can only sell his corn for the market price, so marginal revenue equals the market price, or MR = P* = $2. Competitive market is the only market structure where the marginal revenue equals the market price, or MR = P*. Consequently, the price taker expands production until P* = MR = MC.

We use the following examples to explain why the MR = MC rule works:

**Example 1:** If MR = $3 and MC = $2, then the firm collects $3 for selling that last additional unit that only costs $2 to produce. Thus, profit rises by $1, and firms always expand production, when MR > MC.

**Example 2:** If MR = $3 and MC = $5, then the firm collects $3 for selling the last additional unit that costs $5 to produce. Consequently, the firm earns a loss and would reduce production by 1 unit to increase profits. Consequently, firms reduce production, when MR < MC.

**Example 3:** Firm maintains production at the same level when MR = MC. Thus, the MR = MC rule maximizes the firm's profits.

We depict a competitive firm in Figure 3. It produces quantity q* where MC = MR = P*. Asterisks indicate the equilibrium in the market, and the market price exceeds the firm’s average total cost, or P* > ATC. We denote the ATC by C* on the graph, and the firm’s economic profit per unit is the difference between the market price and average total costs, P* - C*. Moreover, we show economic profit on the graph by the lightly shaded rectangle. Firm sells q* units, so a firm’s total economic profit becomes (P*−C*)·q*. Height of the rectangle is (P*−C*) while the width is (q*−0).

We can obtain the same results from the profit equation in Equation 1, where profit equals total revenue minus total costs. A firm earns revenue by selling his total quantity, q*, for market price, P*. Thus, the total revenue (TR) equals, TR = P*·q*. On the other hand, the firm’s cost per unit is ATC (or C* in Figure 3), and the total costs equal the total units q* multiplied by the average total costs, or TC = C*·q*. We substitute the terms into a firm’s profit function, yielding Equation 1. Furthermore, we can factor the quantity, q*, out, representing the lightly shaded rectangle, (P*−C*)·q*.

\[
\text{Profit} = \text{Total Revenue} - \text{Total Costs} = P^* \cdot q^* - C^* q^* = (P^* - C^*) q^* \tag{1}
\]
A firm maximizes profit by examining the total revenue and total cost functions as shown in Figure 4. We show the total revenue and total cost functions in the left panel while we show the marginal revenue and marginal cost functions in the right panel. Referring to the left panel, a firm maximizes profits by locating the maximum distance between total revenue and total costs. Firm takes vertical slices by adjusting output $q$ until the firm maximizes the distance between total revenue, and total costs, which is the black line at $q^*$. This production level is incidentally the same production level where $MC = MR = P^*$. Economists use the right panel, MR and MC, to determine a firm’s production level.

Figure 3. Competitive firm’s profit is the lightly shaded rectangle

Figure 4. Competitive firm maximizes profit when $MR = MC$
A competitive firm could experience losses and go out of business. However, a firm experiencing losses could still operate in the short run if the firm can cover its average variable costs. For example, if a firm has an average variable cost (AVC) of $12 per good, average fixed cost (AFC) of $8, and the firm sells the product for $15 per unit, then the market price exceeds the average variable costs, or \( P^* > \text{AVC} \). Thus, the firm earns a $5 loss \((15 - 12 - 8)\). Firm recovers all its variable costs and applies $3 towards its average fixed costs. If the firm shuts down, the firm still pays the average fixed costs, earning an $8 loss per unit. Consequently, a firm could earn losses in the short run, but will operate if can cover its variable costs.

A firm shuts down when the market price falls below the average variable costs, or \( P < \text{AVC} \). A **shutdown** is a firm temporarily halts its production or operation of its business. Firm still pays fixed costs during the shutdown. For instance, motels and restaurants that shut down during slow seasons must pay their fixed costs. If a firm has an average variable cost (AVC) of $12, average fixed cost (AFC) of $8 with a market price (P) of $5, then the firm earns a $15 loss per unit. If the firm shuts down, the firm earns a loss of $10 per unit, which is the fixed cost. Consequently, a firm shuts down because it earns smaller losses than if the firm continues operating.

A firm will “**go out of business**” in the long run when the market price (P) lies below the average total costs (ATC), or \( P < \text{ATC} \). Going out of business is a firm permanently exits the market and stops paying the fixed costs. For instance, if the market price, \( P^* \), equals $0.25 for a generic soda and the ATC is $0.50, then this firm cannot continue to operate year after year with losses. Thus, the firm must exit the market in the long run.

We show a competitive firm earning a loss in Figure 5. Competitive firm produces \( q^* \) units, where \( MC = MR = P^* \). Unfortunately, the average total costs exceed the market price, or \( C^* > P^* \). Loss per unit is \( (P^* - C^*) \), and the firm produces \( q^* \) units. Total loss equals \( (P^* - C^*) \cdot q^* \), where profit is negative. Although the formulas are the same, profits become negative for losses. Shaded rectangle in Figure 5 represents this firm’s economic loss.

![Figure 5. Competitive firm earns a loss in the short run](image.png)
We derive a firm’s supply function from the firm’s marginal cost function in Figure 6. A firm maximizes profits where it produces at $P = MC$, and the firm can pay its variable costs. Consequently, a firm’s short-run supply curve becomes the segment of its marginal cost function above its average variable cost. Supply function is not the marginal cost function because a firm does not supply a market as the market price falls below the firm’s average variable costs. Instead, the firm shuts down and supplies zero units to the market, which we represent by the black line on the price axis. The $P_{\text{min}}$ shows the minimum price where a firm begins production. Any market price below $P_{\text{min}}$ causes a firm to shut down. Usually, economists omit the vertical segment from the supply function.

![Figure 6. Deriving a competitive firm’s supply function](image)

Short-run market supply is the horizontal summation of all firms’ short-run supply functions in a market. At each market price, a firm determines its production level, and then we sum the market quantity across all firms’ quantities at that price. We derive a market supply function in Figure 7 if a market has two firms. At a market price of $1$, Firm 1 and 2 supply 10 units. Thus, the market quantity equals 20 units at $1$. At a market price of $3$, the market quantity is 30 units because both firms supply 15 units each.

**Long-Run Output for Competitive Firms**

In competitive markets, firms earn zero economic profit in the long run. Economists call this a normal rate of return because firms earn an accounting profit. We outline the mechanisms that drive long-run profits to zero:

**Mechanism 1:** If firms earn economic profits, subsequently, the market price exceeds average total costs, or $P^* > ATC$. Profits attract new firms to enter the market. Consequently,
the short-run supply function increases, decreasing the market price until it equals $P^* = ATC$ again. Once economic profits equal zero, then firms stop entering the market.

Figure 7. Deriving a market supply function from individual firms

Mechanism 2: If firms earn a loss, then the market price lies below the average total costs, or $P^* < ATC$. Losses force some firms to leave the market. Thus, the short-run supply function decreases, increasing the market price until it equals $P^* = ATC$ again. Once economic profits equal zero, firms stop leaving the market.

Market supply and demand functions determine the long-run equilibrium. For example, we show the competitive market for milk in Figure 8. Left panel represents a milk producer while the right panel is the milk market. Market determines the price and quantity of milk, which the market price, $P^*$, equals $2 while the consumers buy 10 units of milk. Each firm supplies $q^*$ quantity of milk. All dairy farmers earn zero economic profit because the market price equals average total costs, or $P^* = ATC = 2$.

We depict a competitive market again in Figure 9, and we illustrate how the milk industry expands. Left panel represents one dairy farmer while the right panel is the milk market. Market price is $P_1$, and market quantity is $Q_1$. We represent the original demand and supply functions by solid lines. U.S. Government says drinking milk does the body good because milk is a healthy food. Thus, consumers buy more milk, increasing the demand and shifting it rightward because consumers have changed their tastes and preferences. New market price becomes $P_2$ while firms produce $Q_2$ units. Consequently, the dairy farmers expand output to $q_2$ and earn economic profits because $P_2 > ATC$.

Profits attract new firms into the milk market. Short-run supply increases and shifts rightward. Milk price keeps fall until $P_1 = ATC$ again. Consequently, the milk market has the original market price, $P_1$. Consumers drink more milk. Firms produce at $Q_3$ as more firms enter the market, and they all earn zero economic profit. Black horizontal line in the milk market is the long-run supply function, which we discuss later.
If firms in an industry earn economic losses, then some firms will exit the industry. For example, we depict the rice industry in Figure 10. Original market price and quantity are $P_1$ and $Q_1$. We represent the original demand and supply functions as the solid lines in the right panel. We show one rice producer in the left panel, who earns zero economic profits.

Consumers’ income increases, and rice is an inferior product. Hence, the demand function decreases and shifts leftward. Both market price and quantity fall to $P_2$ and $Q_2$. On the left panel, firms contract output to $q_2$, and earn economic losses because the market price is lower than average total costs ($P_2 < ATC$). Some firms leave the rice market, decreasing the supply.
function. Firms keep leaving the industry until the market price rises to $P_1$ again. At this price, firms earn zero economic profit, and firms stop leaving the market.

![Graph showing A Rice Farmer and The Rice Market](image)

**Figure 10. Decreasing consumer demand contracts the rice industry**

Consequently, the long-run price becomes $P_1$; firms produce and sell less rice. Fewer firms remain in the market, and all firms earn zero economic profit. Black horizontal line in the milk market is the long-run supply function.

**Long-run supply function** is the minimum price that firms supply given the firms can adjust all resources of production. Black horizontal lines in the right panels in Figures 9 and 10 are the long-run supply functions. Long-run supply is perfectly elastic because the industry is a *constant-cost industry*. As a constant-cost industry expands or contracts, the resource prices do not change. Usually small industries are constant-cost industries because an expanding or contracting industry has little impact on the resource markets.

An *increasing-cost industry* is an industry where resource prices rise as producers expand market output. This industry is the most common, and the long-run market supply function has a positive slope. We show an automobile industry in Figure 11. We start with an original market price of $P_1$ and a market quantity of $Q_1$. We represent the original demand and supply functions by solid lines. Consumers demand more cars because they earn greater incomes. Market price and quantity rise to $P_2$ and $Q_2$. Automobile industry earns economic profits, which expands the industry. As the automobile industry expands production, resource prices rise. Industry increases its demand for skilled labor, steel, plastics, and other resource inputs. Thus, resource prices increase from the greater demand for resources. As the car industry expands, the long-run price falls to $P_3$ and quantity expands to $Q_3$. Nevertheless, the long run price never returns to the lower $P_1$.

A *decreasing-cost industry* is an industry with falling resource prices as firms expand market output. A decreasing-cost industry is rare, and the long-run market supply function has a
negative slope. Electronic industry may be a decreasing-cost industry. As producers etch more and more transistors onto computer chips, the cost of chips and computers keep falling.

\[ \text{Figure 11. Automobile industry is an increasing-cost industry} \]

We depict a decreasing-cost industry in Figure 12. We start with a market price of \( P_1 \) and a market quantity of \( Q_1 \). We represent the original demand and supply functions by solid lines. Consumers demand more computers because of higher incomes. Demand function increases and shifts rightward, raising the market price, \( P_2 \). Consequently, the computer industry expands to \( Q_2 \), and the computer industry earns economic profits, which expands the industry. As the electronic industry expands while new firms enter the market, the resources prices fall for computer chips, decreasing the long-run price to \( P_3 \) while market quantity expands to \( Q_3 \). Long run price falls below the initial price, \( P_1 \).

**Role of Profits**

Competitive markets and economic profits create wealth and direct resources to produce highly valued goods. Firms earn economic profits when they receive more revenue than pay in costs. Total revenue represents the consumers’ valuation while the total cost becomes the firm’s value of the resource inputs. Profit becomes the firm’s reward for increasing the value of resources. Profits cause firms to minimize costs, operate efficiently, incorporate innovation, and satisfy consumers. Competitive firms introduce new products like microwave ovens, personal computers, and DVD players. Losses penalize firms that reduce the value of resources. Firms must leave the market, restructure, or bankrupt. Losses weed out inefficient firms.

Competitive markets are efficient, and economists use two definitions to measure efficiency. First, **allocative efficiency** is businesses and suppliers transfer resources to profitable industries that consumers want, which we denote by \( P^* = MC \). Market price, \( P^* \), represents the consumers’ evaluation of the product or service while \( MC \) is the firms’ cost for producing that last unit.
Second, **productive efficiency** is businesses produce products for the lowest costs, or \( P^* = \text{minimum} \) (ATC). Refer to Figures 9 and 10, when firms earn zero economic profits, they produce at \( q^* \), which minimizes their costs. Consequently, only a purely competitive market is both allocative and productive efficient. Thus, a competitive market maximizes social welfare because consumers pay the lowest prices while producers sell for the highest price, maximizing both consumers’ plus producers’ surpluses.

![Figure 12. Computer industry is a decreasing-cost industry](image)

**Key Terms**

- pure competition
- monopoly
- oligopoly
- monopolistic competition
- homogeneous
- differentiated product
- nonprice competition
- collusion
- mutual interdependence
- mergers
- contestable market
- marginal revenue (MR)
- total revenue (TR)
- shutdown
- go out of business
- long-run supply function
- constant-cost industry
- increasing-cost industry
- decreasing-cost industry
- allocative efficiency
- productive efficiency

**Chapter Questions**

1. Two firms, AMD and Intel, supply most microprocessors used in laptops and computers. Predict the social welfare for the microprocessor market if both companies compete
vigorously.

2. Why does a single fruit stand in town charge prices that are close to a competitive market?

3. Successful advertising campaigns cost millions of dollars. Could advertising costs create an entry barrier to a market?

4. If a firm sees its MR = $20 and MC = $15, what should it do?

5. If a firm has an average variable cost (AVC) of $50 and an average fixed cost (AFC) of $25, identify the market price where the firm breaks even, earns profits, earns losses, and shuts down.

6. Are the marginal cost (MC) and a firm’s supply functions the same?

7. Cell phone industry has rapidly grown in size since the 1990s, and prices for cell phones are falling. Identify the long-run supply function for this industry.

8. Incomes for U.S. consumers are falling. Identify the long-run consequences to the car industry if the car industry is a constant-cost industry, and cars are a normal good.

9. Determine whether a monopoly is both allocative and productive efficient.
7. Regulating Monopolies

A monopoly is a company that supplies most consumers in a market. A monopoly can manipulate the market price by reducing its production, raising the market price. Hence, a monopoly can earn substantial economic profits. Furthermore, a monopoly can earn these profits in the long run because the market has barriers that prevent competitors from entering the market. Consequently, a lack of competition could cause a monopoly to mistreat their consumers, such as providing a bad service or product. Therefore, government intervenes in the market to limit a monopolies power, to foster competition, or to regulate the monopoly.

Market Entry Barriers

A pure monopoly is a sole producer of a product and possesses the following characteristics:

Characteristic 1: A monopolist is a single seller of a product. Therefore, the demand for the monopolist’s product becomes the market demand curve. Market has one firm supplying the consumers, creating one firm industry.

Characteristic 2: Consumers have no close substitutes for the monopolist’s product. No other product or firm competes with the monopoly. Either a consumer buys the product from a monopolist, or he or she does not.

Characteristic 3: A monopolist exerts control over the market price. A monopolist decreases the production level, which raises the market price.

Characteristic 4: Other firms cannot enter the market because the market has entry barriers. Market entry barriers prevent competitors from entering the market, and they enhance a monopoly’s power. A market can have four barriers.

First Market Barrier: Economics of scale create large companies that we call a natural monopoly. A natural monopoly must be large to produce at low per-unit cost. We show a firm’s long-run average total costs (ATC\textsubscript{LR}) in Figure 1. Long-run average total costs keep declining as the monopolist expands production because the monopolist has economies of scale. Monopolist sells a large volume to cover its high fixed costs. Monopolist pays high fixed costs for large levels of equipment, machines, and infrastructure. Natural monopolies require large fixed costs, and they usually supply the whole market. A new firm wanting to enter this market would need substantial amounts of capital to reach this low-cost production level. Natural monopolies provide phone service, electricity, natural gas, railroad transportation, and drinking water. These industries require a large amount of equipment and infrastructure. Moreover, the market may be more convenient with one monopoly. Imagine a city with 12 competing electric power stations. Then each company installs its own separate power lines and power substations. This would create a mess.

Second Market Barrier: A government erects legal barriers, such as granting licenses and patents. A license is the oldest form of protection, and a government protects a business from competition. Doctors, lawyers, and hair stylists must apply for an occupational license from government in order to provide their services. Other licenses impose restrictions on a business like funeral homes and taxicabs. Licenses vary in costs from inexpensive to quite expensive. For
example, New York City restricts the number of taxicabs that can operate in the city. If a new company wants to operate a taxicab, that company has to buy an existing license from another company. Market price of a taxi license exceeds a million dollars.

\[ \text{\$ per unit} \]

$ \text{Q}^c \text{ Whole Market}$

\[ \text{Figure 1. Economies of scale for a natural monopoly} \]

Most governments in the world grant patents creating another legal barrier. In the United States, a patent grants the inventor the exclusive right to produce a product for 17 years because a patent encourages scientists and inventors to pay for costly scientific research. Thus, a company can recoup its research costs by charging high prices. However, a patent holder charges a high price to consumers until a patent expires. Some accuse the pharmaceutical industry of abusing patents. For example, a patent is ready to expire on a popular medication. Then the pharmaceutical company slightly changes the chemical composition in the medication and applies for a new patent. Company stops producing the old medication and introduces a new medication that the company protects with a patent.

**Third Market Barrier:** A monopoly controls an essential resource: For example, Aluminum Company of America (Alcoa) controlled the supply of bauxite before World War II. Thus, other firms could not produce aluminum cheaply without bauxite and Alcoa became a monopoly in aluminum production.

For another example, DeBeers Corporation of South Africa controlled 85% of the world’s supply of diamonds through a cartel during the 1980s. A cartel is several producers form a group, and the group becomes a monopoly. Cartel restricts output by setting a production quota for each cartel member, which increases the market price and profits. Members of a cartel have an incentive to cheat and sell their excess output secretly. DeBeers Corporation would punish cartel members by “dumping” large quantities of diamonds onto the diamond market. As diamond prices plummet, the cheating members earn loses. Consequently, DeBeers imposed discipline on the cheaters. DeBeers Corporation still controls approximately 55% of the market and invented the slogan, “A diamond is forever.”

**Fourth Market Barrier:** Standard Oil represents the classical example for unfair competition in the 20th century. President of Standard Oil, John Rockefeller, would open a branch in a small town and charge prices for petroleum products below cost. Low market prices
drove competitors out of business. Then Standard Oil would buy these businesses for cents on the dollar and consolidate them into Standard Oil. With no competition remaining in town, Standard Oil charged monopoly prices and moved to the next town. Consequently, John Rockefeller controlled 90% of U.S. oil market.

Some markets have exit barriers, and a government creates them or the firm has high sunk costs. Consequently, firms with exit barriers will stay in the market longer. For instance, we illustrate three exit barriers. First, a firm needs a government’s permission to exit a market in some countries. Second, a firm must pay six-months of salary to its workers after the firm leaves the market or the firm must sell its assets to the government, so the government can take over the company. Finally, a firm invested millions in machines, equipment, and buildings. Firm remains in the market as long as possible to recoup its sunk costs. Unfortunately, industries with many new entrants have high rates of exit. For example, new restaurants continually push the old restaurants out of the industry.

Given enough time, firms can use technology to circumvent the market barriers, enter the market, and drive economic profits to zero. For example, cell phone technology opened the telecommunications market to competition as the local telephone companies lose consumers. Some consumers do not use local phone service because they can take their cell phones with them.

**A Monopoly’s Market Price and Output**

A monopolist maximizes profits similarly to a competitive market by expanding output until MR = MC. We depict a monopolist earning profits in Figure 2. Monopolist’s demand function represents the demand for the whole market because the monopoly supplies the product to all the consumers in the market. Moreover, the marginal revenue (MR) function lies below the demand function. For the monopolist to sell on more unit, he or she must reduce the price to sell it, reflecting a downward sloping MR function. For example, if the monopolist sells a product for $10 and wants to expand production, the monopolist must reduce the price to sell all the units for the same price. Thus, marginal revenue must fall quicker than the market price. Point where MR and MC functions intersect determines the production level. Market price is P*; production level is Q*, and average total cost is C*. Since the market price exceeds the average total cost (ATC), the monopolist earns economic profits, which we indicate by the lightly shaded rectangle.

A monopolist could earn long-run profits because competitors cannot enter the market and drive economic profits to zero. Unfortunately, the high entry barriers prevent competitors from entering the market. A monopolistic market has a lower social welfare than a competitive market because the market with the monopoly has a higher price and lower quantity. Consequently, the monopolist transfers some of the consumers’ surplus from consumers to the monopolist as profits.

We show the social welfare loss of a monopoly in Figure 3. We assume the marginal cost (MC) function becomes constant. Thus, the marginal cost would equal the average cost because the monopolist pays the same cost to produce the same unit. Since all units have the same cost, then the average costs would equal the marginal cost. For example, if the marginal cost equals
$10 per unit, then each additional unit the monopolist produces would equal $10 per unit. After we average all the units, the average would equal $10 per unit. A purely competitive firm would set its price equal to marginal cost (MC) and would produce Qc units and charge a price equal to C*. Consumers’ surplus equals the shaded areas under the demand function including the light and dark triangles plus the lightly shaded rectangle. Since the marginal cost is fixed, the competitive firm earns no producers’ surplus.

A monopolist gains market power and reduces its production level to Q*, where the marginal cost and marginal revenue curve intersects, or MC = MR. Thus, the monopolist charges a greater price at P* and earns economic profits, represented by the lightly shaded rectangle. On the other hand, consumers retain their consumers’ surplus represented by the lightly shaded triangle, but society loses the darkly shaded triangle. Society loses because the monopolist has reduced production to boost the market price. Consequently, a monopolist harms society by reducing social welfare.

![Figure 2. Price and output for a monopolist](image1)

![Figure 3. A monopolist’s social welfare](image2)
A monopoly has an unusual feature. It has no supply function. Monopolist studies the market and sets his production at MR = MC, which becomes only point the monopolist would produce. If a monopolist chose a different production level, then he or she would reduce profits.

Some people believe monopolies price gouge their consumers. Price gouging is a firm charges the highest price possible. However, a monopolist only charges a price, where MR = MC. He does not have an incentive to raise the price further because he reduces his profits at any other price. Although a monopoly market has a higher market price relative to a competitive market, a monopolist has no incentive to price gouge consumers. Otherwise, his profits would fall.

Some investors believe monopolies are good investments because monopolies can earn long-run economic profits. However, an investor buying a monopolist’s corporate stock may not be profitable because the investors already included the monopoly’s value into the stock price. On the other hand, a monopoly would be a good investment if the investor was an early bird, and was the first person to buy the stock before the company became a monopoly. Moreover, some monopolies do not earn long-run economic profits. For instance, a monopolist has patents for products that consumers would never buy.

**Why are Monopolies Bad?**

Many consider monopolies bad for a market and society because the monopolist does not serve the consumers’ interest. A monopolist offers bad service or has no incentive to improve products. Hence, a monopolist limits consumers’ options because one firm controls a market. Consumer either buys the product from the monopolist or goes without. Furthermore, we could include a government agency as a monopoly because an agency has a monopoly over specific government services. For example, a consumer wants to drive a car. He or she must apply for a driver’s license at a state bureaucracy. If a person needs to pay taxes, again he or she deals with one government agency.

Monopolies are not allocative efficient. Allocative efficient is P* = MC. The allocation is consumers value the products, or P* while a firm pays costs to manufacture the last unit, MC. If you remember Chapter 7, market price equals marginal cost for competitive firms, or P*=MC, and the competitive market is allocative efficient. Thus, we use the competitive market as the benchmark to compare the other market structures. However, the market price exceeds its marginal cost (or P > MC) for a monopolist. Furthermore, a monopoly yields the largest difference between price and marginal cost, or P – MC.

A monopolist or government agency may suffer from x-inefficiency. X-inefficiency is firms or agencies do not produce at low cost. Thus, monopolies and government agencies pay greater costs than a competitive firm does because the market lacks competition. With no competitors, a monopolist has no incentive to minimize costs, and they may mismanage the business, or the workers are poorly motivated. Furthermore, x-inefficiency is worse with government organizations because they are much larger and have no profit motive. A monopolist and government agency can become bureaucratic and employ too many workers than a competitive firm would hire.
A firm with monopoly power could encourage rent-seeking behavior. Rent-seeking behavior is an individual, organization, or firm seeks rents (unfair profits) by manipulating its economic environment. Thus, a monopoly uses its power to protect itself from competition and earns massive profits. For instance, Russian companies bribe the government officials, and in turn, the officials grant licenses to only the monopolies, restricting competition. Rent-seeking behavior is the monopolist bribes the Russian government to protect the monopolist’s power and limit its competition. Rent-seeking behavior is more circuitous in the United States. Corporations and interest groups funnel campaign money to politicians, and in turn, politicians pass favorable laws to corporations and interest groups.

**Measuring Market Power**

Economists use the Concentration Ratio, Herfindahl Index, and Lerner Index to measure the level of concentration for a market. Concentration Ratio is the percentage concentration of the four largest firms in the market. If the Concentration Ratio equals 0%, then no firm has a market share; thus, the market is purely competitive. If the Concentration Ratio equals 100%, then the four largest firms completely dominate the market. Concentration Ratio has a flaw. If the ratio equals 100%, economists do not know whether the market has four firms each with 25% of the market, or a monopoly has 95% of the market share, or some other combination.

Herfindahl Index overcomes the problem of the Concentration Ratio. We calculate the Herfindahl Index by taking the percent market share of each firm, squaring it, and adding across all firms in the market. Since a pure monopoly has a market share of 100%, the Herfindahl Index equals 100² = 10,000. On the other hand, a firm in a purely competitive market has a zero market share, which equals zero when we square it. Then we add across all the purely competitive firms in the market, resulting in a Herfindahl Index of 0. Consequently, the scale ranges from zero for pure competition to 10,000 for a pure monopoly.

We calculate the Concentration Ratio and Herfindahl Index for several products in the United States in Table 1.

<table>
<thead>
<tr>
<th>Market</th>
<th>Concentration Ratio</th>
<th>Herfindahl Index</th>
</tr>
</thead>
<tbody>
<tr>
<td>Beer</td>
<td>91</td>
<td>NA</td>
</tr>
<tr>
<td>Breakfast Cereals</td>
<td>78</td>
<td>2,521</td>
</tr>
<tr>
<td>Cement</td>
<td>11</td>
<td>63</td>
</tr>
<tr>
<td>Cigarettes</td>
<td>95</td>
<td>NA</td>
</tr>
<tr>
<td>Computers</td>
<td>85</td>
<td>2,662</td>
</tr>
<tr>
<td>Motor Vehicles</td>
<td>81</td>
<td>2,321</td>
</tr>
<tr>
<td>Women's dresses</td>
<td>13</td>
<td>84</td>
</tr>
</tbody>
</table>

Concentration Ratio and Herfindahl Index have three problems:

**Problem 1:** We calculate the Concentration Ratio or Herfindahl index for the whole market. However, a firm can dominate a local market. A localized market is a market for a small area.
becomes isolated from other markets. For example, cement production seems to be in a competitive market because the Concentration Ratio equals 11 in Table 1 while the Herfindahl Index is 63. Nevertheless, cement is bulky with high transportation costs. Thus, cement firms can be monopolies in their local communities.

**Problem 2:** A product may have interindustry competition. *Interindustry competition* is a product in one market competes with products from other markets. For example, breakfast cereals seem to be a concentrated industry when we refer to Table 1. However, if these companies raise the price too much, consumers could switch to other breakfast foods.

**Problem 3:** A product may have international competition. *International competition* is a concentrated industry is competing with large companies from other countries. For example, the motor vehicle manufacturing appears to be a concentrated industry when we refer to Table 1. However, U.S. car manufacturers compete with car manufacturers from Japan, South Korea, and Germany.

Finally, we can measure monopoly power with the Lerner Index, which we relate to allocative efficiency. We define the *Lerner Index* in Equation 1.

\[
Lerner\ Index\ =\ -\frac{1}{\varepsilon} = \frac{P - MC}{P}
\]  

(1)

Purely competitive markets are allocative efficient, so the price (P) equals the marginal costs (MC), or \( P = MC \). Consequently, the Lerner Index would be zero since \( P - MC = 0 \). Then a monopoly has the most market power; thus resulting in the largest difference between \( P - MC \) and the largest Lerner Index for a market.

We can calculate the Lerner Index from the price elasticity of demand. We denote price elasticity of demand by \( \varepsilon \). Price elasticity of demand is the consumers’ sensitivity of quantity demanded to a change in a market price. Furthermore, the price elasticity of demand is negative, reflecting the Law of Demand – as the market price rises, quantity demanded fall, and vice versa. Unfortunately, some economists drop the minus sign. Finally, all elasticities have one property; they have no units. Thus, economists can literally compare apples to oranges.

Economists estimated foreign travel with a price elasticity of demand of -4. If the market price rises by 1%, then the quantity demanded falls by 4%. Consequently, foreign travel is elastic, and consumers are sensitive to changes in the market price. Lerner Index would equal 0.25 in this case. Furthermore, they will switch to competitors if a travel firm raises the market price. Elastic products have many substitutes or comprise a large portion of income. Consumers’ income plays a role because a consumer buying a house or car would be sensitive to price changes on these assets.

Economists estimated the price elasticity of demand for coffee as -0.2. If the market price increases by 1%, then quantity demanded drops by 0.2%. Consequently, coffee drinkers are not sensitive to price changes, granting coffee producers with some monopoly power. Thus, inelastic products have few substitutes or comprise a small fraction of income. Hence, the Lerner Index for coffee would be 5 in this case.
Government Policies

Government has four policies that it uses to curtail a monopolist’s power. We rank policies from the economically best to the worse.

Policy 1: Best government policy is government reduces or eliminates the market barrier. For example, a government reduces licensing requirements or exposes the monopolist to international competition. Tariffs and quotas protect a monopolist, and government can lower these trade barriers to expose the monopolist to competition (Frank 1968).

Policy 2: A government ideally could regulate natural monopolies and set the market price for the service. Government can use the three pricing methods: Average Cost Pricing, Marginal Cost Pricing, and Ramsey Pricing.

We depict Average Cost Pricing in Figure 4. An unregulated monopolist produces Q*, where MC = MR. Thus, we start with a market price of P* and output of Q*. For Average Cost Pricing, the government sets the price where the demand curve intersects the long-run ATC. Consequently, the monopolist charges a lower price (P~ < P*), produces more output (Q~ > Q*), and earns zero economic profit in the long run. Thus, a government regulated price improves social welfare, but the Average Cost Pricing remains allocative inefficient. Market price still exceeds its marginal cost or P > MC.

![Figure 4](image)

Figure 4. Government uses average cost pricing to set the price for a monopolist

We show Marginal Cost Pricing in Figure 5. An unregulated monopolist produces at MC = MR with a market price of P* and output of Q*. For Marginal Cost Pricing, the government sets the price where the demand curve intersects the marginal cost (MC). Monopolist charges the lowest price (P~ < P*), produces the highest quantity (Q~ > Q*), and has the same social welfare as a competitive market. Thus, Marginal Cost Pricing is allocative efficient because the government had set the market price equal to marginal cost, or P* = MC. However, the monopolist earns a long-run loss because the price lies below its average total cost (P < ATC).
We represent the loss by the lightly shaded rectangle in Figure 5. Consequently, government must subsidize this industry to keep the monopoly from going out of business.

![Diagram](image_url)

**Figure 5. Government uses marginal cost pricing to set the price for a monopolist**

*Ramsey Pricing* fixes the problem with Marginal Cost Pricing. A government allows the regulated monopoly to charge two prices: Unit charge and a fixed charge. *Unit charge* is the government sets the price equal to marginal cost, or \( P^* = MC \). Then the government lets the monopolist take the loss and charge it evenly to its consumers as a *fixed charge*. Thus, the monopolist earns zero economic profit in the long run and is allocative efficient. Nevertheless, government does not subsidize this industry.

**Policy 3: Curbing a monopoly’s power,** a government uses anti-trust laws to break up the monopoly into several smaller companies. Then these companies compete in the same market. For instance, the U.S. Supreme Court dissolved Standard Oil into several companies, including Amoco Corporation, Chevron Corporation, Exxon Corporation, and Mobile Corporation. These corporations grew into some of the largest corporations in the United States. For antitrust laws to be successful, the breakup must foster competition.

Anti-trust laws do not work well for natural monopolies. If government breaks up a natural monopoly, then a government increases the number of firms in the market. As each firm has a lower market share, its per-unit costs rise. Another problem is the breakup may not foster competition. For example, the U.S. government broke AT&T into five smaller telephone companies in 1984. Each telephone company retained monopoly control over its region. Therefore, the breakup did not foster competition but created five smaller monopolies.

Government can use anti-trust laws that do not involve breaking up companies. In the United States, corporations need a government to approve corporate mergers. Consequently, a government stops two corporations from merging if the merger will reduce market competition. Moreover, government can prosecute firms that engage in collusive behavior. *Collusive*
behavior is companies work together to set market prices and quantities, reducing competition. Markets with few firms can have firms colluding with each other.

Policy 4: A government can curb a monopolist’s power by taking over the monopoly. Unfortunately, government leaders can manage the company worse than a private monopoly because a government has no incentives to minimize costs and to satisfy consumers. Moreover, government has no profit motive, and taxpayers may end up subsidizing the government’s monopoly if government severely mismanages it.

Some government agencies and monopolies are not bad. For example, the U.S. government owns the U.S. Postal Service that offers good customer service. However, the U.S. Postal Service is facing intense competition from e-mails, electronic payments, faxes, and other mail carriers. For another example, Intel dominates the microprocessor market for computers and laptops. Although Intel has a market share of 80% of the market, Intel heavily invests its profits into research and development, so it remains the leader in technology.

Key Terms

market entry barriers
- Concentration Ratio
- economies of scale
- Herfindahl Index
- natural monopoly
- localized markets
- legal barriers
- interindustry competition
- licenses
- international competition
- patents
- Lerner Index
- unfair competition
- Average Cost Pricing
- price gouging
- Marginal Cost Pricing
- early bird
- Ramsey Pricing
- allocative efficient
- unit charge
- x-inefficiency
- fixed charge
- rent-seeking behavior
collusive behavior

Chapter Questions

1. Over 95% of personal computers in society have a Microsoft Windows operating system. Which market barriers prevent competitors from entering the market and competing with Microsoft?

2. Intel and AMD dominate the computer microprocessor market. Identify the market barrier for this market?

3. If a monopolist sees its MR = $5 per unit and MC = $1 per unit, what can the monopolist increase profits?

4. Apple Iphones set the standard for cellular phones, and everyone wants one. Appraise whether you should buy Apple stock because of the Iphone.
5. A government-housing agency helps the poor and disadvantaged find affordable housing and subsidizes rent. However, this housing agency has a notorious reputation for providing bad customer service, employing too many bureaucrats, and being connected to political leaders. Identify the problems with this housing agency.

6. A market has five firms with market shares of 60%, 15%, 10%, 8%, and 7%. Calculate the Concentration Ratio and Herfindahl Index.

7. In Texas, many water utility companies are public companies that supply water and treat sewage for their customers. These companies charge two prices: A monthly charge reflecting a household’s water usage and a fixed annual charge the company adds to a household’s property taxes. Identify the pricing policy that the Texas government uses to regulate its water companies.

8. Government worries about Microsoft making too much money and plans to break up Microsoft into two companies. First company takes over the operating system while the second company takes over the Office and other software. Does this government policy have any problems?

9. A local government plans to regulate its electric utility company by imposing a “fair return” on the company’s investment. Which pricing policy should the government use?
8. Public Enterprises

Public goods have an unusual property. Private companies cannot restrict their sales to paying consumers. Free riders can enjoy the company’s products without paying for them. Companies would have troubles supplying public goods such as national defense, flood control, or mosquito abatement. Furthermore, companies can supply quasi-public goods such as education, highways, and mail delivery, but a government takes over an industry or market and supplies public and quasi-public goods. Government can force people to pay for public goods, and a government can expand an industry such building more highways or funding more colleges because they greatly benefit a society. We provide in this chapter the reasons for public ownership, and the benefits and problems the government ownership causes.

Public Goods

A public good possesses two, unusual properties. First, a public good is non-rival. One person consuming and enjoying the good does not prevent other people from consuming that good. Accordingly, the marginal cost would be zero because, after a firm has produced the good, everyone can consume it. Second, a public good is non-excludable. Supplier of a public good cannot exclude people, who do not pay for the product. Consequently, free riders will consume the good, but not help pay for it. Typical public goods include national defense (military), public safety (police), radio and TV signals broadcasted over the air, clean air, and a stable financial environment. Unfortunately, a market undersupplies public goods because firms and suppliers cannot restrict consumption to paying customers.

Internet has created a new public good. Computer hackers, thieves, and pirates duplicate music, movies, books, and computer software, and distribute them freely to anyone in the world via the internet. Consequently, pirated electronic media are both non-rival and non-excludable because one person downloading a file does not prevent another from doing the same, and free riders enjoy the material without paying for it. Accordingly, pirates pay a zero marginal cost to download electronic media. Furthermore, the media companies became alarmed and dismayed at the growth of internet piracy, and successively rallied the governments in the United States and Europe to their cause. Although the governments in Europe and United States started the crackdown on internet piracy, internet piracy continues flourishing and growing.

Public goods could create perverse incentives if private sellers and businesses supply them. For example, Rome had no fire department around 115 B.C., and Marcus Licinus Crassus started a private fire department in Rome. As a person’s house was burning down, Crassus was negotiating a price for his services. Crassus possessed market power and became one of the wealthiest Roman citizens. Consequently, government should supply public goods.

Government may supply quasi-public goods. A quasi-public good is rival and excludable. Thus, one person using a quasi-public good does prevent rivals from enjoying that product. Furthermore, a producer or supplier can restrict consumption of the good to paying customers. Unfortunately, a market may not supply enough of them. For example, private companies can build and maintain highways, libraries, schools, colleges, and post offices. Moreover, the private
companies can restrict consumption to consumers who pay for them. However, government believes these goods and services are so vital to a society that it supplies more public goods than a private market.

A **Lindahl Price** is a method to correct the market failure for a public good. In theory, a government asks which price consumers are willing to pay for the public good, and then government provides the public good and charges each person his price, i.e. a tax. However, the consumers may not truthfully reveal their preferences or willingness to pay for a public good, so a Lindahl Price is not practical. We show a game theory example in Chapter 20 that people would never contribute to a public good.

We depict a public good in Figure 1, and government supplies 100 units of a public good. If the market has two people, and they truthfully reveal their willingness to pay, then Person A pays $50 for the public good while Person B pays $75. Consequently, government uses vertical summation and collects $125 from the people. If you remember Chapter 3, the total market demand for a regular good was the horizontal summation of individuals’ demand functions.

**Figure 1. Deriving a demand function for a public good**

**Reasons for Government Ownership**

Government has many reasons to control industries or a market. However, we do not list some reasons because they are not true. For example, government claims it can lower production costs, offer better service, or increase investment. This could be true in the beginning, but usually not true in the long run. In the long run, government usually pays greater costs, offers poor customer service, and stops investing, letting infrastructure and buildings to
deteriorate. Thus, we do not list these reasons, so we do not create confusion in Chapter 9 that covers deregulation. Consequently, we discuss the benefits and problems for each reason.

A government takes over an industry to improve safety or strengthen national security. For example, many countries control their energy industries, which we show in Table 1. An energy disruption would shut down a country. For another example, many city and county governments own and operate police departments, fire departments, and ambulance services. Could you trust a person to own and manage a police department? Finally, some governments increase public ownership to increase the power and prestige of the state (Conybeare 1982).

Table 1. A Partial List of State Owned Energy Companies

<table>
<thead>
<tr>
<th>State Company</th>
<th>Market</th>
</tr>
</thead>
<tbody>
<tr>
<td>China National Chemical Import and Export Corporation</td>
<td>Imports and exports petroleum for China</td>
</tr>
<tr>
<td>China National Offshore Oil and Gas Corporation (CNOOC)</td>
<td>Handles China’s offshore petroleum and natural gas resources</td>
</tr>
<tr>
<td>China National Petrochemical Corporation (Sinopec)</td>
<td>Refines petroleum into products for China</td>
</tr>
<tr>
<td>Chinese National Petroleum Corporation (CNPC)</td>
<td>Handles everything else for China that is not covered under the Sinochem, CNOOC, and Sinopec</td>
</tr>
<tr>
<td>Ecopetrol</td>
<td>Columbia’s petroleum company</td>
</tr>
<tr>
<td>Gazprom</td>
<td>Russia’s natural gas company</td>
</tr>
<tr>
<td>Pemex</td>
<td>Mexico’s oil and natural gas company</td>
</tr>
<tr>
<td>Petrobras</td>
<td>Brazil’s petroleum company</td>
</tr>
<tr>
<td>Rosneft</td>
<td>A Russian state owned petroleum company</td>
</tr>
<tr>
<td>Statoil</td>
<td>Norway’s oil company</td>
</tr>
<tr>
<td>Transneft</td>
<td>Russia’s pipeline monopoly</td>
</tr>
</tbody>
</table>


A government redistributes wealth in a society by transferring consumers’ and producers’ surpluses or by transferring surpluses between markets. For example, to supply water to consumers, a company invests heavily into an infrastructure. A water company lays a grid network of fresh water and wastewater pipes with a variety of pumps and tanks that crisscross a city. Consequently, a private water company would charge a high price to cover the infrastructure costs. However, many city governments own their own water companies. City governments use tax revenue from property taxes to subsidize water departments. For another example, government is a large purchaser. Government uses its purchasing power to buy sizable quantities of prescription medicine and vaccines, demanding discounts and price breaks from the medical companies. Then government administers medicine and vaccines to the elderly and poor.

A government takes over a market to remove a monopoly’s power. This may be a bad choice because the government becomes the monopoly. Monopolies charge the higher market prices, produce lower market quantities, and earn long-run economic profits. However, monopolies strive to maximize profits, so a monopolist has an incentive to keep costs low. Nevertheless, a government may be worse than a monopoly because government leaders cannot manage a business well and do not follow a profit motive. Thus, government may supply
products and services for higher costs and offer bad customer service. Moreover, government agencies suffer from x-inefficiency. **X-inefficiency** is the government agencies may not minimize costs, inflate salaries for management, hire too many managers, and the managers poorly motivate the workers. Companies and bureaucracies suffering from x-inefficiency have greater production costs.

A government captures substantial market profits. Government controls the distribution of certain products to charge high prices and to collect taxes. For example, the State of Utah owns all liquor stores, and the state government charges high prices and collects taxes. Moreover, natural resources like minerals and energy generate substantial long-run profits and are a large source of tax revenue. Hugo Chavez, the President of Venezuela, is using petroleum revenue to finance his socialistic programs. For another example, Pemex, Mexico’s petroleum company has a monopoly over petroleum and natural gas in Mexico, and controls petroleum extraction, refining, and retailing. If you want to buy gas in Mexico, then you buy it from Pemex through its gas stations. In 2005, Pemex paid the Mexican government $52.8 billion in taxes and duties and earned a $6.9 billion loss. Finally, Petronas is Malaysia’ petroleum company and contributes half the tax revenue to the National Malaysian Government.

An extreme form is government becomes a rent-seeking state. Top leaders of government own the private enterprises. Then they use their political power to protect their businesses and enhance their profits (Conybeare 1982). For example, a country’s President owns a car factory. Then the President uses the government to protect his car business, especially if the cars are poor quality. Thus, the government via the President imposes tariffs and trade protection on the import of cars, and imposes high taxes for cars that the President’s factory does not produce.

Governments may form international cartels to enhance profits. A **cartel** is suppliers for one product unite as one unit, becoming a monopoly. For example, one cartel is the Organization of the Petroleum Exporting Countries (OPEC). Five countries nationalized their petroleum industries in 1960 to form OPEC. Consequently, OPEC maximizes profits from petroleum by setting production quotas on petroleum. Quotas decrease petroleum production, increasing petroleum prices. Over time, OPEC has expanded membership and the current members include Algeria, Indonesia, Iran, Iraq, Kuwait, Libya, Nigeria, Qatar, Saudi Arabia, United Arab Emirates, and Venezuela.

A government use public ownership to reduce corruption. For instance, developing countries have a strong reason for government ownership. If private capital markets are not developed, and regulatory agencies are weak with limited funding and few inspectors, then privatization increases chances of corruption. Consequently, government would control a market to reduce corruption. Of course, this argument contains a flaw. When government takes over and owns a company, it appoints officials who could be as corrupt as everyone else in government.

A government exerts political control over corporations. Corporations are large organizations, and some government leaders control their corporations. For example, the Russian government owns 50.002% of shares in GAZPROM. GAZPROM is Russia’s natural-gas company and controls 100% ownership in 61 companies, a majority shareholder in 41 companies, and minority shareholder in 69 companies. Therefore, the Kremlin, the seat of the Russian federal government, strongly influences over 171 companies. Political leaders
controlling their corporations are a form of corporatism. **Corporatism** is a government controls its industry indirectly through associations. Hence, the bureaucracies, political leaders, and the regulated industries work together for the same goals. Furthermore, government determines which businesses, associations, and groups to work with. For example, the national governments in China, Japan, Taiwan, and South Korea use corporatism to develop rapidly their manufacturing industries in their economies. This swift industrialization becomes a driver of economic growth. Moreover, corporatism varies in the power level a government exerts over its industries. Some governments exert considerable power over their industries while the associations in other countries become advocates for their members and can convince the government to relax its control (Unger and Chan 1995).

<table>
<thead>
<tr>
<th>Cartels are not Effective</th>
</tr>
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</table>

OPEC successfully hiked petroleum price three times since the 1960s. However, cartels have several severe problems, which prevent them from earning long-run economic profits.

**Problem 1:** As the number of firms rises, firms have trouble colluding. Managers experience more difficulties to communicate, negotiate, and reach agreements. Many times OPEC could not agree on production quotas.

**Problem 2:** Firms have different market shares, different costs, etc. Thus, firms have trouble agreeing on production quotas.

**Problem 3:** Cartel members possess a strong incentive to cheat and secretly sell its products on the markets. This became a big problem for OPEC.

**Problem 4:** Members can circumvent fixed prices by non-price competition. A member can offer better quality and service or larger containers, more quantity for each dollar.

**Problem 5:** Some markets have low entry barriers. New rivals enter the market because they expect to earn economic profits, reducing economic profits for everybody. During high oil prices, energy companies search and drill new oil wells in Alaska, Oklahoma, and Texas.

**Problem 6:** Some markets have unstable demands, and the cartel is uncertain how consumers will react. For example, consumers reduced gasoline demand in the long run because consumers bought fuel-efficient cars, traveled less, and moved closer to work. For another example, consumers reduce their spending when the economy enters a recession. Thus, the cartel could break up if they cannot sell their quotas.

**Problem 7:** United States has antitrust laws. It is illegal to collude in the U.S. As the threat of getting caught increases, firms are less likely to collude.

A government uses public agencies to stabilize the economy. As an illustration, a government slows inflation by limiting raises in salaries. Furthermore, the U.S. government started public ownership in U.S. banks and corporations after the 2008 Financial Crisis. Banks are vital to the economy because they link the savers to the borrowers. Businesses borrow to invest in new machines, equipment, and buildings while households borrow to buy houses, cars,
and large appliances. If the banking system collapses, then the savers will hide their money under their mattresses. Thus, savers remove this money from the economy. Banks are important because they inject savings into the economy, putting the money to work through investments.

A government uses import substitution to boost economic growth. Government erects trades barriers that hinder the imports flowing into the country. Government could impose a tariff, where a government taxes imports or creates an overly complicated, bureaucratic system for import licenses. Thus, businesses can never get the proper licenses to import products. Furthermore, a government can subsidize or own the industries manufacturing the products that substitute for the imports. Government-owned industries may suffer from x-inefficiency, and a government creates monopolies within the country and protects them from international trade. However, governments can use import controls, overvalue their currency, or impose price regulation to protect these industries. If these protected state industries start earning losses, then government may operate budget deficits as it subsidizes the industry. Consequently, government may force its central bank to print money to cover budget or borrow from foreign countries. Usually, import substitution creates economic growth in the short run until a financial crisis. Many Latin American and African countries did not use import substitution successfully (Rodrik 1996).

Finally, government leaders like its industries to charge simple rate structure, thus gaining political support from the public. Public firms are not likely to use price discrimination.

**Price Discrimination**

Private firms can use price discrimination to capture consumers’ surplus. Consequently, the firm increases revenues and profits. Businesses and firms use senior citizen discounts, student discounts, coupons, rebates, and family specials to create different prices. Some consumers are more conscious about making purchases, have limited incomes, and are sensitive to high prices. Thus, sellers can earn more revenue by selling a product or service for a higher price, and then reduce the price for the price-sensitive consumers. A firm needs three conditions to use price discrimination effectively:

**Condition 1:** Sellers must identify different groups of customers. These different groups have different demand functions for the product or service.

**Condition 2:** Sellers must prevent the customers who buy at the low price and sell to customers who will pay higher prices. For example, a senior citizen sells her “discounted” medication to another customer.

**Condition 3:** Finally, the seller needs some monopoly power because the seller must raise the market price for groups who are not sensitive to high prices.

For example, a college can use price discrimination to increase revenue. Figure 2 shows a non-price discriminating college. College charges all students $10,000 per year, and 1,000 students enroll. Consequently, the college collects $10 million in revenue, which we show by the shaded rectangle.

In Figure 3, the college administrators use price discrimination and change tuition, so the college students do not transfer to another college. Thus, the same number of students enrolls, 1,000 students. However, the college charges students $20,000 per year. College charges the
300 rich students the full price. It collects $6 million in revenue from rich students represented by the black rectangle with a width of 300 students (or 300 – 0) and height of $20,000. College charges the 300 middle-class students $15,000. College grants $5,000 to these students as scholarships and collects $4.5 million in revenue as the gray rectangle. The gray rectangle has a width of 300 students (or 600 – 300) and height of $15,000. Finally, 400 poor students pay $10,000, and every poor student receives a $10,000 scholarship. College collects $4 million in revenue, represented by the lightly shaded rectangle. The lightly shaded rectangle has a width of 400 students (or 1,000 – 600) and a height of $10,000. Therefore, the price discriminating college gains more tuition revenue from the students. College collects $14.5 million in tuition, gaining $4.5 million with price discrimination.

A producer needs those three conditions for price discrimination to be effective. University and college administrators can easily identify the different social classes of students. They can
prevent students who pay the low price from reselling to students who pay the high price. Finally, colleges and universities has some monopoly power and are in a unique position. They require students to submit detailed financial information for financial aid and scholarships. Administrators have comprehensive accounts about students’ willingness to pay. Did you notice in Figure 3 that some students kept some of their surpluses? Some students kept three, white triangles. If a college could use price discrimination perfectly, then it extracts all consumers’ surplus that lies above the market price but below the demand function.

Public Ownership Types

Government ownership has a variety of forms and dates back to ancient times. For example, the Roman government owned the water industry and military arms production. Early in the 20th century, Great Britain used large-scale nationalizations. Nationalization is a government takes control and ownership of businesses and their assets, and a government may not compensate the owners or stockholders of the company for losing their assets. British government nationalized the telecommunications industry in 1912, Bank of England in 1946, the railroad in 1948, and the electricity markets in 1948. In the United States, city governments own 20% of the electric power market, 80% of the water companies. City governments also own and operate natural gas companies and local transportation systems, such as bus, subway, commuter rail and airports. Both the federal and state governments own and maintain highways and roads. Finally, after the 2008 Financial Crisis, the U.S. government started public ownership in financial corporations that teetered on bankruptcy.

We define five types of public ownership:

Type 1: A government forms a cooperative, which is members form a group with similar interests. A cooperative is a form of corporatism. For example, the U.S. and state government formed cooperatives for U.S. agricultural producers. Cooperative helps agricultural producers with marketing and acts as an intermediary between agricultural producers and the food industry. When a cooperative buys all products from producers and sells to industry as a single seller, then the cooperative has market power and transfers the profits to agricultural producers. Moreover, the cooperative provides loans and credit to help the farmers purchase supplies and equipment. Some cooperatives formed without government aid, and they benefit their members. Remember, monopolies are bad for the economy unless the government forms one, thus helping a disadvantaged group.

Type 2: A government becomes a single producer in a market, a monopoly controlling an industry or product. Government owns all the machines, equipment, and buildings for the industry and hires the workers. Government ownership could occur on a large scale, where it controls a whole industry or market for a country. Refer to Table 1 for governments that nationalize their energy companies. Furthermore, the Soviet Union controlled agricultural producers through collective farms. Soviet government owned everything, and workers became “slaves to the state,” especially the cotton collective farms in the Socialist’s Republic of Uzbekistan. Soviet Union limited its citizens’ mobility, so government restricted its citizens to reside at the collective farms. Finally, government ownership can occur on a small scale. Many U.S. municipal governments own their own water, electricity, and natural-gas companies.
Municipal government is the city and county governments. Public ownership occurs on a small scale because a municipal government controls a small region within a country.

**Type 3:** A government creates departments that extend government. They can potentially control industries and businesses. For example, the U.S. Department of Education enforces regulations for the U.S. education institutions while the U.S. Department of Defense supervises the U.S. military. Many countries refer to their departments as ministries. Consequently, these departments and ministries use their regulatory powers to influence and control businesses and institutions. Government allows people to own businesses and resources, but government controls people and businesses through its regulatory power. Then government punishes people and businesses if it discovers people and businesses are not complying with the regulations.

**Type 4:** A government creates a quasi-government agency, which is neither a public nor a private institution. For example, the United States central bank, the Federal Reserve System, is similar to a corporation with U.S. national banks as shareholders. Although shareholders control corporations, the U.S. banks do not control the Federal Reserve. Board of Governors controls the Federal Reserve, and the U.S. president with Senate confirmation appoints board members, including the chairman and vice-chairman. Current chairman is Ben Bernanke.

**Type 5:** A government establishes a company as a public corporation, and the corporation issues stocks. Government is usually a majority shareholder, and the government controls the company, receives dividends, and collects taxes. Moreover, the government elects the board of directors, who in turn, the board elects the president. Federal National Mortgage Association (Fannie Mae) and Federal Home Loan Mortgage Corporation (Freddie Mac) are two U.S. public corporations that grant mortgages to low-income households. As of 2009, both Fannie and Freddie have accumulated massive billion-dollar losses. Unfortunately, the 2007 Great Recession caused many homeowners to default on their mortgages. U.S. government nationalized both agencies in 2008 and took control of these corporations. Ironically, the U.S. government created these two institutions but privatized them in the 1990s. Both institutions hold roughly $12 trillion in mortgages.

City government extends a public corporation with a similar corporate structure. First, a city government approves a charter. A charter is a document that legally establishes the city and defines the city’s structure. Structure is how the city government is organized and establishes powers and duties for all city departments and agencies. Second, a city council is equivalent to board of directors. A mayor is similar to a corporate president while city residents represent shareholders. Furthermore, residents elect the mayor and city council, and all city council meetings are open to public. Reason is to make city government responsive to its citizens, creating an open government with high transparency. Website, www.municode.com, has many U.S. city charters and laws.

**U.S. Government Bailout of the Financial Institutions in 2008**

The 2007 Great Recession led to the 2008 Financial Crisis. U.S. government intervened in the U.S. financial markets during the Great Recession and prevented the collapse of large banks and financial institutions. U.S. government has started the unprecedented ownership in the largest corporations in the United States as a condition of the bailout.
The 2007 Great Recession started, when the housing bubble deflated in 2007. Unemployment began increasing while some households defaulted on their mortgages. Consequently, banks foreclose on properties that lose value over time. Furthermore, some experts believe the U.S. economy will enter a decade-long recession like Japan.

Federal government intervened and began government ownership because the collapse of the banking system would contract the economy severely. Banks are vital to the economy because they connect the savers to the borrowers. If savers stopped depositing their money into banks, then banks cannot grant loans. Then businesses and households could not invest in the economy. However, the U.S. government bailout has six problems.

**Problem 1:** Bailout package rewards the financial industry for bad decision-making. Financial companies should be punished. If the U.S. government bails them out, then the government should buy the mortgages for a fraction of their book value, forcing losses on the companies. If companies know the government will always bail them out, then the companies will always take excessive risks.

**Problem 2:** U.S. financial institutions face a massive financial exposure because the bailout of all institutions is several times the size of the U.S. economy. Bailout package is only a minuscule drop of water, compared to a potential flood if government must bail out all U.S. institutions that made bad decisions.

**Problem 3:** Government bailed out the financial institutions to get them lending again. Many of the companies the government bailed out hoarded the money. Of course, many U.S. consumers have too much debt, so they do not want new loans or new mortgages. Moreover, banks do not grant new loans on houses that lose value over time.

**Problem 4:** Government could create inflation. U.S. government and Federal Reserve System have injected trillions of dollars into the banking system. If the banks start lending this money, banking system injects the loans into the economy, creating inflation.

**Problem 5:** Government requires the homeowners to be in default before the government can help them. Consequently, people deliberately would default on their mortgages, so the government can bail them out too.

**Problem 6:** U.S. government gains ownership in the financial industry. Bureaucrats can make terrible decisions and tend to be slow, bureaucratic, and perpetuate complex rules.

U.S. government became a shareholder in a variety of U.S. corporations in 2008, and we show a partial listing in Table 2. Corporations teetered on bankruptcy and financial collapse. U.S. government bailed out the U.S. financial institutions by purchasing warrants. A **warrant** lies between a common stock and corporate bond. Warrant does not give the U.S. government voting rights in electing the board of directors. However, the U.S. government exerts control by being a large financial contributor. Warrants infuse the corporations with government’s money, and the government is high on the list if a bankruptcy court liquidates the corporation.

If the U.S. economy enters a decade-long recession like Japan, then the U.S. government would accumulate large losses from holding these financial assets that will lose their value. Bailout would weaken the U.S. dollar further. Thus, the bailout packages have added trillions to the U.S. government debt. Some international investors worry about the government’s ability to repay this debt.
Government's Optimal Size

U.S. federal government's budget mushroomed into $3.8 trillion or roughly 25.3% of the U.S. economy in 2011. We show the main budget items in Table 3 and includes both on-budget and off-budget items. U.S. Government defines the Social Security and the U.S. Postal Office as off budget. Government spends the largest expenditures on national defense, social security, income security, and Medicare. Income security is the safety net programs, such as housing assistance, food stamps, etc. Finally, the net interest on the debt was $207 billion.

Table 2. U.S. Government Ownership of U.S. Corporations in 2008

<table>
<thead>
<tr>
<th>U.S. Corporation</th>
<th>U.S. Government Bailout</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Financial Industry</strong></td>
<td></td>
</tr>
<tr>
<td>Bank of America</td>
<td>$15 billion</td>
</tr>
<tr>
<td>Bank of New York</td>
<td>$3 billion</td>
</tr>
<tr>
<td>Citigroup</td>
<td>$25 billion</td>
</tr>
<tr>
<td>GMAC</td>
<td>$5 billion</td>
</tr>
<tr>
<td>Goldman Sachs</td>
<td>$10 billion</td>
</tr>
<tr>
<td>JP Morgan Chase</td>
<td>$25 billion</td>
</tr>
<tr>
<td>Morgan Stanley</td>
<td>$10 billion</td>
</tr>
<tr>
<td>State Street</td>
<td>$2 billion</td>
</tr>
<tr>
<td>Wells Fargo</td>
<td>$25 billion</td>
</tr>
<tr>
<td>Merrill Lynch</td>
<td>$10 billion</td>
</tr>
<tr>
<td><strong>Insurance</strong></td>
<td></td>
</tr>
<tr>
<td>American International Group (AIG)</td>
<td>$40 billion</td>
</tr>
<tr>
<td><strong>Automobile Companies</strong></td>
<td></td>
</tr>
<tr>
<td>Chrysler</td>
<td>$4 billion</td>
</tr>
<tr>
<td>General Motors (GM)</td>
<td>$40 billion</td>
</tr>
</tbody>
</table>


Table 3. The 2011 U.S. Government Budget

<table>
<thead>
<tr>
<th>Budget Item</th>
<th>Amount ($ millions)</th>
</tr>
</thead>
<tbody>
<tr>
<td>National Defense</td>
<td>768,217</td>
</tr>
<tr>
<td>Social Security</td>
<td>748,354</td>
</tr>
<tr>
<td>Income Security</td>
<td>622,654</td>
</tr>
<tr>
<td>Medicaid</td>
<td>494,343</td>
</tr>
<tr>
<td>Net Interest on the Debt</td>
<td>206,688</td>
</tr>
<tr>
<td>Total Budget</td>
<td>3,818,819</td>
</tr>
</tbody>
</table>


Is the U.S. government too large? Rahn Curve illustrates the relationship between the size of the government and the economy’s growth rate. Richard Rahn estimated the optimal level of government spending would lie between 15 and 25% of GDP. If a government spends beyond 25% of GDP, then it hinders economic growth. Currently, the U.S. government spends
approximately 25.3%, which is only one piece of our government. After we add state and local
governments, then the government spending rises from 35 to 40% of GDP. Similarly, the United
Kingdom is about 43% of GDP while many European countries exceed 50%. Since the 2007
Great Recession, all these countries experienced weak economic growth. On the other hand, the
Asian tigers – Hong Kong, Singapore, South Korea, and Taiwan have government spending
within the optimal range, and their economies are flourishing.

Rahn Curve’s weakness is it classifies all government spending as equal. If a government
has generous social and retirement programs, then these programs would not boost GDP growth
rates. However, if government invests in education, training, or infrastructure, then these
investments can boost future GDP growth rates. As shown in Table 3, the four largest items in
the U.S. budget are the military, retirement, and social programs. Unfortunately, the U.S.
government does not invest in the U.S. economy. The U.S. government’s spending will not
boost economic growth.

Rahn Curve places a lower estimate on the government’s size. Economists have trouble
measuring the size, scope, and mission of our government. Federal, state and local governments
created a variety of quasi-government agencies, authorities, nonprofit organizations, and public
corporations. We refer to these institutions as hidden government because they are free from
government oversight, independent of the voters, and can issue debt that a government backs
and guarantees. Some of these institutions are riddled with corruption, mismanagement, bid
rigging, or maintaining the “good ole boy system.”

Hidden government includes the three examples:

**Example 1:** Local and state governments create a variety of organizations to operate
airports, seaports, toll bridges, low-income housing, parks, schools, and universities. Local or
state government could be liable for these institutions’ debt if these institutions experience
financial problems.

**Example 2:** Some city governments created public corporations or departments to provide
utilities for its residents such as water, electricity, or natural gas. Then the public corporations
and departments charge high prices and pay some of their profits to the local government.

**Example 3:** Federal government created public corporations like Federal National
Mortgage Association (Fannie Mae), Federal Home Loan Mortgage Corporation (Freddie Mac),
and the Student Loan Marketing Association (Sallie Mae). Fannie Mae and Freddie Mac grant
mortgages to low-income households while Sallie Mae grants loans to college students.

Governments created these institutions to benefit their citizens, and these institutions may
not act like private businesses. A personal business has one purpose – to earn profits. If
managers mismanage a private business, or a firm manufactures low quality products, or
provides terrible customer service, then that business could fail and bankrupt. Threat of financial
failure forces a business to pay attention to the market, to its customers, and to its products and
services, or the business fails. Unfortunately, fiscal failure provides little feedback to public
institutions. Public institutions can run to government leaders and beg for subsidies, tax breaks,
or favors to keep inefficient, mismanaged public corporations operating.
Corruption

Political leaders and politicians expand a government’s dominion over time. This is the essence of political leaders and Parkinson’s Law. (Refer to Chapter 2 for a review of Parkinson’s Law). They use taxes, regulations, subsidies, laws, and government ownership of property as their tools. Thus, they use their tools to expand their power and consequently, increase the size, scope, and mission of government. Alongside government’s growth is the explosion of corruption. Growing government and corruption go hand in hand. Although corruption is difficult to define, everyone knows corruption when he or she sees it. It is the old saying – if it looks like a duck, walks like a duck, and quacks like a duck, then it is a duck.

Corruption thrives in societies with tyrants dominating the state and monopolies thriving in the market. Corruption thrives in heavily taxed, regulated societies with concentrations of power. Widespread corruption has three requirements:

Requirement 1: A society needs a level of moral loyalty and civic virtue to maintain itself. As a government becomes more corrupt, the people’s loyalty and virtue break down. Leaders want their way as they become hedonistic and narcissistic with no moral constraints. They abuse their power to maintain their position and authority (Dobel 1978). Ethics and loyalties have no place as leaders use any means to sustain their positions of power.

Requirement 2: Excessive inequality in wealth, power, and status can exacerbate a state’s corruption. After leaders and wealthy people has climbed to the top, they become selfish, proud, and arrogant. They do everything they can to maintain their position, even at a society’s detriment (Dobel 1978).

Requirement 3: Society breaks into warring factions. Factions are sources of wealth and power. Factions want to usurp government and win leaders to their camp. A faction can lure regulatory agencies, police, and the criminal-justice system to their camp. After a faction has gained power, they influence the lawmakers, who in turn write the laws. Then they use the judicial and criminal-justice systems to go after their opponents.

Corruption becomes detrimental to society because corruption causes three negative problems. First, corruption creates uncertainty. Business leaders do not know how taxes, government regulations, and laws will change. They pay higher taxes and greater regulatory costs. Consequently, businesses reduce their investment to minimize their exposure to a growing government. Second, businesses, especially the large businesses bribe government leaders and bureaucrats. Businesses pay greater costs and become more uncertain. Government leaders and bureaucrats can their bribes over time. Since bribes are illegal, parties cannot set future bribes in contracts. Finally, as corruption infests the regulatory bureaucracies, the bureaucrats hinder the creation of new businesses. Old businesses bribe the bureaucrats to prevent new competitors from entering the market, or the bureaucrats create complicated rules. Thus, businesses must pay more to overcome these complex rules, or the bureaucrats withhold or deny the necessary permits and licenses. Usually monopolies are integral to corruption because monopolies can earn substantial profits. They pay bribes to government and bureaucrats who help protect the monopolists’ power. Society plagued with rampant corruption breaks down and deteriorates.

Countries with rampant corruption can suffer from the three impacts:
**Impact 1:** Public law disintegrates and breaks down as the people stop following the law and become violators instead (Dobel 1978).

**Impact 2:** Political debates lose meaning, logic, and common sense. Demagogues espouse class warfare and help one faction punish another faction (Dobel 1978).

**Impact 3:** Violence becomes more prevalent as people lose faith. Government has more difficulties in reforming government (Dobel 1978).

Government can use simple methods to reduce corruption by reducing the concentration of power. For monopolies, government breaks them up, regulates them, or exposes the monopolies to international trade. For the government, the political leaders must lower taxes, reduce the government’s size, eliminate subsidies, and simplify bureaucratic red tape. Of course, governments rarely invoke these policies. Instead, the political leaders increase the size, scope, and mission of government to eliminate corruption. Hence, the political leaders use more government to eliminate the problems of government.

**Key Terms**

- public good
- non-rival
- non-excludable
- quasi-public good
- Lindahl Price
- x-inefficiency
- cartel
- corporatism
- import substitution
- tariff
- price discrimination
- nationalization
- cooperative
- quasi-government agency
- public corporation
- charter
- warrant
- Rahn Curve

**Chapter Questions**

1. U.S. laws prohibit U.S. companies from forming cartels. If two corporations dominate and supply a U.S. market, identify whether they find a way to work together without organizing a cartel.

2. Current market price of petroleum is $150 per barrel. Imagine you were a President of an OPEC nation, and OPEC reduces your country’s petroleum production by 10%. Identify ways you can boost your profits.

3. Explain how a theme park uses price discrimination.

4. Judge whether software companies can use price discrimination, such as student discounts.

5. After the 2008 Financial Crisis, government has strengthened the regulation of banks, increased several taxes on banks, and hiked the deposit insurance rates on banks. Banks
must buy deposit insurance from a public corporation, Federal Deposit Insurance Corporation. Appraise whether a government is using a good strategy.

6. A country nationalized all its industries after a socialist’s party had taken over the country. Socialists strongly distrust free markets. Identify the economic problems that nationalization would cause.

7. Government wants to help the orange growers in Florida, but the government does not want to own or control the industry. Which form of public ownership should the government use for this case?

8. Many former Soviet countries suffer from severe corruption. Identify the methods for a government to reduce corruption.
9. Deregulation

Government is bad at operating businesses. For instance, a private company would bankrupt if the managers mismanaged the company, or the company sells low-quality products or cannot compete with competitors. If managers mismanaged a government-operated company, or it produces inferior goods, and lacks competition, then the public company could avoid bankruptcy and financial hardship. Unfortunately, a public company has connections to government, and the government may subsidize the business to keep it operating.

Government agencies and monopolies may suffer from x-inefficiency. X-inefficiency is the firms and government bureaucracies do not minimize their production costs for their goods and services. They face little or no competition, have no incentive to minimize costs, mismanage the company, or poorly motivate the workers. X-inefficiency may be more severe with government agencies because government agencies usually are larger than private ones, and they lack a profit motive. Consequently, governments deregulate markets because a government believes private companies generate more wealth than public companies and adopts technology quicker. Thus, government deregulates the public entity, introducing competition and imposing financial discipline on the public entity.

Benefits and Problems of Deregulation

Many countries are deregulating their financial and energy markets, allowing their corporations to compete internationally. Deregulation is government removes regulations, reduces taxes and subsidies, removes price controls, or converts a government agency into a private one. Some governments remove regulations and add new ones. This is not deregulation but re-regulation. For example, the State of California “deregulated” its electricity power generation. State government removed old regulations and added new ones in 2000. When the new regulations did not work, the state officials declared deregulation a failure.

Government has six reasons to deregulate.

**Reason 1:** A government deregulates a public company to stimulate new investment and technology. Usually but not always government adapts new technology slowly and underinvests in public companies. When government deregulates public companies, it opens the company to foreign and domestic investment. Investors bring new technology with them. In some cases, the new companies could evolve into international corporations and start investing in activities abroad. In the United States, a government subcontracts with private technology companies to help government implement new technology. U.S. government depends on private subcontractors for its new technology.

**Reason 2:** A government deregulates to curb the power of labor unions. Government agencies and public companies allow labor unions to form easily. Labor unions raise workers’ wages, increase workers’ benefits, reduce work requirements, and create more difficulties and barriers to terminate workers. Although a government may not pay as well as private companies, government offers excellent health and pension plans. On the other hand, private corporations tend to fight and resist labor unions. After the government has deregulated a company, the
company busts the labor union and reduces labor costs. Moreover, the company may also lay off workers and reorganizes the business to improve efficiency.

**Reason 3:** Consumers gain from deregulated public companies. In a competitive market, producers compete for consumers and cater to their demands. Consequently, consumers pay lower prices, have more choices, and receive better service. Key word is competition. Government must subject the deregulated company to competition. For example, government lowers trade barriers, forcing the deregulated company to compete with other companies in the international markets. Moreover, recently privatized companies experience large increases in profits and labor productivity. *Productivity* measures the production level relative to the labor force. Thus, the privatized company has workers who actually work. How many times have you wandered into a public company or a government agency, and the workers are idle? If the privatized company can reduce its costs, then it can sell products and services for lower prices.

**Reason 4:** A government financially gains from deregulated companies. Government has a new company to tax, could receive cash from privatizing a public company, or lowers subsidies and tax credits. Furthermore, government could reduce its budget deficit if it borrowed to keep a public company running. A budget deficit is the shortfall in a budget when a government spends more than what it collects in taxes.

**Reason 5:** A government deregulates a public company to end preferential treatment. Public companies and government agencies are connected to government, and government officials and leaders may bestow favors, subsidies, tax breaks, and other favors to the public companies. Moreover, if a public corporation had violated a law, would the government shut down the public corporation? Government usually has no problems shutting down private businesses, when they violate the law.

**Reason 6:** A government deregulates to reduce the power of interest groups. Interest groups strive to manipulate or influence government and its regulatory agencies. Converting a government agency or public company into a private one reduces the power of interest groups. Furthermore, corruption flourishes when tyrants control the state, and monopolists dominate a market. Privatization could reduce government corruption as power is dispersed over a wider group.

Privatization is not completely positive and creates two problems. First, privatized agencies usually reduce workers’ wages because government agencies had allowed labor unions to form. Labor unions force the government agency to pay excellent wages. Usually, competitive markets pay excellent wages for specialized skills or professionals with high-levels of education, but low wages for labor with common, basic skills. Professionals are limited in quantity, while labor with common skills is common in the labor pool. Unfortunately, a competitive market can be cruel to workers with little skills. Second, a privatized company may reduce the number of workers through layoffs. If a laid-off worker, who is over age 40 may have trouble finding new work. Employers usually hire young workers because young workers are easier to train, have computer skills, and work for a longer time for the employer.

Successful deregulation hinges on competition. If a government deregulated a public company, and this company is the only seller in the market, then this deregulated company
becomes a monopoly. In this case, a monopoly permanently raises market prices as the monopoly reduces production and earns profits.

**Methods of Privatization**

Government uses several methods to deregulate government agencies or public companies. All methods require the government to change the legal system because government introduces or expands property rights and contract law. Moreover, the judicial system must change because judges help enforce contracts and protect property rights. For example, the former communist governments converted public property, such as apartments into private property. Governments changed the role of the government agency that monitored and controlled the apartments. Government agency must introduce property titles, allowing property owners to sell and transfer property.

Government uses four methods to transfer state property to the public. For the first method, government transfers state property to families that had their property seized by the state. State grants *restitution* to its citizens for stealing and expropriating property. This method was popular in Eastern Europe, and not very common in the former Soviet Union countries (Brada 1996). For example, families and owners must prove to the state that they had owned the property before the expropriation. Soviet Union was created in 1924, while the Eastern Bloc countries became communist after the Soviet army invaded these countries after 1945. With the 1940s being more recent, owners can prove they owned the property. Common forms of property returned to owners were farmlands and small businesses. One problem of restitution is the owner must evict people and families who occupy the property (Brada 1996).

For the second method, a government sells or auctions the whole state company to the public, or to another private company. Then the government sells the firm to the highest bidder. Consequently, government receives revenue. Argentina, Chile, Hungary, New Zealand, and United Kingdom used this method. However, auctions may touch a sensitive issue. Should a government allow foreigners to buy companies? Although the country attracts foreign investment, the citizens believe the government is selling the country to foreigners. For example, Hungary allowed foreigners to invest freely in their country, and Hungary captured 1/3 of all investments to Eastern Europe and the former Soviet Union (Brada 1996). Other countries, like Czechoslovakia, Poland, and Russia imposed more restrictions on foreign ownership. They did not trust outsiders.

For the third method, government uses *vouchers* to convert public property into private property. In this case, government does not receive any cash. People usually have no money, and the vouchers become assets, creating wealth for the citizens. People, who have vouchers, can convert vouchers into shares in a corporation or into ownership of private property, such as apartments and houses. Then government establishes a stock market exchange for the corporations. Former communist countries used vouchers to transfer public property to the people. In some cases, government gave vouchers to families as compensation when the government had seized their property during socialism times (Brada 1996).

For the fourth method, government organizes the public company as a corporation with the government being the majority shareholder. Government has two options. First, government...
gradually sells its shares to the public over time. Thus, a government gradually transforms the public company into a private one. For example, the British government sold British Petroleum in this manner, and the Canadian government did the same with Petro-Canada. Second, government forms a joint venture between public and private companies. Hence, government sells shares of the public corporation to a specific buyer. Consequently, the joint venture is a corporation with the foreign company, public company, and government as the only shareholders. Joint ventures are popular with former Communist and Latin American countries. A joint venture allows a government to retain control of a company by being the majority shareholder, but it allows the public corporation to attract foreign investment and technology. Some governments channel all foreign investment to the joint ventures within their countries. Consequently, government can show high privatization rates, but government conceals its ownership through public trusts, public banks, and public corporations (Brada 1996).

For the last method, government reduces the level of regulations, decreases taxes and subsidies, or removes price controls. For example, the U.S. government heavily regulated the banking industry before the 1980s, and President Ronald Reagan helped deregulate the banking and financial markets. For another example, South Korea government wanted to expand its chemical industry with subsidies, but the industry continued its bad performance. Finally, the Korean government withdrew all subsidies and opened their chemical industry to international competition. Thus, competition forces companies to be fiscally responsible; otherwise, they will bankrupt and exit the market.

Conversion of state companies into private ones creates a host of problems. First, a state agency, usually called the State Property Agency, holds onto the property. Furthermore, a company’s management and workers have uncertainty because it takes time to sell the company to new owners. Process is slow, and the State Property Agency usually does not take an active role in company management. Second, government and workers may resist privatization. New managers can lay off redundant workers, so the managers can boost productivity and can compete with other firms. A government may also not like the rising unemployment from privatization, or a spike in bankruptcies if the privatized firms cannot survive. Moreover, the state firm loses power and income. Third, government usually retains its burdensome regulations and high taxes, which hamper the success of the privatized businesses. Finally, investors may be only interested in the most profitable enterprises, and they avoid the companies that investors view as unprofitable (Brada 1996).

In extreme cases, a government evolves into a kleptocracy, which plagues several former Soviet Union countries. As the government converts a state company into a private one, a country's President appoints the president of the newly formed company, who are close friends and relatives of the country’s President. Then the friends and relatives extract, steal, or expropriate as much money and assets as possible from the company. They also pay bribes and contribute to the country’s President. Kleptocracy means the country’s President, and top leaders use the state “to steal” on a large scale.
Subcontracting Government Functions

Government may subcontract some of its functions to a private company. Private company creates goods and services for a government agency because the private company reduces the costs, provides better customer service, improves choices for customers, and improves efficiency. Government may also subcontract out functions to avoid complex regulations or avoid conflicts with a government labor union. For example, a city subcontracts out its environmental inspections to a private company because the federal government’s environmental regulations are too complicated, or the government wants to change job duties that violate labor union contracts. Consequently, subcontracting appears to shrink government. Although subcontracting is a form of deregulation, and a government subcontracts part of its work, it may enlarge the bureaucracies. Federal and state governments have many rules and regulations for subcontracting. Thus, the government agency must hire more bureaucrats to monitor the contracts and ensure the companies comply with all contract terms (O'Tool and Meier 2004).

One city government subcontracted most of its functions. Sandy Springs, Georgia incorporated in 2005 because the residents did not want the City of Atlanta to annex them. Sandy Springs is an affluent community with roughly 100,000 residents that borders northern Atlanta. Residents complained the Fulton County collected tax revenue from Sandy Springs to develop poor areas in the county.

After the city government had incorporated, city had no infrastructure, buildings, and employees. City leaders subcontracted most its functions to private businesses, which they a public-private partnership. City government administers the fire and police departments and employs the judges but subcontracts the other court functions. City contracted the functions to private companies: Administration; human resources; finance; accounting; purchasing; information technology, parks and recreation; road and sidewalk maintenance, traffic design and control, and community development.

Subcontracting was a success. City government has no liabilities or pension fund crisis, but the city is only 8 years old. Furthermore, the city has not raised its tax rates even after the 2008 Financial Crisis hurt many municipal governments across the United States. City leaders claimed the city pays half the cost to provide the same services than if city managed its own functions. City leaders believe the city government should provide services to the community and not act as an employment agency. Moreover, the city accumulated reserves in the operating budget that city officials used for capital projects. Finally, the city leaders won their reelections by a landslide. Candidate with the lowest vote received 84% of the votes.

Five cities have adopted this model, and the State of Florida plans to privatize its prison system and Medicaid services in 2013. Medicaid is the state receives funding from the U.S. federal government to provide health care for poor residents. Most city and state leaders have no plans to subcontract government functions for several reasons. First, they are suspicious to subcontract any government functions to private companies. Public may be suspicious to privatizing the police and fire departments. Second, they have less staff and people to manage. Finally, the public and leaders believe subcontracting would worsen corruption city leaders pick
the companies to subcontract and demand kickbacks and bribes. If political leaders plan to use their offices to steal, they can easily steal under a traditional government or a government using subcontracting.

**Communistic Countries in Transition**

Communistic countries in transition face many challenges. Under communism, the government controlled all means of production. Government owned all the factories, land, and property because a government was following Marx’s and Lenin’s beliefs. Marx believed private property becomes a means by which one person can exploit another. Thus, an owner of a factory exploits a worker. If a government owns all the property, then no one would be exploited. Consequently, the state owned and controlled everything, and no one in society was exploited. However, free markets require that government separate economic and political power. Deregulation always reduces a state’s power. Furthermore, Marx's and Lenin's ideology loses its appeal. Government and citizens embellish other ideas such as free markets, mercantilism, or economic nationalism.

Communism created large state bureaucracies that controlled the economy. Bureaucrats decided what should be produced, which quantities, and which prices, and who consumed them. Soviet planners imposed production quotas, while quality became a secondary issue. Thus, the Soviet industries usually produced low quality goods. A problem with the production quotas is they became fixed and difficult to change. Although the Soviet Union had a high-level of education, the Soviet industries rarely incorporated innovation or new technology. Incorporating technology would impose unknown costs on a firm, and the bureaucrats must change the production quotas. Hence, the Soviet system had no incentives to design new products, and manufacturers rarely updated product designs. Under a market system if one firm sells a better quality or better product, then consumers flock to that producer for the best quality goods. Consequently, competitive firms have a strong incentive to adapt new technology, while communism hinders the adoption of technology.

Material balancing causes production quotas to fail. State bureaucracy must match inputs and outputs for all industries. This requires the Soviet planners possess perfect information. Consequently, shortages and surpluses plagued the Soviet economy. For example, the iron mining industry did not meet their quotas for iron ore. This ore shortage would trickle down through all the other Soviet industries. Thus, the steel factories cannot meet their quotas. Then a steel shortage trickles through the economy, causing shortages in other industries. Usually the military industry would get its steel first, and consumer products for steel were last. Therefore, Soviet government had plenty of guns and tanks, but few citizens owned cars. To combat this problem, Soviet factories hired specialists who searched for materials and products that a factory needed to meet its production quotas. Specialists would pay bribes or barter for the needed materials (Katsenelinboigen and Levine 2010).

Move to a market economy requires changes to a country’s legal system. Government must write a new constitution, and create political parties, electoral rules, administrative and judicial structures. Then the state must educate its citizens of the new “rules of the game” as new unprecedented concepts take root. Government allows firms and businesses to earn profits, and
they would compete. Furthermore, government should allow inefficient, non-profitable firms to bankrupt. Of course, countries in transition will experience unemployment, although unemployment did not officially exist under socialism. State required everyone who could work must do so.

Government loses its ability to set prices or plan the economy. Government must create private ownership, and allow markets to determine prices and wages. Then government transfers the state property to its citizens. Deregulation does not disperse the power. New sources of power could emerge outside the state. Economic and political power could become re-concentrated in the hands of a few elite. For instance, the old communist party bosses became the new capitalist bosses.

A country in transition must deregulate the markets. Then prices become signals to the buyers and sellers because a market price reflects a product’s scarcity. Thus, scarcity drives prices up, which limits the quantities consumers will purchase in a market. In the socialist countries, prices for goods were relatively low relative to their wages because the bureaucrats set prices that way. Furthermore, consumer goods and services were often limited and poor quality. Consequently, consumers found themselves with more money than they could spend.

Two institutions emerged to handle the excess cash: black markets and bribery. People used black markets to pay for imported goods, buy hard currency, or products and services in short supply. Furthermore, some citizens resorted to bribery. For example, patients paid doctors for better health care. Store employees hid inventory and sold the products to customers for a greater price. Even in the state factories, dead employees, called dead souls, collected paychecks, which the factory managers secretly pocketed (Katsenelinboigen and Levine 2010).

As government removed the price controls, their economy experienced rapid price increases creating inflation. Unfortunately, inflation hurts the firms and people, especially the elderly and pensioners. Although the shortages disappeared, the producers and suppliers sold goods at higher prices. Workers demanded higher wages from their employers, but the state still owned many companies. Unfortunately, the state businesses could not increase wages. Finally, some governments printed money to cover budget deficits. Printing money causes inflation or even hyperinflation. Hyperinflation devastates the economy as people stop taking money and resort to barter.

**Russia's Rocky Transition to Capitalism**

Russia’s road to capitalism illustrates several problems of transition. Soviet government was rooted in one party, the communist party, whose founders even wrote in the nation's constitution. Leader of the Soviet Union was also the leader of the communistic party, who was called the General Secretary. Communist party limited membership from 5 to 10 percent of the population. People referred the party members as nomenklatura. They controlled all machinery of government. Nomenklatura lived better than the rest of the population, had the best housing, traveled abroad, and could shop at special stores, which were stocked with Western goods or products in short supply.

Russia had little experience with democracy and free markets. Russia jumped from an agrarian society directly to a socialistic, industrialized society in 1917. Soviet planners
constructed rapidly heavy industry, infrastructure, educational and health facilities. Stalin dispersed the Soviet industries among the Soviet countries, ensuring these republics would never break apart, at least not with severe hardship. For example, Russian workers assembled the Soviet radios; Georgian workers made the radio vacuum tubes, and Ukrainian workers made the radio circuit boards. Each Soviet state did not contain a whole industry, creating interdependence among the states. During the 1960s, the Soviet Union grew rapidly and led to urbanization as people left the villages and headed to the cities. However, by the 1970s, stagnation and resignation reigned, and the economic performance ground to a halt. In some countries, the life expectancy began to decline.

Mikhail Gorbachev came to power in 1985. Gorbachev represented a new, younger generation of Soviet leaders whom Joseph Stalin did not indoctrinate. Gorbachev inherited a stagnant economy, and he implemented economic and political reforms: glasnost (openness) – greater personal freedom and perestroika (reconstruction) – reorganization of the economy. Although the factory managers had greater authority to make production decisions, the state planning bureaucracy maintained its power. Private ownership and private enterprise were encouraged, but prices remained regulated. Thus, the system was doomed to collapse. Political power and government were too intertwined to separate the two (Bialer 1988). Soviet Union collapsed in 1991 and dissolved into 15 countries. Soviet industries shut down because their suppliers were located in different countries, and they could not obtain critical supplies and resources.

After 1991, Russia cut the subsidies to firms and agriculture and eliminated fixed prices on most goods. Russian government also sold millions of apartments, over 100,000 small firms, and over 15,000 large ones. By 1994, the private sector grew into 50% of the Russian economy (Brada 1996). Government used vouchers and auctions to privatize the state’s assets.

Vouchers overcome three problems associated with auctions. First, the Russian people had little money, and they can acquire assets from the state. Workers and managers can buy shares in their firms. Second, vouchers are politically popular because the state transfer wealth directly to the people, and voucher programs tend to be transparent. Transparent means the citizens easily know the rules, regulations, and decisions made by government. Finally, people are usually risk averse and do not invest their money into dubious state enterprises. However, people used vouchers to invest in Russia, sparking the entrepreneurial spirit (Brada 1996). Furthermore, the Russian government auctioned firms to the highest bidder because it desperately needed the revenue. However, the Russian government discouraged foreign investors from participating. Russian banks were the only firms with money, and they bought the largest and most valuable firms. Consequently, Marx’s fear came into fruition – a few rich bankers own the country.

Russia has other problems. First, Russia has not integrated into the world or European economy. Soviet Union used its military to gain control over Eastern Europe, and the European countries resented Russia. Thus, Russia must rely on its own large internal market. Moreover, Russia is blessed with abundant natural resources. It exports petroleum and minerals to the international markets. However, resource prices are volatile. For example, during 2005 and 2008, petroleum prices fluctuated between $50 per barrel and $150 per barrel. Thus, the Russian
Federation experiences large swings in petroleum revenue. Second, Russian government has troubles in enforcing the laws. Organized crime quickly spread throughout the country. Then the mafia offers protection to businesses or monopolizes markets. Between 1991 and 1996, assassins killed more than 100 bankers. Finally, Russia inherited the debt from the Soviet Union and saw its currency collapse in 1998.

Russia saw high GDP growth rates between 2000 and 2008. Several factors explain this. First, Russia government passed a flat tax of 13% in 2001. Flat tax is a simple tax system that takes a fixed percentage of income. Unlike the U.S. tax system, the Russian government did not riddle the tax system with exceptions, credits, and complicated forms. Second, some businesses do not follow all the rules and regulations. Thus, the Russian economy appears deregulated because the government does not have the resources to enforce the rules and regulations. Finally, with the banks controlling Russia’s large industry, they indirectly formed a Japanese Keiretsu. A Keiretsu is a group of corporations that merge into a group with a bank being a member. A bank provides financial oversight and grants low-interest loans to businesses within its group. Consequently, Russia’s economic reforms are taking root as the poverty rate continues to fall. Poverty rate was 16% in 2007.

Russia’s miraculous growth may not last. Last two Presidents, Vladimir Putin and Dmitry Medvedev, are strong leaders who are steering the state towards a more government-controlled system. If investors fear the state will re-nationalize their private property, then they halt investing in Russia. Why would an investor invest in a society where a government may seize all your assets? Furthermore, after the 2008 Financial Crisis, investors feared the Russian banks may collapse, and Russia experienced large capital outflows. President Medvedev bailed out the banks slowing down the capital outflow and temporarily restoring trust with the investors.

**China’s Successful Blend of Communism and Markets**

Chinese leader Mao Zedong (1893-1976) used the Stalinist model after the revolution in 1949. Chinese government owned all means of production, established collective farms, and used central planning. China was an agricultural society with little manufacturing. Its economy was less developed than the Soviet Union. However, the Soviet model was not successful. Peasants became hostile to the bureaucracies and centralization. People also preferred traditional family units rather than the communal farms.

Chinese leader, Deng Xiaoping, gradually opened the Chinese economy to free markets and capitalism, using Singapore as their economic growth model. Although the Communists still control the government, they blended Communism and free markets successfully. China’s real GDP grew 9% per year before the 2008 Financial Crisis. After the financial crisis, China continues to grow phenomenally. Its mercantilistic policy fuels its strong economic growth. China devalues its currency that expands exports and hinders imports. Their exports coupled with strong foreign investment allow China to export manufactured products, such as computers, textiles, heavy machinery, and industrial equipment. Finally, the trade surplus allowed China to garner roughly $2.2 trillion of foreign currencies and gold in 2009.

Government started the initial reforms in the 1970s, and it allowed the peasants to sell their excess food in free markets. Consequently, farmers increased agricultural production
dramatically as these reforms took root. Agricultural reforms created a free market for food, helping food producers to become more efficient and alleviating rural poverty. Consumers benefited from the greater food quantity and lower prices. Then the national government went further and introduced market forces to stimulate the economy. It lowered barriers to international trade and finance, attracted foreign investment, and introduced new products and resources. According to World Bank’s estimates, China attracts $80 billion per year in foreign investment. This openness policy gives China access to new technology, and the Chinese leaders revised their slogan, “to be rich is glorious.” Of course, Marx would strongly disapprove.

China continued with market reforms and legalized private businesses. In the beginning, the government privatized small firms. Then by the mid-1980s, the government privatized large-scale firms with thousands of workers. Nevertheless, Chinese government still operates and financial supports state-run companies that are inefficient and outdated. Estimates of the state ownership range from 33 to 70% of all businesses. Furthermore, government still owns the critical important industries, such as energy and heavy industries. However, this is a great improvement since the time, when the privately owned businesses comprised of 1% of the economy in 1978. Finally, the Chinese government swings through cycles of relaxation and control of private markets and enterprises. Chinese government tries to control private enterprise and markets, keeping “the bird in the cage.”

Some predict China will become the new world leader and hegemony in the 21st century. For example, China’s company, Cosco, owns and is expanding a port outside of Athens, Greece. Port opens a backdoor for China to export its products to Europe. Unfortunately, China has two problems that could slow down its growth and prevent it from becoming a world leader. First, China does not have enough resources to fuel this strong growth for the next generation. China would import minerals and resources on a large scale. Currently, China is opening and expanding ports in Brazil and Africa, giving China access to raw materials and resources. (Japan and the Asian tigers also lack abundant resources). Second, the China’s policy of one child per family will come back to haunt them. Within several decades, China’s population will comprise of the elderly and retired people with a small, working population.

**Key Terms**

- x-inefficiency
- deregulation
- re-regulation
- labor unions
- productivity
- restitution
- vouchers
- joint venture
- kleptocracy
- nomenklatura
- glasnost
- perestroika
- transparent
- Keiretsu

**Chapter Questions**

1. U.S. government deregulated the U.S. airline industry during the 1980s. After deregulation,
airfares fell, customer service improved, and more people flew on airplanes. Was de-regulation successful?

2. State of Texas deregulated how colleges and universities set their tuition in 2002. Then they hiked their tuition by 10% in 2002. Was de-regulation successful?

3. Terrorists attacked the World Trade Center on September 11, 2001, causing the U.S. government to strengthen national security. One effect was the federal government took control over airport security by creating the Transportation Security Agency (TSA). Identify the problems of the government taking over airport security.

4. Republic of Kazakhstan is a former communist country and possesses huge mineral and petroleum wealth. Government needs technology from the United States and Europe to help extract the petroleum and minerals, but the national government wants to retain control. Which method should the government use to develop its mining and petroleum industries?

5. Republic of Kazakhstan transitioned to a market economy quickly by transferring state property to the public. However, Kazakh citizens had no money and wealth. Which method should the government use to privatize the state’s assets?

6. Could a country be both capitalistic and communistic at the same time?

7. Eastern Europe depended on import and exports, even under Soviet rule. Appraise whether Eastern Europe has an advantage in transition.

8. Could a small country rely on its internal markets for growth and retain high trade barriers?

9. Identify problems a country would experience if it goes through cycles of state control and market.
10. Theory of Free Trade

Many countries like the United States have witnessed the rapid growth of free trade. In 2007, the U.S. exported $1.6 trillion of goods and services and imported $2.3 trillion. Although the United States has the largest exports and imports in the world in absolute terms, free trade comprises a small percentage of the U.S. economy. Economists measure an economy’s size by Gross Domestic Product (GDP), which is the total market value of all goods and services that producers manufacture within a country for one year. Comparing exports and imports to the size of the economy, U.S. exports comprised 11.9% of GDP while imports were 16.9% of GDP. Critics claim free trade is harming the United States while others claim free trade becomes a source of wealth and economic growth. We explain the economics of free trade in this Chapter while we explain in Chapter 10 why governments restrict it.

Rapid Growth of Trade after World War II

Many countries participate in international trade, and several factors explain this rapid growth. First, governments in many countries decreased their tariffs and other trade barriers and entered into a variety of trade agreements with other nations. A trade agreement is two or more countries negotiate on free trade. One of the most important international institutions was the General Agreement on Tariffs and Trade (GATT) that the United States and Europe had created after World War II. GATT encouraged countries to engage in free trade and reduce tariffs. GATT was successful because countries reduced tariffs by roughly 33% and ensured member countries received equal treatment. Furthermore, GATT eliminated import quotas and encouraged countries to agree on intellectual property rights such as patents, trademarks, and copyrights. World Trade Organization (WTO) took over in 1995 and currently has 153 member countries. WTO has more enforcement power than GATT. It can review national trade policies, protect intellectual property rights, help settle trade disputes, and impose trade sanctions on member states that violate trade agreements. United States lost several cases at the WTO. For example, WTO forced President Bush to remove import restrictions on imported steel because President Bush tried to protect the U.S. steel industry in 2001. However, the U.S. has won several cases. WTO forced Mexico to open access to its sugar markets. Thus, U.S. firms can sell high-fructose corn syrup to Mexico.

Another factor encouraging the growth in trade is decreasing transportation costs. Transportation cost is firms and suppliers transport products and services to the market, which is a form of transaction costs. With lower transportation costs, suppliers can cheaply ship products and services between any countries in the world. Moreover, companies designed large barges and airplanes to carry massive amounts of cargo and use high technology like Global Positioning Satellites (GPS) to avoid storms and other problems that occur over the seas.

Communication technology has driven down costs and forms another transaction costs. Companies, people, and governments communicate and arrange transactions across the world using telephone, e-mail, and computers. Some state governments and corporations in the United States have moved their information hot lines to India and the Philippines to reduce costs.
Multinational corporations and international banks have expanded their businesses across the world. A *multinational corporation* operates in two or more countries. Every country has different laws, rules, and regulations; however, corporations create departments and hire specialists who keep up with countries changing legal system. Unfortunately, proprietorships and partnerships are too small to engage in international trade. See Table 1 for examples of multinational corporations. An *international bank* operates in two or more countries. For corporations to build factories or transport products between countries, banks help transfer the money. Thus, international corporations and banks go hand in hand.

<table>
<thead>
<tr>
<th>Country</th>
<th>Corporation</th>
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<tbody>
<tr>
<td>Germany</td>
<td>Bayer Corporation, BMW, and Mercedes</td>
</tr>
<tr>
<td>Japan</td>
<td>Honda, Nissan, Sony, and Toyota</td>
</tr>
<tr>
<td>Netherlands</td>
<td>Unilever</td>
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<tr>
<td>South Korea</td>
<td>Hyundai, LG, and Samsung</td>
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<tr>
<td>United States</td>
<td>Coca-Cola, Chrysler, Ford, General Motors, and Pepsi</td>
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<td>Switzerland</td>
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**Production Possibilities Curve**

A *Production Possibilities Curve (PPC)* is a graph that shows how many goods and services a country can produce given its limited resources. We show an example of a PPC in Figure 1, and it has three important assumptions:

**Assumption 1:** Countries only produce two products. Otherwise, we could not graph it. Figure 1 shows how much bread and milk that a country can produce, given the economy’s limited resources.

**Assumption 2:** A society uses resources efficiently. Resources include land, labor, entrepreneurs, and capital. Economists refer to capital as machines, equipment, and structures, but we sometimes switch to the other definition in this book, which refers to money and assets investors use in investments. Then an *entrepreneur* organizes and uses the resources to produce goods and services, makes strategic decisions, introduces new products and services, or reduces production costs. Several entrepreneurs include Samuel M. Walton, who founded Wal-Mart; Ted Turner who owned WTBS, CNN, TNT, and bought the Atlanta Braves, and William "Bill" Gates III who founded Microsoft.

**Assumption 3:** Society has no technological progress, which will be relaxed later.

If the United States produced at Point A, then the U.S. produces 5 (billion) loaves of bread and zero milk. Of course, people would want milk with their bread. How could a society move from Point A to Point B? Producers must shift resources from the bread industry to the milk industry. Thus, the U.S. produces 1 (billion) fewer loaves of bread and 4 (billion) more gallons of milk. This movement is the opportunity cost of moving from Point A to Point B. *Opportunity cost* is the cost of giving up your second, best alternative. Since society produced more milk, it
must reduce its bread production. Society does not have enough resources to produce them all. Consequently, this society can produce any combination of goods that lie on the boundary of the PPC. However, we do not know which point, unless we knew the market prices of bread and milk.

Figure 1. PPC shows the economy’s production of bread and milk

Figure 1 has two points. If this economy produces within the interior at Point X, then society does not use its resources efficiently. Hence, society does not use all its resources during a recession because the unemployment increases as some workers become unemployed. Thus, this society could produce more bread and milk if total production moved towards the boundary. We have no opportunity costs because society can produce both bread and milk. On the other hand, society would like to produce at Point Y, but this economy does not have enough resources for this production level. However, countries could use free trade to attain this level, consuming outside the boundaries of their PPCs.

We showed a curved PPC in Figure 1, but PPCs could be straight lines. If a PPC is a straight line, then all resources in that society are perfect substitutes. For example, a PPC shows the production of vegetables and houses in Figure 2. Farmers grow vegetables on farms while developers build houses on land. Thus, both products require land as a resource. If the land is perfectly transferable between farms and houses, then the PPC is a straight line. However, land quality varies, causing a curved PPC. If society produced at the mid-point, where both PPCs touch, then farmers use the best land for farming while builders use the best land to build houses. As we move away from the midpoint, society loses production from land quality. Some land is better suited for farms while other lands are more suitable for houses. Hence, the largest losses occur if that society produces all vegetables or all houses. For example, farmers grow rice in marshes. This land would be terrible to build a house on because a house’s foundation would sink in the soft, damp soil.

Production Possibilities Curve can shift outward, which we call economic growth because the economy produces more goods and services. Five factors cause economic growth. First, an economy with more resources, such as more labor increases production. Second, a society
invests in machines or education. More machines and education allow workers to boost their productivity, increasing production. We call investment in education human capital. Consequently, better-educated workers are more productive because they possess technical and computer skills. They can produce more given the same level of resources. Third, this society experiences technological progress. Inventors and entrepreneurs create new products and services or better manufacturing techniques. Workers use technology to produce more products and services by using the same level of resources. Fourth, a government within a society improves its legal system. Government defines better property rights, introduces patents, or passes laws that allow private commerce or corporations to form. Corporations garner large amounts of financial capital that allow investment into mass production because mass production requires massive amounts of machines and equipment. Finally, a society changes its workweek. If employees raise their working hours, then they produce more goods and services.

![Production Possibilities Curve](image)

**Figure 2. Straight and curved line PPCs.**

Production Possibilities Curve could shift inward. Government and people do not like inward shifts because their society is shrinking and producing fewer goods and services. A war and a natural disaster destroy a country’s capital and labor and disrupt a country’s institutions. Furthermore, a government can develop a poor legal system. It imposes excessive taxes and complex regulations, or it has created powerful, overbearing bureaucracies that hinder business activity or raise business costs. Unfortunately, private enterprise has trouble surviving, and a society begins stagnating.

Figure 3 shows the United States and China investing in machines and equipment. Both societies produce both pizza and machines and have the same PPCs for 2008. In 2008, the United States produced more pizza than machines while China produced more machines than pizza. U.S. “parties” more on pizza while China invests in their future. In 2009, both economies grew because they both produced more machines (i.e. capital), shifting their PPCs outward. However, China produces more machines. Therefore, its PPC shifts more than the U.S. PPC. Consequently, China experiences greater economic growth.
Adam Smith, the father of economics, developed Absolute Advantage. Countries can gain economically from international trade through Absolute Advantage. **Absolute Advantage** is a country specializes in the production of products where it is a low-cost producer and trades with other countries for other products. Specialization allows producers to boosts production levels and decrease costs. Then countries can engage in trade to share the increased production.

David Ricardo, a British political economist, expanded Absolute Advantage, which he called Law of Comparative Advantage. Comparative Advantage shows how two countries can benefit from trade, although one country can be gigantic and can produce everything. **Law of Comparative Advantage** is each country specializes in producing goods that have a relative advantage and trades with other countries for products. Relative advantage means relative cost advantage or relative opportunity costs. Relative advantage does not mean the country is the cheapest producer. For example, a country can produce all products the cheapest, but it still can gain from free trade. That country produces products where it has the relative advantage allowing other countries to specialize in their relative advantage. Then the countries engage in free trade, expanding world production.

We show the Production Possibilities Curves in Figure 4 the United States and Mexico. PPCs show how two countries can benefit from trade. We assume both countries produce at full employment. They produce on the boundaries on the PPCs, and the PPCs are straight lines. Consequently, a country experiences no losses, when moving resources from one industry to another. This analysis works with curved PPCs, but straight-line PPCs are easier to work with.

We begin the analysis with Mexico and the United States not engaging in free trade. United States and Mexico produce both tomatoes and cars, and they set their production levels at the halfway points. We can choose any production point on the PPC, but we simplified the analysis. Consequently, the U.S. produces and consumes 25 tomatoes and 50 cars while Mexico produces and consumes 30 tomatoes and 15 cars. Both countries produce 55 tomatoes and 65 cars.
Mexico and the United States engage in free trade. Free trade is a country imports or exports without any government restrictions. Thus, these countries specialize in production, where they have a comparative advantage. Slopes of the PPCs reflect the opportunity costs. For the United States to produce one more car, it must give up 0.5 tomatoes. For Mexico to produce one more car, it must give up 2 tomatoes. Consequently, Mexico has a higher opportunity cost for producing cars while the United States has a greater opportunity cost in growing tomatoes. Thus, the United States will produce all cars while Mexico will produce all tomatoes.

One characteristic of straight-line PPCs is countries completely specialize in production of one of the goods. If the PPCs were curved, then countries still specialize, but they still produce a mix of both products. Consequently, both countries manufacture 100 cars and 60 tomatoes, which we show in Figure 4. Both countries gain 35 cars and 5 tomatoes through free trade. Thus, both countries can expand consumption outside their PPCs. Unfortunately, we do not know how the countries will divide this extra production between themselves because we did not include a society’s preferences in the analysis. A society’s preferences could help determine relative prices.

PPCs are limited because we cannot predict market prices. Thus, we expand the supply and demand functions to include free trade. We can focus on a market for a particular product or service and predict changes in market quantities and prices. Furthermore, we assume large countries engage in trade, and they can affect trade and prices.

We show an importing country in Figure 5. If this country does not engage in free trade, the market price and quantity are P* and Q* as shown in the domestic market. Country imports zero units. To determine the level of imports, economists define an excess demand (ED) function, which equals the domestic demand function minus the domestic supply function. Excess demand function must equal or exceed zero that we show in the international market, indicating a country’s demand for imports.
International market determines the market price for the domestic country. As an illustration, domestic consumers pay the lower price, $P_I$ and consume $Q_T$. Country imports $Q_T - Q_D$ units from the international market, which equals $T'$. Furthermore, the domestic industry contracts with production dropping from $Q^*$ to $Q_D$. Unfortunately, a contracting industry employs fewer workers. Consequently, the domestic consumers pay for imports, causing an outflow of money. Although the international market graph is redundant, we can analyze several trade restrictions in Chapter 11.

We show an exporting country in Figure 6. If this country does not engage in free trade, then the market price and quantity are $P^*$ and $Q^*$, and exports equal zero. To represent exports, economists define an *excess supply (ES) function*, which equals the domestic supply function minus the domestic demand function. Excess supply function must equal or exceed zero. We show an excess supply function for the international market that reflects the supply in the international market.
International market determines the domestic country’s price. Domestic consumers pay the higher price, $P_E$ and consume $Q_D$. Furthermore, the country exports, $Q_T - Q_D$, and exports equal $T'$ in the international market. Free trade expands the domestic industry. Consequently, an expanding industry hires more workers, creates jobs as more money flows into a country from export sales.

We show the excess supply and excess demand functions for free trade between Kazakhstan and United States in Figure 7. We show Kazakhstan in the right panel while United States is the left panel. Then the International market sandwiched between the countries. Both countries produce petroleum, but Kazakhstan has a comparative advantage. International market determines the market price $P^*$, where the excess supply and excess demand curves intersect and Kazakhstan ships $T$ units of petroleum to the United States.

![Figure 7. Free trade between Kazakhstan and United States](image)

Domestic demand and supply functions for the United States are $D_m$ and $S_m$. U.S. produces $Q_1$ petroleum but consumes $Q_2$, importing $Q_2 - Q_1$ units, which equals $T$ in the international market.

Kazakhstan’s domestic demand and supply functions are $D_x$ and $S_x$. It produces $Q_4$ but consumes $Q_3$. Consequently, Kazakhstan exports $Q_4 - Q_3$ to the international market, which equals $T$. Thus, money flows into Kazakhstan as American pay for the petroleum.

Economists can analyze and predict changes in international markets when a supply or demand function shifts. Factors that shifted supply and demand in Chapter 3 would affect the international markets. However, a shift in the demand or supply function will shift the corresponding excess supply or excess demand function.

**Foreign Exchange Markets**

Who needs foreign currency? Any person or business engaged in international trade and commerce. International traders import and export products, and international travelers need
foreign currency to pay for food, lodging, and entertainment in a foreign country. Furthermore, international investors invest in foreign countries for greater returns.

International investors use a variety of strategies for business transactions. An investor uses **hedging** to invest in a variety of currencies to reduce a risk. Other investors include **speculators**, who gamble on price changes. They buy currency for a low price and sell for a high price. Finally, investors could use **arbitrage** to take advantage of price differences between two markets. Thus, they buy currency for a low price in one market and sell for a high price in another market. As arbitrageurs move commodities from one market to another, they drive the price difference between the markets to zero.

**Foreign exchange market** is people and businesses trade the currency of one country for another country’s currency. Foreign exchange market is the largest market and banks move currency through electronic transfers, which occur 24 hours per day, 7 days per week. Foreign exchange market has two markets. Retail market comprises a small market, where the agents buy and sell foreign currencies to consumers and tourists. Retail market has two exchange prices. Selling price must always exceed the buying price because the agents earn their profits from the price spread. Wholesale market is a large market with a network of about 2,000 banks and brokerage firms. They deal with each other and with large corporations. Wholesale market uses an international clearing system where they exchange electronic deposits denominated in different currencies. International clearing system is similar to a clearinghouse for checks.

We assume government does not interfere in the exchange market, so supply and demand functions determine exchange rates. For example, one euro equals $1.3, or $1 = 1 €. How much does a 1-liter of Coca-Cola costs in dollars if it costs 1.35 euros? Multiply the euro price by the ratio ($1.3 / 1 €), which equals $1.76. We calculated in Equation 1. We know we calculated correctly because the correct currency unit remains in the answer. If we had multiplied by 1 € / $1.3, the euros would be squared with dollars in the denominator. That makes no sense.

\[
1.35€ \left( \frac{\$1.3}{1€} \right) = \$1.76
\]

Trade between Mexico and the U.S. illustrates an example of a demand function for foreign currency. Price for pesos is the exchange rate dollars per one peso. Currency price is always in the denominator of the currency exchange rate because a price decrease is a currency depreciation, while a price increase is a currency appreciation. A currency **appreciation** is the currency increases in value, while **depreciation** causes a currency’s value to become lower. Demand for pesos originates from U.S. consumers who want to import goods and services from Mexico companies. Thus, U.S. consumers need pesos to pay for the Mexican goods. As U.S. consumers convert dollars to pesos, the demand for pesos simultaneously creates a supply of dollars on foreign exchange market.

We depict a demand for pesos in Figure 8. A movement from Point A to Point B causes the peso exchange rate to decrease. Thus, the peso depreciated because one peso buys fewer dollars while the U.S. dollar appreciated because one dollar buys more pesos. Consequently, the price
of U.S. goods became more expensive while Mexican goods become cheaper. Americans buy more Mexican imports while Americans sell fewer exports. U.S. exports and imports would show the opposite pattern.

![Diagram of the demand function for the peso]

**Figure 8. Demand function for the peso**

We show the exchange rates for Points A and B in Equations 2 and 3. We write the currency price first while we place the standard exchange ratio in brackets. One peso buys 10 cents at Point A while it only buys 5 cents at Point B. Hence, the peso can buy fewer U.S. dollars as we move from Point A to Point B. If one currency depreciates, then the other currency must appreciate because appreciation and depreciation are relative terms to two currencies.

Point A: $0.10 per 1 peso \text{ or } [\$1 = 10 \text{ pesos}] \quad (2)

Point B: $0.05 per 1 peso \text{ or } [\$1 = 20 \text{ Pesos}] \quad (3)

U.S. firms sell products and services to Mexican consumers, which are U.S. exports. Consequently, the supply function for pesos originates from the Mexican consumers who buy U.S. products. Mexican consumers need U.S. dollars to pay for U.S. exports, so they exchange their pesos for U.S. dollar, creating a supply of pesos on the exchange market. Thus, a demand for currency in one market automatically creates a supply of currency into another market.

Figure 9 shows a supply function for pesos. Movement from Point A to Point B causes the peso exchange rate to increase. Peso appreciated while the U.S. dollar depreciated. Consequently, the price of U.S. goods became cheaper while Mexican goods become more expensive. U.S. imports decrease while U.S. exports increase. Mexican imports and exports would have the opposite pattern.
We depict the demand and supply functions for pesos in Figure 10. Equilibrium exchange rate is $P^*$ while the equilibrium quantity is $Q^*$. Americans increase their demand for more Mexican products, ceteris paribus, increasing their demand for pesos and shifting it rightward. Thus, the dollar depreciates while the peso appreciates. U.S. products become cheaper to Mexicans. U.S. exports rise while U.S. imports fall. Exact opposite occurs to Mexican made products.

Figure 9. Supply function for peso currency

Figure 10. Demand increases for currency
Changes in exchange rates alter prices of all goods, services, and assets that people and businesses trade on the international markets. Furthermore, analysts use appreciation and depreciation to compare two currencies. If one currency appreciates, then the other currency must depreciate because they are relative terms. When analysts refer to a weak or strong U.S. dollar, they compare the U.S. dollar to a basket of other industrialized countries. A weak U.S. dollar means the value of the dollar decreased relative to a basket of currencies of developed countries, such as the euro, pound, and yen. A strong U.S. dollar is the opposite.

**Factors that Shift Demand and Supply Functions**

Many factors influence supply and demand functions for foreign exchange rates. Some factors include interest rates, inflation, income, and central banks. Interest rates affect investment and financial capital inflows and outflows for a country, while inflation affects a country’s prices and hence its trade flows. Inflation is a continual increase of prices. Moreover, a growing economy creates higher incomes, and consumers increase their demands for normal goods, which are most goods produced in a society. Finally, central banks influence exchange rates by buying and selling currencies, or increasing or decreasing the money supply.

Real interest rate has an impact on exchange rates. Real interest rate means economists deduct a country’s inflation rate from the nominal interest rate. We show the tenge exchange market in Figure 11, and the original market price and quantity are \( P^* \) and \( Q^* \). Kazakhstan has a greater real interest rate than the U.S. has. U.S. investors invest more in Kazakhstan to earn the greater interest rate. Consequently, the demand for tenge increases and shifts rightward. Furthermore, Kazakh citizens invest more within their country, reducing their supply of tenge, keeping their currency within the country by investing in it. When both supply and demand shift, either the market quantity or market price becomes indeterminate. In this case, market price increases while market quantity is indeterminate. U.S. dollar depreciates while the tenge appreciates.

We can determine what happens in a market as both the supply and demand functions shift. We just shift the first function, and then shift the second function three times with a small shift, intermediate shift, and large shift. Although the graph becomes messy, we know which variable changes, and which variable becomes indeterminate. Indeterminate variable will have both an increase and decrease, which would be impossible.

Inflation rates of countries influence the foreign exchange market. For example, Mexico has a greater inflation rate than the United States. We depict a U.S. dollar exchange market in Figure 12, and the market price and quantity are \( P^* \) and \( Q^* \). Thus, the higher inflation rate causes Mexican goods to become expensive while U.S. goods become relatively cheaper. Therefore, Mexicans increase their demand for U.S. goods, increasing the demand for dollars. Consequently, the U.S. citizens buy more U.S. made goods, decreasing their demand for Mexican goods. Hence, the supply for U.S. dollars decreases and shifts leftward. U.S. dollar appreciates while the peso depreciates. In this case, the equilibrium quantity for dollars is indeterminate.
A central bank can increase or decrease the supply of its currency on the foreign exchange markets. For example, we show a U.S. dollar exchange market in Figure 13, and the market price is $P^*$ while market quantity is $Q^*$. Federal Reserve System, the U.S. central bank, increases the U.S. dollars on the international market. Federal Reserve buys foreign currencies...
using U.S. dollars. Consequently, the supply function increases and shifts rightward. Market price falls. U.S. dollar depreciates while the euro appreciates.

![Diagram of supply and demand]  
\[ \text{Price of U.S. Dollar} \]  
\[ \text{Euros per U.S. dollar} \]  
\[ P \]  
\[ P^* \]  
\[ Q \]  
\[ Q^* \]

**Figure 13. Federal Reserve increases the supply of dollars on the exchange market**

A central bank intervenes in a country’s exchange rates that affect international investment and the trade balance. Consequently, a central bank needs a cache of foreign currencies to intervene in its exchange rate. If a central bank plans to appreciate its currency, it buys its currency using a foreign currency. Thus, a central bank’s cache of foreign currencies decreases, increasing imports and decreasing exports. If a central bank plans to depreciate its currency, it buys foreign currencies using its own currency. Hence, a central bank accumulates foreign currencies that boosts its exports and reduces its imports.

Supply and demand analysis is not clear in some cases. For example, incomes in Mexico grow faster than incomes in the United States. Thus, Mexican citizens boost their demand for all products, including imports. As Mexican citizens increase their demand for dollars, they increase the supply of pesos on the exchange market. Consequently, the U.S. dollar appreciates while the peso depreciates. However, a rapidly growing country also experiences a higher inflation rate, which depreciates its currency, counteracting the gain from higher incomes.

In the real world, many factors influence exchange rates. A country could impose trade barriers like tariffs and quotas. A tariff is a tax on imports, while a quota limits the quantity of imports. Both trade barriers reduce a country’s imports. Furthermore, some countries impose a strict regulatory climate. Extensive regulations and taxes reduce trade and financial capital flows between countries. Finally, investors’ expectations and uncertainty have impacts on trade flows. If an investor believes a country’s currency will depreciate, the investor avoids investing in that country. Then a depreciating currency reduces the value of assets in that country.
The Asian Tigers

Heavily regulated, highly taxed economies tend to grow slowly, while countries with free, competitive markets tend to grow quickly. In some cases, a totalitarian state can grow rapidly, but the high growth rate is temporary. For example, the Soviet Union grew rapidly during the 1960s as it was expanding and adding cities and factories. However, the Soviet economy was stagnating during the 1980s. Currently, Venezuela is growing fast under the leadership of Hugo Chavez. Venezuela exports petroleum and is a member of Organization of Petroleum Exporting Countries (OPEC). President Chavez uses the petroleum revenue to finance his socialistic society.

Asian Tigers have free competitive markets, are business oriented, and grow incredibly fast. Their real gross domestic products (GDP) increase roughly 10% per year for decades. Real means economists have removed the effect of inflation. Asian Tigers are Hong Kong, Singapore, South Korea, and Taiwan, and they have the following characteristics:

Characteristic 1: Asian Tigers protect their “infant” industries from foreign competition. They levy trade barriers on manufactured goods and impose few restrictions on raw material imports. The Asian Tigers do not possess abundant natural resources (Lim 1994), and they need low-cost raw materials to supply their factories. On the other hand, African and Latin American countries are rich in natural resources but suffer from slow economic growth.

We use two theories to explain this discrepancy. First, the Dutch Disease is resource abundant countries attract foreign investment, appreciating its currency. Appreciating currency increases a country’s imports and reduces exports. Thus, manufactured products from resource abundant countries cannot compete internationally. Second, resource rich countries could suffer from the Resource Curse. A country with large mineral and petroleum wealth suffers from more corruption, greater income inequality, higher poverty rates, and an authoritarian government (Tax Justice Network 2005). Political leaders know their country has petroleum and mineral wealth, and they believe they will be wealthy one day. Thus, they believe they can interfere with all business affairs, pass bad laws and regulations, and expropriate and steal the nation’s wealth. Consequently, countries with few resources such as the Asian Tigers have limited options, and the leaders open their economy to free markets because that is the only thing, they can do.

Characteristic 2: Asian Tigers pursue export-oriented policies. Export-oriented policies are a country opens its economy to international trade and has low trade protection. Usually international trade comprises a large portion of the economy. Consequently, their export industries form linkages and relationships with the international business community, and they learn from the industrialized countries. Moreover, free trade standardizes business practices and encourages governments to be transparent (Gerring and Thacker 2005). International investors avoid nontransparent countries because they risk losing their investments. Corruption plagues nontransparent governments while the Asian Tigers have low corruption levels.

Singapore and Hong Kong became an entrepot, which is a country allows shipping companies to import and export products and cargo duty-free. Consequently, the entrepot evolves into a major transportation hub and intermediary, and the transportation routes become shorter as companies specialize in specific routes. For example, a company can export its
products from India to Singapore while another company ships the products from Singapore to the United States. That way, one company does not ship products from India to the United States directly.

International investors can invest freely in the Asian Tigers, causing an inflow of foreign capital. For example, one large investor in the Asian Tigers was Japan. Japanese investors heavily invested in the Asian Tigers bringing their expertise and technology with them. Export industries and foreign investment go hand in hand with each other (Frank 1968). We show in Table 2 the investment rates for the Asian Tigers in 2011 and investment comprises approximately 23% of their GDPs.

Characteristic 3: Asian Tigers have low price distortions. A price distortion is something prevents the market from determining the price. A government creates distortions by imposing taxes, subsidies, price controls, and regulations. Large price distortions mean a government heavily intervenes in its markets.

Characteristic 4: Asian Tigers can devalue and weaken their currencies. A devalued currency strengthens exports and weakens imports. Moreover, Asian Tiger currencies are stable with low volatility. However, the Asian Tigers experienced the Asian Financial Crisis in 1997 that rapidly depreciated their currencies.

<table>
<thead>
<tr>
<th>Table 2. Economic Characteristics of the Asian Tigers in 2011</th>
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<td><strong>Country</strong></td>
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<td>Hong Kong</td>
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Characteristic 5: People in Asian Tigers are phenomenal savers. People deposit their savings into banks, and in turn, the banks lend to businesses. Businesses invest in machines, equipment, and buildings or adopt new production technologies. Furthermore, banks lend to families who buy houses, cars, and appliances. Many Asian Tiger governments helped establish the private banks and financial institutions. However, people must deposit their savings into banks. Thus, a country requires a stable financial system. Unfortunately, this presents a problem for some developing countries. Although some countries establish a banking system, their citizens do not trust their banks and hide their savings at home, removing money from the economy.

Characteristic 6: Asian Tigers build large factories because the country supplies the domestic and international markets. Larger factories have economies of scale. Thus these factories produce products for low, long-run average costs. We had discussed economies of
scale in Chapter 6. Moreover, export industries lead to spillover effects. A large export industry uses energy and resources from domestic suppliers. Thus, the resource and energy industries quickly expand to supply the export industry (Frank 1968). Then their export industries can compete with companies and industries from the developed countries (Lim 1994, Gerring and Thacker 2005).

**Characteristic 7:** Asian Tigers have high education levels and high literacy rates. These countries emphasize vocational and technical training, which accelerates the adoption of new technology and know-how. A nation with better-educated citizens boosts efficiency and productivity. Finally, Asian Tiger governments encourage their citizens to become entrepreneurs who establish their own businesses. Thus, the people rely on themselves instead of their government for their livelihood.

**Characteristic 8:** Asian Tigers have small governments that operate with budget surpluses, which they can use to pay down their debts. We show the budget surpluses in Table 2 for the Asian Tigers in 2011, and Taiwan is the only country with a budget deficit. A small government deficit or budget surplus creates four benefits. First, a low deficit means that country could have a small government debt, which Table 2 clearly illustrates. Second, some countries with government budget problems rely on printing money as a source of revenue, which creates inflation. Thus, Asian Tigers have low inflation rates. Third, the small government debt of the Asian Tigers does not crowd out private investment. Investors can invest in the private markets because the government has low debt. Finally, budget surpluses mean government is not financially strapped and does raise taxes. Their economies grow rapidly that expands the tax base, so a government does not raise taxes. Consequently, taxes comprise between 15 and 25% of an Asian Tiger’s economy as depicted in Table 2. Of course, a small government does not translate into democratic societies. Asian Tigers usually have strong governments that manage their growth process, and these countries are not democratic.

**Characteristic 9:** Asian Tigers have large trade surpluses. Consequently, more money flows into the countries then leaves them. Thus, the Asian Tigers accumulate foreign currencies, especially U.S. dollars and euros. Governments of Asian Tigers use these foreign currencies to buy machines and equipment and invest in foreign countries by purchasing stocks, bonds, and real estate. Finally, the Asian Tigers invest in the U.S. government’s debt.

These characteristics gave the Asian Tigers a comparative advantage, and they grew rapidly. Furthermore, the Asian Tigers experienced rapid industrialization. For example, South Korea’s manufacturing sector comprised 14% of its GDP in 1960 and quickly grew to 30% by 1980. Taiwan’s manufacturing started at 26% of its GDP in 1960 and rapidly expanded to 40% by 1993. During the same period, their agricultural sectors quickly contracted relative to their GDPs. Asian Tigers used mercantilism to achieve this miraculous growth, which we discuss in Chapter 12. Unfortunately, this extraordinary growth has a problem. For an Asian Tiger to maintain a trade surplus, its trading partners must experience trade deficits, fueling the growth process. After the 2008 Financial Crisis, the industrialized countries cannot continue subsidizing the growth of the Asian Tigers.
Key Terms

gross domestic product (GDP)  Law of Comparative Advantage
trade agreement  free trade
General Agreement on Tariffs and Trade (GATT)  excess demand (ED) function
World Trade Organization (WTO)  excess supply (ES) function
transportation cost  hedging
communication technology  speculator
multinational corporation  arbitrage
international bank  foreign exchange market
production possibilities curve (PPC)  appreciation
time entrepreneur  depreciation
opportunity cost  Asian Tigers
economic growth  Dutch Disease
human capital  Resource Curse
Absolute Advantage  entrepot
  price distortion

Chapter Questions

1. Free trade has many supporters and critics. Has free trade benefited your community?

2. Identify an example of a multinational corporation.

3. Distinguish why some PPCs are straight lines while others are curved.

4. Draw the PPC for the United States. What happens if the United States has a higher birth rate?

5. Draw the PPC for the United States. What happens to the PPC if the United States weakens its private property rights? For example, the United States starts expropriating land and buildings because people cannot pay their property taxes and imposes complex rules and regulations that stop all land development.

6. Two countries, the United States and China, produce computer chips and soybeans. China can produce either 100 computer chips or 50 bushels of soybeans while the United States produces either 25 computer chips or 100 bushels of soybeans. If both countries open their economies to free trade and have straight-line PPCs, which products do the countries specialize in?

7. Refer to Question 6. If China and the United States produce at their half-way points on their PPCs, calculate the gain in world production when China and the U.S. engage in free trade?
8. Using the supply and demand analysis for free trade, identify the cost and benefits of importing goods for a market.

9. Using the supply and demand analysis for free trade, identify the cost and benefits of exporting goods for a market?

10. United Arab Emirates uses the dirham as its currency. How much does a Pepsi cost in dirhams if Pepsi costs $0.75 in the U.S. and the exchange rate is $1 = 3 dirhams?

11. Identify the origin of the supply of U.S. dollars in the foreign currency market.

12. Please draw supply and demand functions for pesos. What happens to the market if the 2008 Financial Crisis causes Americans to reduce their demand for Mexican made products?

13. Please draw the demand and supply for the U.S. dollar exchange market with the euro as the other currency. How can the Federal Reserve strengthen the U.S. dollar relative to the euro? Could the European central bank oppose this?

14. Federal Reserve reduces the U.S. interest rate to jumpstart the U.S. economy. What happens in the U.S. dollar exchange market if the Fed pursues a low real interest rate?

11. Trade Protection and Restrictions

A government wants its industries to export products to foreign countries. Thus, its industries expand production and create jobs for its citizens. Furthermore, more money flows into a country than leaves. However, free trade causes some industries to expand while other industries to contract. Contracting industries are the industries that do not have a comparative advantage. Hence, a government introduces trade restrictions to protect producers in contracting industries and prevent job loss. In some cases, government uses trade protection to protect the consumers, as well. Of course, government wants free trade for its exports and devises means and methods to restrict its imports. That way, a nation benefits from trade.

Why Government Intervenes in Free Trade

1. A government protects an eroding comparative advantage.

For example, Country A has a comparative advantage in producing and exporting a product. Then Country B comes along and gains the comparative advantage, taking trade away from Country A. Thus, Country A intervenes in international trade to protect its industries.

2. A government wants to achieve domestic policy goals.

Free trade could bankrupt inefficient industries, raising unemployment and reducing tax collections. Thus, government imposes trade restrictions to keep inefficient industries in business.

3. A government protects national security.

Some commodities, especially natural gas, petroleum, and food, can wreak havoc on a country if a trading partner blocks trade. Consequently, governments use trade protection to boost domestic production and enhance national security. However, many Asian countries, like Japan, have little energy resources and are vulnerable to energy disruptions.

4. A government protects its “Infant Industry.”

A country’s industry may be relative new and cannot compete with foreign industries. Therefore, a government protects its industry, encouraging the industry to grow until it is large enough to compete. For example, the United States became independent from England in the 18th century. Newly formed U.S. government imposed trade restrictions to encourage the growth of U.S. industries. At that time, most manufacturing was in Europe, and England manufactured products and exported them to the United States. Then England wanted the U.S. colony to ship food and raw materials to England. This policy would create a trade deficit for the colonies.
because the manufactured goods have a higher value than raw materials and food, causing a perpetual outflow of money from the colonies.

5. A government protects national health.

Government restricts trade of harmful products. For example, Europe does not import beef from the United States because U.S. beef contains growth hormones, and Europeans believe the hormones are harmful to humans. (They may be right!)

6. A government intervenes in its foreign exchange rate.

Government views its currency as being either too strong or too weak. Consequently, a government imposes trade restrictions to correct the currency problem. Usually Asian countries weaken their currencies, boosting their exports and shrinking imports. Hence, a weak currency can strengthen the export industries that create jobs and wealth.

United States government pursues a strong dollar. A strong dollar encourages U.S. consumers to buy cheap products from China, but hurts the U.S. export industries. Unfortunately, the United States has been losing industries to China and other countries for the last 40 years. One reason for this policy is the U.S. dollar became the international currency. Thus, international investors will not hold dollars if they believe dollars will become weaker. Furthermore, the U.S. government operates a large U.S. federal government debt while the U.S. economy is plagued by sizable trade deficits. Investors either hold onto the U.S. dollars or use the dollars to buy U.S. government debt or purchase corporate stocks and bonds and real estate in the United States.


Balance of payments is the total inflow of money minus the total outflow for a country. A government has a problem, when more money flows out than in. Usually the central bank or government must finance the outflow especially large outflows. Hence, government imposes trade restrictions to reduce a balance-of-payment problem.

United States has large trade deficits, causing an outflow of U.S. dollars into the international markets. With the U.S. dollar being a strong, widely accepted currency, foreign governments, foreign central banks, and foreigners hold onto these U.S. dollars. Consequently, the U.S. government and its central bank, the Federal Reserve System, have avoided financing its large trade deficits.

Many countries and investors worry over the rapid growth in U.S. government debt, and the U.S. government’s ability to repay this debt. Therefore, many countries want to hold fewer U.S. dollars, which weaken the dollar. Supposedly, the U.S. government is following a “controlled” devaluation. A weaker U.S. dollar increases U.S. exports and decreases imports, thus reducing a trade deficit. Consequently, a weaker U.S. dollar lessens the balance-of-payment problem.
However, international investors may shun the dollar because a weaker currency causes their investments to decline in value.

8. A government imposes trade restrictions to increase government revenue.

Free trade is a luxury. Thus, a government imposes tariffs to collect revenue. For a government to remove the tariffs, it must find new sources of tax revenues (Stein 1984). Government can collect tariffs easier than income taxes because a government has better control over its ports. Consequently, tariffs are more effective for countries with widespread income tax evasion.

9. A government prevents export of high technology.

Some countries ban or restrict exports of technology because they do not want other countries use technology to develop military weapons or become future competitors. Moreover, a country’s military invests in high technology because it gives the military a tactical advantage over its opposition. Thus, governments prevent the export of technology that could give new comers a comparative advantage. For example, the U.S. government prohibited the export of software, including internet browsers that used strong encryption technology before 2000.

10. A government protects its domestic industries from dumping.

A government could accuse another country of dumping, in order to protect its domestic industries. Dumping is an exporting country sells their products for such a low price; its trade partners cannot compete. Consequently, the domestic industries for the importing country bankrupt and go out of business. For example, China accused the United States automobile maker, General Motors, of dumping cars onto the Chinese market in 2011, while the United States accused China of dumping solar cells onto the U.S. market in 2012. Accordingly, countries will impose trade restrictions to protect domestic industries from dumping, which the World Trade Organization permits.

Law of Comparative Advantage states a country specializes in the production of goods and services. Thus, by definition, the exporting country sells its products relativity cheaper than the importing country. Nevertheless, an exporting country dumps products onto its trading partners if three conditions exist. First, export industries have economies of scale, achieving low costs per unit. Second, the exporting country sells to its citizens the product for a high price, so the exporting industries earn all their profits from their home country. Finally, the exporting country “dumps” its surplus production onto the international market, pricing products below its costs. Hence, domestic industries in the importing countries cannot compete, and they go out of business.

11. A government protects or retaliates against policies of other trading countries.
One country imposes a trade restriction. Consequently, other countries retaliate against that country. For example, one country weakens its currency, in order to boost its export industries. Other countries may weaken their currencies to nullify the first country. Furthermore, government could use trade protection to enhance or protect its domestic industries. For example, government could lie and incite a health risk or national security to restrict trade to protect its domestic industries. Finally, a government can also use threats of trade protection as a bargaining chip to gain access to close markets (Stein 1984).

**Economics of Trade Protection**

Government imposes trade restrictions, using one of the reasons listed in the previous section. Trade restrictions include tariffs, quotas, and export subsidies. A *tariff* is a government imposes a tax on each good imported, while a *quota* is government establishes the maximum quantity that it allows companies to import into the country. An *export subsidy* is government subsidies exports to boost its exports industries.

We show free trade with a market price of $P^*$ and amount imported, $T$ in Figure 1. Imports are the horizontal difference between quantity demanded and quantity supplied as labeled on the domestic market. Government imposes a tariff, causing a price difference of $P_T - P_I$ per unit imported. Domestic consumers pay the higher price, $P_T$ and consume less while domestic producers expand production. As domestic production expands, the industry employs more workers. However, the tariff causes a country’s imports to drop to $T_t$. In the international market, foreign producers sell for a lower price, $P_I$, and export less. Government revenue is the lightly shaded rectangle, and the deadweight loss is the black triangle. Tariff in the international market is similar to a government tax on goods. Thus, the tariff reduces the social welfare for these two countries. We analyzed the economics of taxes in Chapter 4.
Government could impose an import quota and set the maximum imports at $T_1$ in Figure 2. Do you notice something familiar about the quota? It looks identical to a tariff. Consequently, an import quota, $T_1$, is equivalent to a tariff of $P_t - P_I$. Quota has the same economic impact on the market but with one significant difference. Government does not collect tax revenue. Foreign exporters collect the lightly shaded rectangle as “economic rent.” Economic rent refers to long-run profits because the government drove up the international price and lowered the producers marginal cost. Normally, market competition drives profits to zero. However, economic rent is a special term to indicate an unfair advantage to the producers because the market has an imperfection or government interference.

![Figure 2. Government imposes a quota on imports](image)

Producers can change the quality of their imports if they export to a country with import quotas. During the 1980s, the U.S. government pressured Japan to voluntary place voluntary export restraints on itself because the Japanese manufacturers, Honda, Nissan, and Toyota, were hurting the U.S. car companies. Consequently, Japanese producers earned the economic rent and exports high quality cars. On the other hand, a government could set the import quota that exceeds the amount a country imports, or greater than $T$ in Figure 2. In this case, the quota would have no impact on the market.

Government can impose subsidies to boost its export industries. United States and the European Union grant subsidies to their agricultural producers. We show the economics of an export subsidy in Figure 3. Market price without the subsidy is $P*$ with the country exporting $T$ units. Exports are also the difference between quantity supplied and quantity demanded in the domestic market that we labeled on the graph.
Government institutes an export subsidy and pays a subsidy of $P_E - P_I$ per unit. Domestic consumers pay the greater price, $P_E$ and consume less because the subsidy causes a higher market price within the country. However, the country exports more, boosting the quantity in the international market. Foreign consumers pay the cheaper price, $P_I$ and import more. Thus, the domestic industry expands, producing more output and employing more workers. Government subsidy is the lightly shaded area plus the black triangle. Black triangle represents the deadweight loss of the subsidy to society. Government must pay for a subsidy by imposing a tax on another market. Did you notice the subsidy for an international market differs from a regular market subsidy that we discussed in Chapter 4? Domestic consumers pay a lower price for regular subsidy but a greater price if that country exports that product.

![Figure 3. Government subsidizes its exports](image)

Tariff, quotas, and export subsidies are “*Beg-thy-neighbor*” policies. Government imposes a trade restriction to boost its industries at the expense of its trading partners. Trade restrictions lower international prices, harming the exporting countries. Thus, some countries will retaliate with their own trade restrictions. Furthermore, a government may impose *non-tariff barriers*. Non-tariff barrier includes a government imposes licensing requirements or standards, creating bureaucratic red tape. For instance, government can cite a potential health problem and stop beef imports from a particular country. Moreover, a government can make the process so complicated and convoluted that importing companies can never get the proper licenses to import foreign products.

Economists can expand this analysis to predict the market impacts from other government trade restrictions. Economists discuss these restrictions in higher-level economics books. Unfortunately, they are beyond the scope of this book and the common restrictions are:
Trade Restriction 1: Government manipulates the exchange rate. A government could weaken its currency to expand exports and boost the export industries, or it could strengthen its currency to increase the consumers’ purchasing power, boosting imports. China and the Asian tigers weaken their currencies to boost their exporting industries while the United States strengthens its currency to fuel imports.

Trade Restriction 2: Government imposes import subsidies and encourages its citizens to buy products manufactured outside the country. This strategy may not be common, unless a country is rapidly adopting technology that would enhance and further develop its industries.

Trade Restriction 3: Government imposes an export tax. An export tax increases the price for exported goods, and foreign customers buy less. Government usually uses an export tax to raise revenue, especially if this country has widespread tax evasion problems.

Trade Restriction 4: Government uses trade restrictions to reduce production in domestic industries, causing higher market prices and profits. For example, government reduces agriculture production to help the farmers receive greater prices and earn profits.

Trade Blocs

Countries could create trade blocs. A trade bloc promotes internal free trade with member countries while retaining trade barriers with nonmember nations. This is a form of trade discrimination. Although trade blocs violate the GATT and WTO principles of nondiscrimination, GATT and WTO have never sanctioned countries for creating trade blocs since the United States and Europe both created trade blocs.

We define four types of trade blocs, which countries differ in their degree of integration with other members.

Type 1: Trade bloc is a free-trade area, and it has the lowest level of integration of free trade between member countries. A free-trade area is a group of countries removes trade barriers among themselves, but they maintain their separate barriers for outsiders. For example, the North American Free Trade Agreement (NAFTA) created a free trade zone between Canada, Mexico, and United States in 1993, reducing trade barriers between members and completely removing trade barriers in 2008. Goal is to expand trade and create more jobs and wealth. However, each country maintains their separate customs and trade barriers with the rest of the world.

NAFTA has many critics and supporters. Economists estimated Mexico gains the most from NAFTA while Canada is second. United States supported NAFTA to preempt Japan from heavily investing in Mexico. Consequently, NAFTA would reduce Japan’s influence. Furthermore, NAFTA created positive benefits for Mexico. Before the 1980s, Mexico was a closed economy like Soviet Union, and then it experienced a financial crisis during the late 1980s and early 1990s. Last four presidents of Mexico have been opening Mexico to free markets and international trade. Mexico has relaxed foreign investment laws and opened free trade with other countries. Consequently, products and services from other countries can slip products through Mexico and into the U.S. circumventing the U.S. trade barriers. NAFTA Members are also discussing the expansion of NAFTA to the South American countries.
Type 2: A customs union is a group of countries removes trade barriers among themselves, and they erect a common external barrier to outsiders. For example, the countries Russia, Belarus, and Kazakhstan formed a customs union in 2010. Thus, these countries allow free trade within the union, but they erected the same tariffs and import policies for all members. For another example, the Southern Common Market (MERCOSUR) is a customs union between Argentina, Brazil, Paraguay, and Uruguay.

Type 3: A common market is a customs union that allows free movement of resources within the bloc. Consequently, goods, services, capital, and labor can migrate freely to any country within the common market. European Union (EU) is a union of 27 countries. However, the EU strives for further integration because it created the common currency, the euro, and created public institutions that govern all members. These institutions include the European Parliament European Court of Justice and European Central Bank.

EU in some cases has deregulated member countries. For example, Greece removed product regulations for ice cream. Germany revised the beer purity regulations, and Belgium eliminated the regulations for Belgian chocolate. However, the EU makes it difficult for outsiders to penetrate the EU markets.

Type 4: An economic union is the member countries unify all economic policies and become one unit. All members have the same monetary, fiscal, and welfare policies and a common currency. For example, United States is an economic union of 50 states.

We depict the economics of a trade bloc in Figure 4. If the United States engages in free trade, then it imports $Q_C$ products from China for a market price of $P_{\text{China}}$. Did you notice the supply function is perfectly elastic, where it forms a horizontal line at the price, $P_{\text{China}}$? We have simplified the analysis. Consequently, the Chinese producers supply all of consumers’ demand for that specific market price. Since the United States does not produce anything, it loses its industries and has more unemployment. Subsequently, the United States government imposes a tariff, reducing the Chinese imports. Market price rises to $P_{\text{tariff}}$ while the U.S. imports $Q_t$. Furthermore, the U.S. government collects tariff revenue, and the tariff creates a price wedge. U.S. consumers pay $P_{\text{tariff}}$ while the Chinese exporters receive $P_{\text{China}}$. Hence, the government collects the difference as tariff revenue for $Q_C$ units. A tariff reduces the world’s welfare because the market price rises while and the market quantity falls.

United States enters a trade bloc with Mexico, and Mexico begins exporting products to the United States with zero tariffs. Mexican price, $P_{\text{Mexico}}$, is between the tariff’s price and the Chinese price. Consequently, a trade bloc increases the world’s welfare because it encourages trade as opposed to trade protection. Trade bloc causes the market price to fall to $P_{\text{Mexico}}$ while consumers increase their quantity demanded to $Q_M$. Consequently, a trade bloc creates trade diversion. Trade diversion is trade shifts from a low-cost producer to a higher-cost trade partner. Thus, a trade bloc has a higher welfare than trade protection but a lower welfare than free trade.

A good question – could the United States benefit from a trade bloc? In this case, the answer is ambiguous because the U.S. government loses tariff revenue, but the U.S. consumers gain as they pay a lower market price and buy a greater trade volume.
A trade bloc has three benefits:

**Benefit 1:** A trade bloc unifies countries and increases the number of customers and investors. Thus, investors become more comfortable in investing within the trade bloc.

**Benefit 2:** A trade bloc fosters competition and reduces market prices. Moreover, monopolies in individual countries compete with monopolies from member countries. Consequently, competition forces firms to minimize costs and implement new technologies.

**Benefit 3:** A trade bloc enhances production specialization and efficiency. Furthermore, companies experience increasing returns to scale as they expand production to supply a larger market of consumers.

**Currency Exchange Rate Regimes**

Nations implement a regime or system to settle international payments that arise from international trade and finance because nation must use a system to settle payment between countries. We call this system the **exchange rate regime**. We had explained in the last chapter how free markets determine a currency’s exchange rate. Governments rarely allow market forces to determine the value of their currency. Consequently, we explain the common exchange rate regime and the role of government.

First and oldest exchange rate regime is the gold standard that started with the Greek and Roman civilizations. Then, the world used the gold standard between 1876 and 1913 before World War I plunged the world into war. A **gold standard** is a central bank sets an exchange rate of their currency to gold. Subsequently, the central bank agrees to convert their currency to gold on demand. For example, the United States, Japan, and Britain establish the following exchange rates as Equations 1.

If the U.S. central bank wants a money supply of $40 million, then it must buy and hold 20,000 ounces of gold, which is $40 million ÷ $2,000 per ounce. For a central bank to boost the money supply or grant emergency loans to banks, it must buy and store more gold.
Gold standard forces fixed exchange rates, which economists call a **fixed exchange rate system**. Consequently, one U.S. dollar equals 100 yen or 2 pounds. We calculate the exchange rates in Equations 2. First, we set all currencies equal to one ounce of gold. Then we divide by one currency’s coefficient, yielding the exchange rates, which in this case, we divide all numbers by 2,000:

\[
1 \text{ ounce of gold} = \frac{2,000 \text{ yen}}{2,000} = \frac{4,000 \text{ pounds}}{2,000} = 1 \text{ pound}
\]

A gold standard helps countries balance the money flowing into and out of a country. For example, the U.S. experiences a trade deficit with Japan, where the U.S. consumers buy more Japanese imports than the Japanese consumers buy U.S. exports. Consequently, U.S. dollars are flowing out of the United States and into Japan. On the other hand, Japan accumulates U.S. dollars, and the Japanese central bank exchanges the U.S. dollars for gold from the U.S. central bank. Then gold begins flowing out of the United States and into Japan. Once the U.S. central bank possesses less gold, it must contract the money supply. Remember, the money supply fixes the ratio between gold the government is holding and the currency. As the money supply declines, the prices in the economy will decrease, which we call **deflation** or negative inflation. Thus, U.S. products become cheaper than other countries’ products. Then the U.S. businesses export more goods abroad while the lower U.S. prices cause U.S. consumers to buy fewer, expensive imports. U.S. exports expand while imports shrink until the money inflows and outflows balance and gold stops flowing out of the United States. Exact opposite would occur in Japan. Consequently, a gold standard automatically eliminates trade deficits and surpluses.

**Benefit 1**: High inflation rates were rare under the gold standard because central banks had little control over the money supply. If a central bank wants to increase the money supply, then the central bank must buy gold. For example, the inflation rate averaged less than 1% in U.S. under the gold standard. Consequently, a gold standard constrains a central bank’s ability to expand the money supply.

**Benefit 2**: International investors have a lower risk because exchange rates do not fluctuate. All exchange rates become fixed.
Benefit 3: Gold standard greatly constrains a government’s power. For instance, central banks have little power to influence the money supply, and hence, they cannot pursue policies to influence their economies. Thus, gold goes hand in hand with free markets, strong property rights, and limited government, but this benefit depends on the reader’s viewpoint because this could be a problem. During the 2008 Financial Crisis, the Federal Reserve granted $2 trillion for emergency loans to banks, which would be impossible under a gold standard.

Gold standard, unfortunately, can export a country’s recession to other countries. However, all exchange rate regimes have this problem with different degrees.

After World War II, 44 countries implemented the Bretton Woods System, named after the resort where the delegates met in New Hampshire. The Bretton Woods System established fixed exchange rates between nations, lasting between 1945 and 1971. All countries except the United States fixed their exchange rates to the U.S. dollar. Then the United States government established the official exchange rate of $35 for 1 ounce of gold because the United States held much of the world’s gold supply. United States accumulated gold from Europe as Europeans purchased U.S. military goods during World Wars I and II. However, the gold-dollar exchange rate applied to foreign governments because U.S. citizens could not possess gold legally between 1933 and 1974. Consequently, the Bretton Woods System transformed the U.S. dollar into the international reserve currency. Countries agreed to accept U.S. dollars as payment. If a nation did not want to hold dollars, then it would convert the U.S. dollars into gold at the official exchange rate.

The Bretton Woods system was more flexible than the gold standard because countries could adjust their currency exchange rates relative to the U.S. dollar. Consequently, countries used a system resembling a gold standard, but a government can intervene with its exchange rate to correct problems when a country has more money flowing out than in. The U.S. President, Richard Nixon, ended the Bretton Woods System on August 15, 1971 because the United States experienced trade deficits that would lead to a gold outflow.

The Bretton Woods system created two institutions: International Bank of Reconstruction and Development, or simply World Bank and the International Monetary Fund. World Bank lends to developing countries to sponsor large development projects that improve a country’s infrastructure such as highways, bridges, power plants, and water supply systems. World Bank lends to countries to help them eradicate HIV and AIDS, reduce poverty, and/or improve the education system. World Bank sells bonds in the international markets to raise funds for its projects and ask for contributions from the developed countries.

Countries created the International Monetary Fund (IMF) to be the lender of the last resort. IMF is similar to a central bank because a central bank can grant emergency loans to the banks during a financial panic or crisis, whereas the IMF grants loans to countries with currency problems. If a country has more money leaving the country than entering, then the world accumulates that country’s currency. Unfortunately, a country can experience financial problems if the world does not want to hold that country’s currency. Then the government must pay for its currency using gold and foreign currencies. If the country has no assets to buy its currency, subsequently, it can ask the IMF for a loan.
During the early 1970s, the U.S. experienced large government budget deficit and trade deficits, which could cause an outflow of gold. Consequently, President Nixon ended the Bretton Woods System in 1974 to prevent the outflow of gold. Although nations abandoned the Bretton Woods System, the IMF and World Bank have survived. Bureaucracies can survive and expand their missions over time.

Governments in the modern world use a variety of controls for their country’s currency. Governments specify the rules and limits how people and businesses can exchange its currency for other currencies. Furthermore, governments impose controls on imports, exports, and international investment. Government can limit or prohibit foreigners from buying real estate, land, and financial assets. Government’s controls influence its currency exchange rates. We define the main currency controls and systems governments use.

*Free float* or *clean float* is a flexible exchange rate system. Government does not intervene in its currency exchange rates. Consequently, the supply and demand in the foreign exchange markets determine the exchange rates. Canada, Eurozone, Japan, South Korea, and United States allow the markets to determine the exchange rates, but a government does intervene with its exchange rate occasionally.

A *managed float* is government intervenes in the foreign-exchange market in order to achieve its policy goals. If people are pessimistic about the government’s ability to regulate a market, then they call this a *dirty float*. Government either keeps its currency too strong or too weak. A managed float has a potential problem. If investors believe a country's currency will depreciate, then investors start selling this currency. Furthermore, investors can overwhelm a government, and subsequently, a government devalues its currency. Hence, investors’ expectations become a self-fulfilling prophecy.

A *pegged exchange rate* is a country fixes its currency as a fixed exchange rate to a strong currency such as the U.S. dollar or euro. For example, the United Arab Emirates defines its currency as $1 = 3.67 dirhams. Bahamas, Barbados, Bosnia Herzegovina, Hong Kong, Uzbekistan, and several African countries peg their currencies. Pegging a currency creates problems if the government refuses to support its currency’s market value, which we explain in the next section.

*Dollarization* is a country uses the U.S. dollar or euro as its currency. Panama has used the U.S. dollar since 1907, Ecuador since 2000, and the U.S. territories, Guam, Marshall Islands, U.S. Virgin Islands, and Puerto Rico use the U.S. dollar. Although Montenegro and Kosovo are not members in the European Union, they use the euro as their currency. One benefit of dollarization is the country integrates its economy with United States or Eurozone, which ties the inflation rate to that country and removes the exchange rate stability. Nevertheless, the dollarization has a severe problem. A country severely limits its central bank. Consequently, the central bank has no monetary policy and earns no seigniorage. *Seigniorage* is a government or central bank can profit from printing money. For example, the Federal Reserve pays 7.8 cents to print a $100 dollar bill, creating $92.2 of value out from the air.
Fixed Exchange Rates

Some governments enter the currency exchange market and peg their currency to a strong currency like the U.S. dollar or euro. Government does not specify an exact price. Instead, it specifies the maximum and minimum values of the exchange rate that we call a band. For example, the United Arab Emirates (UAE) defines its currency as 3.67 dirhams = $1 that we show in Figure 5. Central bank of UAE will allow the market exchange rate to fluctuate within this band. If the exchange rate falls outside this band, then the central bank must intervene to restore the exchange rate within this band. Of course, a central bank requires a cache of currency reserves to intervene with its currency exchange rate.

![Currency exchange market](image)

**Figure 5. Currency exchange market for dirhams**

The 2008 Financial Crisis affected the United Arab Emirates as depicted in Figure 6. International investors reduced their demand for dirhams, shifting it rightward. Lower demand causes the dirhams to depreciate and fall below the band. To restore the original exchange rate, the central bank must reduce the supply of dirhams on the international currency markets. Thus, the lower supply causes the dirhams to appreciate. Central bank uses its cache of U.S. dollar or euros to buy the dirhams from the exchange market. Consequently, a central bank can deplete its currency reserves if it must intervene continually in the currency exchange market.

Uzbekistan and many African countries pegged their currency’s exchange rate to the U.S. dollar. Unfortunately, the government has established a stronger exchange rate than it can support, and the government rarely allows the central bank to maintain the strong exchange rate. Consequently, two markets form for the exchange rates: Official government market and the black market. Black market reflects the true market value of the currency. Black market participants always underprice the currency relative to the official rate. Then government imposes many regulations and controls on its currency, preventing the people and businesses
from using the black markets. For example, a government requires an official document that a business or person exchanged the currency at the official government rate.

Currency controls cause legitimate companies to participate in the black markets. For example, the Pepsi Corporation sold Pepsi in Burma. Unfortunately, the Burmese military controlled the government and pegged its exchange rate higher than it could support. Consequently, the Burmese government imposed many regulatory controls over the banking system, and it prohibited the export of hard currencies like U.S. dollars. Pepsi Corporation circumvented these currency controls. As people bought Pepsi and paid in kyat, the Pepsi Corporation bought agricultural products like mung beans. The Pepsi exported these agricultural products to other countries and accepted U.S. dollars as payment. Nevertheless, this strategy could place the Pepsi Corporation in a bind if agricultural prices start falling. Burmese government encouraged this strategy because it did not want to deregulate its banking system, or let market forces determine the Kyat-U.S. dollar exchange rate (McCarthy 2000).

![Diagram showing central bank intervention in the currency market.](image)

**Figure 6. Central bank intervenes in the currency market**

A country can impose strict measures if a severe financial crisis strikes a country. A government may stop convertibility of its currency into other currencies, impose a temporary pegged exchange rate, and/or prevent the international investors from transferring their money and capital out of a country.

A financial crisis can cause capital flight. **Capital flight** is the foreign investors become spooked and scared, and they begin withdrawing their investments from a country. Capital flight causes a massive outflow of currency and depreciates a country’s currency rapidly. Investors believe they will lose their investments, and they rapidly cash out. Capital flight is similar to a bank run, where all the depositors appear at their bank to withdraw money from their accounts, but the bank run is on the whole country. Unfortunately, capital flight causes problems for a government because it rapidly depreciates a country’s currency. Furthermore, that country could
enter a severe recession, reducing economic growth and boosting the unemployment rate. For example, the Asian Financial Crisis started in Thailand in 1997. Thai government could not support the baht fixed exchange, and it devalued the baht. International investors panicked and quickly withdrew their investments, sparking a crisis. Then the crisis sparked a contagion that spread to Hong Kong, Indonesia, Laos, Malaysia, South Korea, and the Philippines as international investors pulled their investments from these countries. Other countries devastated by capital flight were Mexico in 1994-1995 and Russia in 1998.

Causes of capital flight vary. Usually an event or government policy triggers the capital outflow. For example, France imposed a new tax on the wealthy in 2006, encouraging the wealthy to transfer their investments out of France. Although the French government collected $2.6 billion per year, it lost more than $125 billion in capital. Moreover, the Thai government devalued the baht, sparking the Asian Financial Crisis and harming the investors’ baht investments. Finally, a government nationalizing industries could trigger capital flight as investors worry about their investments and transfer their capital out of the country before the government seizes it.

Capital controls are ineffective. If foreign investors believe a country will impose capital controls, they use several methods to cash out investments from a foreign country, which are:

- International investors transfer their cash out of the country via bank transfers. Once the capital outflow becomes severe, then government may impose capital controls on the banks to limit outflows.

- Investors could smuggle currency out of the country. Then they deposit it into banks in their home country or to an offshore account. A government can tighten security at airports and seaports, and customs will seize currency if they catch any traveler with too much currency.

- Investors could convert their currency to precious metals, such as gold, silver, or platinum. Then they smuggle the metals outside of the country.

- Investors can use money laundering where they structure cash deposits into the banking system, hiding the investors’ activities.

- Investors prepare false invoices if they deal with an importer. For example, an investor could falsify invoices that overprice imported items or underprice the exported items. Thus, they transfer more money out of the country by paying more for imports and receiving less money from selling exports.

Besides, these activities may be illegal.

**Key Terms**

dumping 

| gold standard |

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tariff | fixed exchange rate system  
quota | deflation  
export subsidy | Bretton Woods System  
economic rent | World Bank  
beg-thy-neighbor policy | International Monetary Fund  
non-tariff barriers | free float  
trade bloc | clean float  
free-trade area | dirty float  
customs union | pegged exchange rate  
common market | dollarization  
economic union | seigniorage  
trade diversion | capital flight  
exchange rate regime

Chapter Questions

1. Japan is losing their manufacturing jobs to China. Identify the reason the Japanese government could use to impose trade restrictions.

2. Chinese economy is growing quickly, and its currency, the yuan, is appreciating. Identify the reason the Chinese government would use to weaken its currency.

3. U.S. government threatened Japan with trade restrictions during the 1980s because Chrysler, Ford, and GM could not compete against Toyota and Honda. Japanese placed voluntary export quotas on itself. Identify the economic consequences of these quotas.

4. Could countries retaliate against non-tariff trade barriers?

5. NAFTA has many supporters and critics. Has NAFTA benefited your community?

6. Some claim the Customs Union between Russia, Belarus, and Kazakhstan is a form of trade protection. Evaluate this claim.

7. European Union (EU) does accept new countries for membership and imposes a condition. Candidate country must peg the value of its currency relative to the euro. Identify the exchange rate regime the candidate country using.

8. Chinese government expands exports to the United States. Which exchange rate regime does China use to weaken it currency relative to the U.S. dollar?

9. An Asian Tiger pegged its currency to a weaker value relative to the U.S. dollar. Can an Asian Tiger maintain a weak currency if its currency always is appreciating?
10. A country recently pegged its currency for a greater value than the market exchange rate. Can a country sustain an overvalued currency for a long time?
12. Mercantilism and Economic Nationalism

Mercantilism is the oldest and most powerful idea that emerged from the Renaissance. Mercantilism came before the father of economics, Adam Smith. Between the 15th and 18th centuries, the modern nation-states emerged. These modern states viewed markets and international commerce as a source of wealth and power. Furthermore, these nations wanted to harness this wealth and power for the state, helping them finance large armies and navies. Then the nations could conquer and add colonies. Consequently, a government intervenes in its economy to garner wealth and power, making the government strong and powerful. Although mercantilism is an old idea, Japan successfully used mercantilism to rise from a war-destroyed country into the second largest economy in the world.

**Mercantilism**

Classical economics views international trade as a positive sum game. Thus, all participants win if they allow countries to specialize in products and services where they have the lowest opportunity costs. Mercantilists view the world differently. Mercantilists believe free trade is a myth. If one nation gains, then the other nation must lose. Consequently, they take an “us versus them” mentality. Nations only promote free trade if it promotes their national interest. For example, Great Britain ruled the world and created its Empire during the 19th century. It established trade routes throughout the world between Britain and its colonies. Then the United States rose to dominate the world after World War II, when war destroyed Europe’s factories. Hence, the Europeans bought manufactured products from the United States (Stein 1984), causing a large expansion in the U.S. manufacturing economy during the 1950s and 1960s.

Original definition of mercantilism is the state promotes exports and limits imports, creating a trade surplus. Thus, money travels in the opposite direction of the products and commodities, creating a money inflow into a country. Before the 20th century, money was gold and silver. Of course, the gold and silver are the main source of wealth that a government uses to finance an army and a navy. Consequently, the military becomes the source of power. Government can defend itself from other countries or conquer new territories and add more colonies.

Government also finances private industries. Soldiers and sailors need food, uniforms, and weapons. Thus, the government pays producers to manufacture these products. Hence, the state indirectly expands manufacturing, creating more jobs for its citizens. Government also uses the gold and silver to expand its infrastructure. Government builds roads, ships, and ports. This infrastructure allows regions within a country to specialize, leading to the rise of large industries. Furthermore, navigation and shipping greatly improved during the Renaissance. Finally, governments imposed trade protection to maintain their trade surplus, keeping the money flowing into the country.

Mercantilism has one drawback. It leads to inflation. A large flow of money into a country causes the prices for all goods and products to rise. For example, the Spanish conquistadors
discovered gold in Mexico, and they stole it from the Aztec Indians. A large flow of gold into Spain caused high inflation. Hence, Spain disappeared from the world and lost its world power.

One natural question arises. Who benefits from mercantilism? Government benefits first. In those days, the top leaders in government were the monarchy, the kings and queens. King used the inflow of gold to build a large, strong military, enhancing the king’s power. Then the king granted licenses and permission to the monopolies of manufacturing and export industries. Thus, the businesses paid the king for these rights. Furthermore, bureaucrats benefited because they became the machinery of government and helped the king administer his empire. Finally, the last group was the merchants and stockholders of joint-stock companies. They benefited because they exported their products to the colonies, guaranteeing a large group of customers.

European countries fought numerous wars. Therefore, the king wanted a strong military. Weaker the nation, the weaker and more vulnerable it becomes. National security becomes a primary issue, and security is expensive. Government must generate wealth to pay for this security. A nation uses security to protect itself from invaders, control critical resources and materials, and control geographical locations. Thus, wealth and power become a vicious cycle. Wealth creates power, and power creates wealth.

A variant of mercantilism is economic nationalism. Economic nationalism is a country develops into a coherent entity. People, businesses, and government become tied together, forming a uniform system. Economic nationalism rose in the late 18th and 19th centuries. Before the 18th century, economies were regional, and the regions were fairly independent. However, society saw improvements in production technology and transportation, causing the economy to become national. Production technology allows producers to manufacture products cheaply and transport anywhere within a country or world. Regions begin specializing in production of goods and services. Furthermore, other trends occurred. Countries developed markets and fairs to distribute resources and products, and people begin migrating to the cities, creating larger cities. Urbanization still occurs today; just add communications technology to the mix, and these arguments are still true.

Britain became powerful during the 19th century. British founded colonies and invaded countries around the world. Mercantilists needed the colonies because a nation produced manufactured goods that exceeded its citizens’ demand. Thus, countries turned to imperialism to support and sustain their industries. Colonists bought the manufactured goods and in turn shipped the raw materials and food to the home country. Manufactured goods are high-valued goods, while agricultural products and raw materials are low value. Again, a home country experiences a trade surplus while the colonies suffer from a trade deficit, causing money to flow from the colonies to the home country. Great Britain went to great lengths to protect its manufacturing industries. For example, the government forbade skilled labor to leave the country and use their skills in developing manufacturing in other countries (Stein 1984).

Germany and United States were concerned about the rise of Britain’s power. Moreover, they depended on Britain for trade. They exported agricultural products to Britain and bought the British manufactured goods. Nevertheless, Germany and the United States wanted to develop their own industries and create an engine of wealth and power. An American, Alexander Hamilton (1755-1804), wanted trade protection to nurture the U.S. industries. At this
time, the United States was a young country and became a new country in 1791. He advocated the *infant industry* argument. U.S. industries were young and needed protection, so they could thrive and grow. Consequently, the U.S. government imposed tariffs on imports. A *tariff* is a government taxes imports. Tax does two things. First, the tax causes a higher market price for imports. Thus, U.S. citizens purchase fewer imports and buy more products locally. Second, the tariff gives the U.S. government revenue. Finally, Hamilton also wanted to give subsidies to industries to help them grow larger.

Infant industry argument is similar to import substitution. *Import substitution* is a government develops a domestic industry manufacture products that substitute for an imported product. Usually import substitution fails because a government lets large monopolies form and protects it from international trade. In some cases, government even owns the industries, multiplying the failure rate (Rodrik 1996). Another problem is these governments do not encourage exports. Exports are important for economic development because a country earns foreign currency from the export sales. Then countries can finance a country’s imports (Frank 1968).

Brazil, Mexico, and Turkey used import substitution, and it failed miserably. Import substitution is another form of mercantilism because a government restricts imports while maintaining the same level of exports, creating a trade surplus. Import substitution creates two benefits. First, businesses and government have a low risk to establish a brand-new business because the market is already there. They manufacture products that replace the imports. Second, foreigners may invest in the country to avoid the trade barriers. Unfortunately, import substitution has six problems. First, government has problems picking winners and losers. Second, government could foster the growth of monopolies that restrict competition. If the country is small, then a firm faces a tiny market, and it cannot achieve economies of scale in production. Third, the protected industry resists government’s efforts to remove the protection. Fourth, government may own or control the industry, which could foster corruption. Fifth, the government does not focus on exports. Exports are a source of foreign currency that government, businesses, and people can use to finance imports. Finally, many governments could not control their spending and borrowed to cover budget deficits. Consequently, Mexico and Latin American countries suffered a financial crisis in late 1980s and early 1990s, while Turkey experienced a crisis in 2001.

Germany took mercantilism one-step further. German Friedrich List (1789-1846) advocated the state should promote education, technology, and industry. Education and industry are complements because manufacturing industries require more mental abilities than agricultural industries. Thus, the state must promote education, which in turns promotes industry. Of course, we still have this argument today. Many countries want their citizens to have computer and communication skills, which form the foundation of the high-tech industries.

**Hegemony**

A nation can exert relational and/or structural power over other nations. *Relational power* is one nation can force another nation to do something or not do something. Many sports, such as football, soccer, or chess are forms of relational power. Strength of a nation’s military
determines relational power for a country. Structural power is a nation’s power to shape and influence the international institutions. All countries, political institutions, businesses, and people operate under the international institutions. Some nations have the power to affect the international institution and change the rules in its favor, which is structural power.

United States has both forms of power, which it gained after World War II. United States became a leader in technology and grew into the world’s largest economy. Moreover, it possesses a strong military. In the beginning, the technology gave the United States an edge or comparative advantage in product manufacturing while the strong military allowed the U.S. to protect its global interests (Stein 1984). Furthermore, the U.S. has a structural power. It can influence the World Bank, and the International Monetary Fund. Of course, the U.S. helped create these institutions, and it contributed $98 billion to the World Bank in 2013 and $64.5 billion to the IMF.

Hegemony goes beyond relational and structural powers. A hegemony is one country dominates the other countries in international commerce. Hegemony is the richest and most powerful nation that establishes the institutions for international trade. Hegemony becomes a source of wealth, power, and economic growth. Modern world has witnessed three modern hegemonies. United Provinces (i.e. Holland) ruled international trade in the 18th century, Great Britain during the 19th century, and the United States after World War II. Modern hegemonies possess three characteristics. First, they possess the most advanced and low-cost industrial and agricultural industries. Second, the hegemonies have strong financial markets. Finally, the hegemonies dominate international trade and finance.

Hegemony is critical for free trade because international markets and institutions are public goods. Consequently, the hegemony fosters free trade and ensures peace and security. It protects international trade from pirates and rogue nations, creates the system of international payments (i.e. money system), and establishes the international institutions. Hegemony pays high costs to provide these public goods, and many nations can free ride on the international system without contributing to it (Stein 1984).

A hegemony still provides the international public goods, even including the free riders because the benefits outweigh the cost. When hegemony arises, the world economy grows and prospers as countries engage in free trade. Markets create wealth for all participant nations. For example, the United States supports a system of free trade. After World War II, the U.S. was the largest industrial producer while the European factories lay in ruins. Creating international trade greatly benefited the United States, and the U.S. experienced a strong, world demand for products produced in its manufacturing industries during the 1950s and 1960s.

Hegemony’s costs rise over time and weaken the hegemony's base of wealth and power. If the hegemony fails, then the public goods disappear. Consequently, world trade breaks down, and the world’s economy stagnates and stagnates. We can add an interesting twist to hegemony. A rich and powerful nation gains control after a large war. Over time, the hegemony falls into decline while its costs rise, and harmonious relationships break down. Then a war follows, and a new hegemony arises in the aftermath.

United States has evolved into a selfish hegemony because the U.S. government has abused this system. U.S. government relies on the U.S. dollar being the international currency, and it
has a large growing debt. Then large trade deficits plague the U.S. economy, causing an outflow of U.S. dollars into the international markets. Some foreigners and central banks hold onto to these dollars, or they buy U.S. government securities. For example, the U.S. buys petroleum from Russia. Thus, Russia delivers oil to the U.S. while the Russians keep the U.S. dollars, which are pieces of paper. Furthermore, many Russians save their earnings in U.S. dollars, and some buy the U.S. government debt. Again, they buy U.S. Treasury Securities, which are pieces of paper. Currently, these pieces of paper have value. However, some people question whether the U.S. government can continue financing the dual deficits. If the U.S. dollar collapses in value, then foreigners would hold worthless pieces of paper. Consequently, they would stop accepting U.S. dollars as payment, halting international trade. Other countries accumulating debt do not have this financing ability. Consequently, a nation whose currency is used and accepted around the world can borrow beyond its means.

**Trade Sanctions**

A country or group of countries may use trade as a weapon. They impose trade sanctions on another country as a punishment to force a country to do something, such as democratic elections of the top government officials. *Trade sanctions* include boycotts, restrictions, or embargoes. For example, the United States imposed sanctions on Cuba in 1950s because President Fidel Castro's communistic regime came into power in the 1950s, and Cuba befriended the Soviet Union. United States outlawed trade between U.S. businesses and the communistic bloc countries. U.S. hoped the trade sanction would isolate Cuba and force a change in power. President Fidel Castro retired after 49 years in power.

Trade sanctions are not effective for four reasons. First, third party nations become the middlemen, circumventing the trade embargo. Second, food embargoes starve the people while the leaders never go hungry. If the starving people protest against the government, then government may use its military against them. Hence, a trade sanction could cause a government to massacre its people. Third, if a country has isolated itself, then a trade sanction further isolates a country. Moreover, the government may become more xenophobic after the trade sanction. Finally, a country may produce and export illegal products to gain currency. Then the government uses this currency to buy military equipment, guns, and weapons (McCarthy 2000).

Two examples illustrate the problems of trade sanctions. For instance, the United States imposed trade sanctions against Cuba. Nevertheless, the United States has free trade with Mexico via the North Atlantic Free Trade Agreement (NAFTA) while Mexico has free trade with Cuba. Thus, Americans potentially eat Cuban sugar as traders transport Cuban sugar through Mexico. Another example is the trade sanctions against Burma. Military controls the government in Burma and does not allow democratic elections. Trade sanctions isolated Burma because countries do not trade or invest in Burma. Consequently, the government grows, creates, and exports heroin to garner hard currency. Then the Burma government buys weapons from China to sustain its military rule (McCarthy 2000).
Industrial Espionage

*Industrial espionage* is governments, businesses, and people spying and gathering secret intelligence usually for technology. During the Cold War, the United States and Soviet Union created vast spy networks and gathered intelligence. Hence, the spies helped improve military security, and they gathered information about hardware, and technology. After the Soviet Union had collapsed in 1991, nations and businesses started spying to acquire information and technology.

Governments rely on different methods for industrial espionage. China sends visiting students and professors to developed countries. Students obtain PhDs while the professors penetrate the academic, corporate, and government laboratories. China supposedly stole technology about atomic warheads, the neutron bomb, and satellites by employing Chinese scientists at the right places. Furthermore, Germany uses computer espionage, and funds a computer-hacking school in Frankfurt. Government uses hackers to break into computer databases of other nations and businesses. Moreover, countries may plant listening devices in hotels and flights of executives of large companies. Approximately 75% of commercial intelligence is available from computers, publications, and research journals. For example, the U.S. Patent Office posts patents on the internet, allowing foreign spies and counterfeiters to steal patents. Many countries, especially Asian countries have weak or nonexistent patent laws, and their manufacturers use the latest technologies without paying for them.

Many countries form the military–industrial complex. Countries use high technology to develop the defense industries that provide three benefits. First, military complexes produce military weapons and develop defense-related technologies and products. These industries employ civilians and create high-tech jobs. High-tech jobs encourage workers to attain higher education. Second, technology from the military-industrial complex spills over into other parts of the economy, creating civilian jobs and new products. For example, the U.S. military developed the internet in the 1960s. Internet has one feature. If a nuclear bomb destroys a city, the internet-communication system still works computers route the communications around the destroyed city. Finally, the military-industrial complex increases a nation’s self-sufficiency and political autonomy. Countries do not want to rely upon foreign countries for critical resources and products. Thus, many countries produce their own weapons, even stealing and adopting technology, and know-how from other countries.

Some governments impose contradictory conditions on their military-industrial complex. For instance, the U.S. government restricts information about high-tech weapons. However, the U.S. sells military weapons for money. Unfortunately, a foreign country employs engineers and scientists who can reverse engineer the high-tech weapons. Thus, a nation figures out how the weapons work, and then it creates their own defense industries to manufacture the weapons on a large scale. Moreover, some claim the military-industrial complex is dangerous because if a nation accumulates too many weapons, then the military must use those weapons to secure future funding.
The Consummate Mercantilist – Japan

We study Japan as an interesting case because it rose from the ashes of World War II with a ruined economy to become the second-largest economy in the world. During many decades, Japan’s GDP grew phenomenally at 9% until the 1990s. Furthermore, the nation became the world’s largest creditor nation, and a world-class producer, exporter, and financier. This miraculous growth took one generation to achieve. We attempt to explain the origins and sources of Japan’s phenomenal growth in one section.

Japanese has an unusual characteristic that aided Japan’s miraculous ascent towards the top. Japanese can imitate, adapt, and assimilate ideas, institutions, and technologies from cultures that they view as superior to their own and adapt them to their particular needs. For example, the Japanese adopted Zen Buddhism and chopsticks from China, Confucianism from Korea, science and technology from the Dutch, their school system from the Germans, and their national constitution from Prussia. Japanese observed the world and incorporated the best into its culture. Usually culture can impose boundaries and prevent countries from adopting the finest practices in the world.

United States government shaped the institutions of modern Japan. U.S. government wrote Japan’s current constitution after War World II. Constitution extended the right to vote for all men and women and granted civil rights to Japanese citizens. Furthermore, the United States prohibited Japan from having a military. Thus, the United States stationed troops there. Military is a large item in a government’s budget, and the Japanese has resources to spend and invest in other areas. Moreover, the United States gave Japan technology and opened U.S. markets to Japanese products. However, Japan closed its markets to outsiders. United States government looked the other way because they wanted to stop communism from spreading. U.S. wanted a strong Asian capitalistic country as an ally that was near the Soviet Union. Of course, this mercantilist’s policy worked extremely well for Japan.

Japanese have another unusual characteristic. They see the world as a hierarchy and view countries, empires, races, classes, and companies as either strong or weak. In the beginning, the Japanese viewed their nation as inferior to its powerful neighbors. Having an inferiority complex does not hinder progress if this complex motivates people to overcome them and better themselves. However, as Japan rose to a dominant power, the Japanese became proud and viewed other cultures and countries with disdain. Furthermore, the Japanese is relatively homogeneous and have a strong sense of nationalism. Everyone shares the same ethnic background, and the government can foster a strong sense of national identity, appealing to all groups. Moreover, the Japanese has a mercantilist’s view of the world. Business is war; thus only the strong prosper. Consequently, many refer to Japan as “Japan, Inc.”

Japanese government directly became involved with its economic growth. Japanese government used corporatism to accelerate its rapid growth. Corporatism is government forms alliances and associations with businesses, usually the large corporations and heavy industry. Consequently, government became a partner with industry and aided its growth. Government agency in Japan was the Ministry of International Trade and Industry (MITI), and it fostered Japan’s economic development (Unger and Chan 1995). Moreover, the Japanese citizens had
high regards for their bureaucrats because they devised a coherent national economic plan and developed “long-term strategies.” Furthermore, they predicted the "winners" and "losers" in industries, which they conveniently called the “sunrise” and “sunset” industries. Although government provided a guiding hand, it did not repress market forces when they intervened in the economy. Thus, MITI preserved and nurtured the forces of competition.

Japan had several economic characteristics that differ from other countries. Employers provided the “three sacred treasures” to their employees - lifetime employment, seniority wage scales, and company unions. As an employee gained seniority and longer service, the employer would pay the worker a greater salary. This practice was also common in the United States before the 1990s, but businesses phased this out as they competed for top talent. Furthermore, the Japanese company sponsors the company unions, which is unusual. Usually, unions are outside forces that organize workers along particular trades and skills. Then the union leaders and company managers negotiate workers’ wages and working conditions. If the unions failed at negotiations, the union would call a strike where the workers would leave the employer and shut down the business, harming the employer. Consequently, the three sacred treasures caused employees to be loyal to their Japanese companies, creating harmony between workers and managers.

Japan’s tax system is conducive to high savings and investment rates. During some periods in their history, Japanese saved 40% of their incomes. Between the 1960s and 1980s, the savings rate averaged 20%. High savings rate drives economic development because the savers deposit money into the banks, and in turn, the banks grant loans to businesses and people. Thus, this high savings rate has three impacts on the economy. First, the banking and financial sectors grow quickly. Second, businesses borrow from banks and invest in buildings, machines, and equipment, which boost future economic growth rates. Finally, the people borrow from banks to buy homes and cars, expanding the construction and manufacturing industries.

Japan has weak antitrust laws that aided in the rapid growth of large manufacturing and heavy industries. Japanese allowed their corporations to grow extremely large, and the corporations could work together. We call the Japanese conglomerate corporations a keiretsu, and a bank lies at the heart of a keiretsu. This bank provides low-interest loans to members of its group. Moreover, the keiretsu would supply resources and parts to each other and pool their resources together for research and development. Since keiretsu works with each other, corporations rarely took over other corporations. For example, when one U.S. corporation takes over another corporation, they usually incur large amounts of debt. Then the parent company squeezes as much money as it can from the newly acquired subsidiary to repay this debt. Finally, the keiretsu planned strategically for long-term market share, while U.S. corporations worried about maximizing short-term profits.

Japan’s miraculous growth ended during the 1990s. As stagnation settled in, employers did not guarantee Japan’s lifetime employment anymore. Moreover, corruption scandals riddled the Japan’s ruling party, the Liberal Democratic Party (LDP). Liberal Democrat Party ruled Japan for four decades. Some even compared the LDP to the mafia. Before the bureaucrats were caught in the public scandals, the public held a high regard for bureaucrats because the bureaucrats were independent of the political party and implemented Japan’s economic reforms.
Japan’s extremely high savings rate fueled Japan’s housing and stock market bubbles. An asset bubble is an excessively rapid increase in an asset’s price that is not sustainable. Then the price reaches a peak, and subsequently, the price drops, triggering financial chaos. A price increase differs from a bubble because prices are not sustainable for bubbles. After an asset’s price has attained a peak, it quickly crashes. Unfortunately, asset bubbles attract speculators. Speculators buy an asset, hoping to re-sell the asset for a greater price, earning a quick profit. Moreover, speculators can boost an asset’s prices before the price crashes. They also use loans to acquire assets. For example, Japan has a high population density and limited land. Some speculators bought parcels of the land that were too small for construction, hoping someone would buy it for a higher price. During the 1990s, both the Japanese land and real estate and stock market prices crashed. Real estate prices dropped approximately 50% while the Japanese stock market index, the Nikkei, peaked at 38,957.44 in 1989 and fell to 6,994.90 in 2008, dropping 82%.

Financial bubble financially harmed the Japanese banks. Some people and speculators could not repay their loans. Furthermore, the banks foreclosed on assets that were losing value. Another complication came from the keiretsu banks. They kept lending to subsidiaries that were earning losses. Banks kept the bad performing business afloat and were reluctant to let businesses go under. Unfortunately, these bank loans greatly increased the government bailout costs. Moreover, the government kept these banks operating, hoping the economy would turn around. This sounds suspiciously close to the situation in the United States after the 2008 Financial Crisis.

Japanese economy experienced a persistent stagnation since the early 1990s, and this stagnation is not disappearing. Economists recommend three broad strategies for countries to overcome their endless malaise and jumpstart their economies again. However, these strategies would not work for Japan. Three strategies are:

**Strategy 1:** Japan can use export growth strategy to jump-start economic growth. Why not use mercantilism to get the country growing again? First, the Japanese yen is too strong. A strong yen makes imports cheaper and exports more expensive. Hence, a strong yen hinders the export sector. Second, Japanese exports comprise a small segment of the Japanese economy. Boosting the export sector would create small spillover effects on the rest of the economy. Third, many Japanese firms converted their money from abroad to prop up their finances at home. This strengthens the demand for the yen, strengthening it further. Finally, companies make many Japanese products outside of Japan. For example, Honda, Toyota, and Nissan make some of their cars in the U.S. and Canada. They produce outside of Japan, and the manufacturing does not contribute to its economic growth.

**Strategy 2:** Some recommend Japan should reduce its savings rate and encourage more consumer spending. Unfortunately, a financial crisis frightens people to save more, and the Japanese is already phenomenal savers. Furthermore, consumers are reluctant to make large purchases in real estate and cars if they face an uncertain future. Moreover, banks do not grant loans for assets with falling values. Finally, a large consumer economy did not help the United States. Americans and the U.S. government are atrocious spendthrifts because they borrowed heavily to prop up consumer spending, trying to maintain a growing economy. Then the 2008
Financial Crisis occurred, forcing American consumers to lower their borrowing. Now consumers must repay this debt, which imposes severe repercussions on the U.S. economy. Unfortunately, the U.S. government has accelerated its borrowing. Nevertheless, the U.S. government cannot maintain the rapid growth in debt.

**Strategy 3:** Some recommend Japan use *Keynesian Economics*. When the private markets are weak, then government should step in and pick up the slack. Thus, the Japanese government should boost government spending and/or reduce taxes. Allowing people to keep more of their after-tax income would cause people to spend more, expanding the economy. However, if people save this extra money, then the economy would further contract. Keynesian Economics require a government to reduce government spending and raise taxes if a growing economy creates inflation.

Japanese government used Keynesian Economics extensively and borrowed heavily. Japanese debt soared to the second highest debt to GDP ratio in the world. In 2009, the debt to GDP ratio ranged between 170 and 200%. Thus, the Keynesian solution did not work. U.S. debt to GDP ratio was approximately 100% in 2012. Eventually, Keynesian economics will fail the United States as investors stop lending to the U.S. government.

Mancur Olson (1982) proposed an interesting theory that explains Japan’s failure to overcome its perpetual stagnation. Before the U.S. occupation of Japan, the ruling families, called *zaibatsu* families, controlled the Japanese industries. After the United States had defeated after World War II, the U.S. broke up these powerful coalitions. Zaibatsu families grew and coalesced into the powerful keiretsus. A new government formed that geared the new institutions for economic growth and development. Over time, these new institutions became fixed and rigid, and they cannot change as their society changes. A strong force must come along and break up these coalitions before society can change in a new direction and start growing again.

**Key Terms**

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**Chapter Questions**

1. Asian Tigers use export growth strategy to fuel rapid economic growth. Is this strategy a form of mercantilism?
2. Some Americans advocate “Buy American” campaigns. If Americans do buy more, is this campaign a form of mercantilism?

3. Many foreign investors worry the U.S. government is operating massive trillion-dollar deficits while huge trade deficits plague the U.S. economy. What would happen to the United States hegemony’s power if the U.S. dollar collapsed in value?

4. China holds nearly $2 trillion of U.S. debt and currency. Could China cause the dollar to crash by selling its U.S. dollars and U.S. government securities quickly?

5. If trade sanctions do not work, why do governments continually use them to punish countries?

6. Is government using resources for espionage efficiently?

7. Does Olson’s Theory have any validity for a nation to change?

8. Does a large corporation benefit in having a bank as a group member?
13. The Aggregate Demand and Aggregate Supply Functions

We use the aggregate demand and aggregate supply functions as tools to analyze macroeconomic issues. Thus, these functions represent an entire economy. Then we study which factors shift these functions and predict changes to a country’s gross domestic product and its inflation rate. Students should review this chapter if they planned to study and read Chapters 14 and 15. Students learn how a government uses fiscal policy in Chapter 14, and how a central bank uses monetary policy in chapter 15. Students use aggregate demand and aggregate supply to predict changes in an economy as a government or central bank influences an economy.

The Aggregate Demand

Aggregate demand (AD) shows the level of goods and services that people, businesses, and government buy at a specific price level, reflecting total spending in the economy. We represent the amount of goods and services a country produces by a country’s gross domestic product (GDP). Furthermore, the price level is an index of all prices for final goods and services. We show an aggregate demand function in Figure 1, and it has a negative slope. Although market demand functions have negative slopes and are similar to an aggregate demand function, they differ. A market demand represents one product or service, while aggregate demand combines the value of all goods and services within an economy. Unfortunately, aggregation loses information. For example, if the price of apples rises causing consumers to switch from apples to oranges, aggregate demand functions lose this information because GDP includes both oranges and apples losing the changes in specific markets.

![Figure 1. Aggregate demand function](image)

Three effects explain why an aggregate demand function has a negative slope.

**Effect 1: Real Balance Effect** is the public’s response to inflation, and the inflation’s impact on their wealth. Term “real” refers to the value of people's money, savings and
investment after adjusting for inflation. A high price level means an economy experienced inflation because the price level had to rise to become large. Unfortunately, inflation reduces the value of money, savings, and investments like stocks and bonds. Thus, these assets have a lower real value. When people have little wealth, they buy fewer goods and services, reducing the GDP. Moreover, at a lower price level, people have a higher real balance effect and spend more on goods and services. Consequently, the real balance effect causes the slope for an aggregate demand function to be negative.

Effect 2: Interest rate effect is more complicated. Money in an economy is fixed until a central bank increases it. At high-price levels, people reduce their savings and withdraw savings from financial institutions because a high-price level indicates a high inflation rate. Inflation reduces the value of savings. Consequently, banks must raise interest rates to attract funds. At high interest rates, businesses and people invest less in structures, machines, and equipment, reducing the GDP. Thus, the aggregate demand function has a negative slope. Furthermore, we can relate this effect to the Fisher Equation, where the nominal interest rate equals the real interest rate plus expected inflation. If the public expects high inflation rates, then both nominal inflation and interest rates must rise, reducing the GDP.

Effect 3: Foreign purchases effect entails the inflation rate’s impact on the trade balance. For example, the U.S. price level increases relative to another country. Although the exchange rates did not change, the price level affects exports and imports directly. Americans increase imports because they are relatively cheaper while foreigners decrease exports because they become more expensive. Thus, the U.S. exports industries contract while U.S. consumers pay more imports, reducing the GDP. Unfortunately, the manufacturing industries in the foreign country gain production, boosting its GDP.

Aggregate demand function can shift because a sector changed its spending. Sectors in an economy are consumers (C), businesses investing (I) in machines and equipment, government spending (G), and net exports (X). Net exports are total exports minus total imports. Exports reflect foreigners buying a country’s goods while imports represent residents buying foreign-made products. Thus, we calculate the GDP by summing the expenditures of all sectors in the equation, or GDP = C + I + G + X.

Consumers purchase goods and services, such as food, clothes, cars, houses, and household appliances. If consumers increase their spending, the aggregate demand increases and shifts rightward. If consumers decrease their spending, the aggregate demand decreases and shifts leftward. We depict the shifts of the aggregate demand function in Figure 2.

We list five factors where changes in consumers’ behavior changes and shifts the aggregate demand function.

Consumer spending: Consumers save less income and consume more because they altered their behavior. Consumers purchasing more goods and services increase the aggregate demand function and shift it rightward. Remember, aggregate demand reflects society’s purchases and expenditures for goods and services. If consumers save more and consume less, then the aggregate demand function decreases and shifts leftward.

Real Wealth: If consumers’ wealth increases, then consumers spend more. Aggregate demand function increases and shifts rightward. For example, the 2008 Financial Crisis
negatively impacted wealth. Stock prices dropped by half during 2008. Consequently, the people’s wealth plummeted in value as the value of pension plans and investments dropped in half. Thus, consumers reduced their spending and increased their savings, decreasing the aggregate demand function and shifting it leftward.

![Figure 2. Aggregate demand function shifts](image)

**Consumers’ expectations**: If consumers are optimistic about the future, they spend more now, which increases aggregate demand. If consumers become pessimistic about the future, subsequently, they spend less, decreasing the aggregate demand and shifting it leftward. For example if the consumers expect layoffs, a tough job market, or a long recession, they would reduce their spending and increase their savings. Of course, consumers would not make large purchases in new cars, homes, or exotic vacations.

**Household debt**: If households have low debt, they can increase their spending by borrowing more, causing the aggregate demand to shift rightward. If households have high debt, they cannot borrow to finance their spending. Furthermore, they may even decrease their spending to lower their debt, which cause aggregate demand to decrease, and to shift leftward.

**Taxes**: If a government hikes taxes, then consumers have less income to spend. Consequently, households spend less, decreasing the aggregate demand function and shifting it leftward. If a government reduces taxes, then consumers have more income to spend, increasing the aggregate demand function and shifting it rightward.

Businesses affect the aggregate demand function through investments. Businesses invest in machines, equipment, structures, and tool. They invest to boost inventory or replace worn-out equipment and machines. Consequently, businesses investing more increase the aggregate demand function shifting it rightward. On the other hand, business reducing their investment does the opposite.

We list five factors that influence a business’s investment levels:

**Real interest rates**: Real means the economists removed the impact of inflation from the variable. A low real interest means businesses pay low borrowing cost and would boost their investment. Of course, the change in the interest does not result from the change in the price
level. Otherwise, the economy would move along an aggregate demand function. Remember; the inflation changes the nominal interest rates and not the real interest rates. A central bank can affect the real interest rate. Similarly, households invest in new houses, new cars, and appliances, when consumers pay low real interest rates.

**Expected Profits:** Businesses invest if they expect to earn higher profits. Hence, businesses will invest if they are optimistic about the future business climate, such as the economy experiences healthy growth, or consumers' demands for products and services are strong. However, businesses will reduce their investment during recessions and financial crises as the future becomes uncertain.

**Technology:** Businesses boost their investment to adopt new technologies because firms use technology to pay lower production costs, increase workers' productivity, or improve a product's quality.

**Production Capacity:** If businesses are operating at their full capacity, then businesses invest in machines, equipment, and structures to increase the capacity level.

**Taxes:** If government decreases taxes on businesses, then businesses invest more because businesses pay lower costs. If a government had raised taxes on businesses, subsequently, businesses would invest less.

Government is a large sector of the economy, and it buys goods and services, and constructs and maintains schools, highways, airports, roads, and parks. Nevertheless, economists exclude government transfer payments like Social Security and Medicare because the government does not change the spending level. Instead, the government redistributes incomes between groups in society. Government spending includes all three levels: Federal, state, and local. If a government boosts its spending, then the aggregate demand increases and shifts rightward. If a government lowers its spending, subsequently the aggregate demand decreases and shifts leftward.

Last sector is the international sector. Remember; the aggregate demand does not shift from changes in the price level. We list the three factors that shift the aggregate demand function:

**Net Exports:** If exports are increasing and/or imports are decreasing, then a country produces more goods and services inside the country. A country that manufactures more can boost their exports, increasing the aggregate demand function and shifting it rightward. If exports falls and/or imports rise, then the foreign country manufactures more products, which does not contribute to the economy. Thus, the aggregate demand function decreases and shifts leftward.

**Foreign income:** If a foreign country becomes richer, then foreigners import more. Consequently, our exports rise that boosts manufacturing and raises economic growth. Thus, the aggregate demand function increases and shifts rightward. If foreign incomes fall, then the opposite would occur.

**Exchange rates:** If the U.S. dollar appreciates or becomes stronger, then U.S. exports fall while imports rise. A stronger dollar makes foreigners buy fewer, expensive U.S. made-products while U.S. consumers buy the cheap, foreign-made products. Thus, the aggregate demand decreases and shifts leftward because the foreign country expands production and its GDP. If the U.S. dollar depreciates or becomes weaker, then the opposite would occur.
The Aggregate Supply

Aggregate supply is a schedule that shows the amount of goods and services producers manufacture at each price level. Consequently, aggregate supply focuses on production similarly to a supply function but it becomes more complicated because we have two time horizons: Short run and long run. Short run is prices for some resources do not change immediately to changes in the price level. Some production prices are fixed, usually a worker’s wages, while the long run is prices for all resources change immediately to price level changes. Thus, the long run and short run exhibit two different aggregate supply functions.

We show a short-run aggregate supply in Figure 3, and it has a positive slope. Slope is positive because companies produce more goods and services, when the price level rises while workers’ wages remain the same. Some economists use the expression - the employer “fools” the workers to produce more for a lower real wage because the workers do not realize the inflation rate has increased. However, we could argue the employers exploit the workers as firms and businesses pay lower real wages. Consequently, a greater price level increases the total value of goods and services that boost GDP. Firms earn higher profits, and the exploited workers increase production even though they earn lower real wages. Most workers are not in a position to negotiate wages when the inflation rate rises.

![Short-run aggregate supply function](Image)

Figure 3. Short-run aggregate supply function

Long-run aggregate supply function differs from the short-run aggregate supply. All resource prices rise with the price level. Thus, the aggregate supply function becomes perfectly inelastic that we show as a vertical line in Figure 4. Moreover, workers’ wages rise with the cost of inflation. Consequently, the country produces the same level of GDP regardless of the price level. However, we could challenge this assumption. For example, if the price level and worker’s wages are increasing at the same rate during hyperinflation, then, theoretically, a society still produces at the same GDP level. Nevertheless, hyperinflation causes a society to break down, which contracts GDP because people stop using money as a medium of exchange.
Financial markets could not function under hyperinflation, and financial intermediaries would not channel funds from savers to investors.

![Long-run aggregate supply function](image1)

**Figure 4. Long-run aggregate supply function**

Aggregate supply function can also shift. We focus on the short run because as Maynard Keynes once stated, “In the long run, we are all dead!” We show an increase and a decrease of a short-run aggregate supply function in Figure 5.

![Shifting a short-run aggregate supply function](image2)

**Figure 5. Shifting a short-run aggregate supply function**

First factor that could change is input prices. A firm uses three inputs, which we list below:

**Input 1:** Labor is the largest expense for businesses. If a government allows immigration, then new workers enter the market, boosting the labor supply and reducing wages. Since businesses pay lower labor costs, businesses can expand production, which increases the aggregate supply function and shifts it rightward. If many workers retire, then the supply of
workers falls, raising wages. Thus, businesses pay more for labor, and they reduce their production. Consequently, the aggregate supply function decreases and shifts leftward.

**Input 2:** Businesses use buildings, equipment, machines, and tools, which we call capital. If the price for capital drops, then businesses invest more, increasing the aggregate supply function and shifting it rightward. If foreign countries sell machines and equipment for cheaper prices, subsequently businesses import more and boost their investment.

**Input 3:** Businesses use raw materials in the manufacturing process. Firms expand production if resource-inputs become cheaper. Thus, the aggregate supply function increases and shifts rightward. For example, if companies discover more petroleum or mineral deposits, then prices for these commodities will fall. Furthermore, firms importing resources from foreign countries can expand production if the imported resource prices fall.

Companies with market power can influence the aggregate supply and boost market prices. For example, the Organization of Petroleum Exporting Countries (OPEC) sets production quotas on petroleum. Quotas reduce oil production, increasing the petroleum price. Companies use many petroleum-based products in manufacturing and production, and the transportation sector transports goods between markets and the factories. Thus, as the petroleum’s price rises, then all prices in an economy rise. Consequently, the aggregate supply function decreases and shifts leftward.

A nation’s productivity affects the aggregate supply function. **Productivity** is workers produce more when they use the same level of resource inputs. Thus, productivity gains allow a country to expand output. Productivity goes hand in hand with new technology. In the United States, the average real GDP grew roughly 3%, and productivity gains contributed approximately 2/3 to this growth. Consequently, productivity causes a nation’s aggregate supply function to increase and shift rightward.

A country’s legal environment significantly impacts an economy. A government’s rules and regulations affect manufacturing and production. If a government changes the legal system that lowers businesses’ production costs, then the aggregate supply function increases and shifts rightward. Some examples are a government reduces business taxes, improves property rights, reduces regulations, eliminate bureaucratic red tape, or boosts subsidies. If a government does the opposite, then the aggregate supply function would decrease and shift leftward.

**Changes in Equilibrium**

**Equilibrium** is a state of rest where nothing changes. Equilibrium occurs where the aggregate demand intersects the aggregate supply. We show an equilibrium in Figure 6 by P* and GDP_{FE}, where the FE means full employment. As long as nothing changes in an economy, the price level and GDP remain at the same level.

Equilibriums are stable. For example, a price shock occurs in the economy, and everyone awakens with a lower price level at P' as depicted in Figure 6. At P', businesses and producers produce at Q_1 while consumers, government, businesses, and foreigners want to buy at the higher level of Q_2. Consequently, society’s quantity demanded vastly exceeds the suppliers’ production. Furthermore, producers see their inventories for products falling. Therefore, consumers bid up prices until the price level returns to the equilibrium price level, P*. As the
price level rises, suppliers produce more goods and services while consumers, government, and businesses reduce their spending.

![Figure 6. Price shock causes a lower price level](image)

Another price shock hits the economy, and the price level rises to P”, which we depict in Figure 7. At P”, businesses and producers produce goods and services at Q₂ but consumers, government, and businesses only purchase at Q₁. Price level is too high, and the consumers, businesses, and government do not buy all the goods and services. Producers see their inventories rising. Thus, the businesses must reduce prices to sell their inventories and cut back on their production. Consequently, the price level falls until it equals P* again.

![Figure 7. Price shock causes a higher price level](image)

A factor causes the aggregate demand function to increase and shift rightward as shown in Figure 8. For example, businesses invest more. A government boosts its spending or reduces its income taxes, or foreigners enjoy greater incomes and buy more imports. If the economy
operated at the full employment (FE) and aggregate demand increases, then the GDP expands beyond the full-employment level. Furthermore, the price level rises, creating demand-pull inflation. Demand-pull inflation is consumers have too much money, and they are buying goods, bidding up the prices, “Too much money is chasing too few goods.” Finally, demand-pull inflation would rarely exceed 10%.

![Figure 8. Aggregate demand function increases](image)

Aggregate demand function can decrease and shift leftward, which we depict in Figure 9. For instance, businesses reduce their investment because they become pessimistic about the future. A government decreases spending or boost income taxes. Consumers become concerned about the rising unemployment rate and increasing layoffs, so they save more. If the economy operated at the full-employment level, then aggregate demand function decreases as the economy enters a recession. One question arises - how severe is the recession and could prices decrease? Prices in an economy rarely decrease. If the prices could fall creating deflation, then the economy contracts to the GDP level, $Q_1$, which is a mild recession. If prices remain fixed and rigid and do not fall, subsequently, the economy enters a more severe recession at $Q_2$. 

![Figure 9. Aggregate demand function decreases](image)
Figure 9. Aggregate demand function decreases

Several factors cause prices to be fixed and rigid.

**Factor 1:** Companies do not want to trigger a price war because price wars destroy profits as companies undercut each other.

**Factor 2:** Menu costs can fix prices. Companies must pay costs to change prices. If firms believe the recession will be short, they may not lower their prices. Firms do not want to pay the additional cost of printing brand new catalogs and menus, re-pricing merchandise in inventory, or communicating the new prices to consumers. Unfortunately, firms could lose consumers if they become angry from sudden and unexpected price changes.

**Factor 3:** Although labor is a major cost, firms cannot lower workers' wages because firms and workers have specified wages in the labor contracts. Even if a firm does not have contracts with its labor contract, a government imposes minimum wage laws. Firms cannot lower wages below the minimum wage, or government can fine and penalize the business. Consequently, firms cannot lower their prices because they cannot lower their labor costs.

**Factor 4:** Employers pay better wages than the market because the high wages boost productivity, which economists call efficiency wages. If a business had reduced its employees’ wages, then workers' morale and work habits would suffer. Subsequently, workers become bitter towards their employer and reduce their productivity (Bernanke and Parkinson 1989). Furthermore, the firm’s best workers may "jump ship" and work for another employer while some of the remaining workers may steal or sabotage their employer. For example, disgruntled employees in high-tech industries could leak technology to competitors or post sensitive technology on the internet, while other employees, especially in the computer support may plant viruses in their employer's computer system. Thus, managers hesitate to reduce wages, fearing a backlash from their employees.

Aggregate supply function could decrease, which is detrimental to a country. For example, a war, a natural disaster, or an energy price shock decreases the aggregate supply function and shift it leftward as shown in Figure 10. Consequently, the GDP for a country contracts while the economy experiences inflation from the greater price level. If the economy operated at full employment, then a decrease in aggregate supply creates cost-push inflation. Cost-push inflation is an economy experience both a high inflation rate and unemployment rate at the same time. Economists also referred to cost-push inflation as stagflation.

Large price increases on a critical resource could create cost-push inflation. For example, the Organization of Petroleum Exporting Countries (OPEC) rapidly boosted the petroleum prices during 1973-1975, 1979-1980, and 2000. Manufacturing companies use petroleum to produce fertilizers, plastics, gasoline, diesel, and many more products. As the petroleum price rises, all these products become expensive, instantly increasing all prices on all goods and services. Even if companies do not use petroleum in manufacturing products, trucks, trains, and ships use diesel fuel to transport all goods between the factories and markets. Consequently, consumer cut back on goods and services from the higher prices, the Law of Demand. Then all producers must pay greater costs and sell fewer quantities for their products. Unfortunately, soaring petroleum prices cause the United States to enter a recession about a year later.
For the last case, the aggregate supply function increases and shifts rightward as depicted in Figure 11. For example, producers adopt new technology, or the government increases immigration that lowers wages. If an economy operated at full employment, then the aggregate supply increases, expanding the GDP. However, the degree of change depends whether prices are flexible or rigid. If prices could fall, then the economy grows to $Q_1$. If the prices are rigid, subsequently the economy grows much faster and attains $Q_2$. We already have discussed inflexible and fixed prices, and prices may not fall because a firm has market power, menu costs, and labor contracts, or a firm pays efficiency wages.

We show with this analysis the impact of rigid prices on an economy. If an economy has rigid prices, then changes within an economy have a larger impact on the economy. Consequently, an economy experiences greater swings in its business cycle.
Key Terms

aggregate demand
real-balance effect
interest-rate effect
foreign purchases effect
aggregate supply
short run
short-run aggregate supply curve
long run
long-run aggregate supply curve
productivity
equilibrium
demand-pull inflation
menu costs
efficiency wages
cost-push inflation
stagflation

Chapter Questions

1. What would happen to the aggregate demand function if the U.S. dollar appreciates relative to the other currencies?

2. The 2008 Financial Crisis causes many firms to be pessimistic about future profits. What would happen to the aggregate demand function?

3. What would happen to the aggregate demand function if the U.S. federal government reduces taxes for the households?

4. What would happen to the short-run aggregate supply function if a government imposes a new tax on businesses’ machines, equipment, and buildings?

5. What would happen to the short-run aggregate supply function if the government cracks down on illegal immigration and deports all illegal immigrants?

6. What would happen to the short-run aggregate supply function if the petroleum companies discover a new petroleum reserve that boosts petroleum supplies and reduces the petroleum’s price?

7. What would happen to the economy in the short run if the government imposes new complicated rules, regulations, and taxes on businesses? Show and explain using the AD-AS graph.

8. What would happen to the economy if the productivity increases for an economy? Show and explain using the AD-AS graph.

9. What would happen to the economy if households boost their spending because they have little debt and willing to borrow more?
14. Fiscal Policy

John Maynard Keynes (1883-1946) greatly influenced economics during the 20th century. Keynes advocated a mixture of government and market forces to help the economy grow and prosper. The Great Depression influenced his writings and thinking, which he stated the “invisible hand sometimes errs in catastrophic ways.” Keynes based his reasoning on the Paradox of Thrift. For example, people worry they might become unemployed next year. Then they react by saving more and spending less. What would happen if everyone did this? Businesses sell fewer products. Their profits plummet, and they lay off workers. Subsequently, a society ends in a vicious cycle of layoffs while people save more because they are afraid their employers will lay them off. Thus, the Keynesians believe government should intervene in an economy, and a government must spend and invest during economic downturns, picking up the slack from the private markets. Please review Chapter 13 before continuing with this chapter. We use aggregate demand and aggregate supply functions to show how government uses fiscal policy to influence an economy.

Economics of Growth

An expanding and thriving economy has a growing, real Gross Domestic Product (GDP). Economist use real to remove the impact of inflation because inflation raises nominal GDP. An economy producing more goods and services or has inflation always raise nominal GDP. If real GDP rises, then a society produces more goods and services because economists removed the impact of inflation from real GDP.

Economists measure economic growth in two ways: the level of real GDP, or real GDP per capita. A higher real GDP indicates a society manufactures more goods and services. However, we do not know if the population is changing. Thus, GDP per capita equals GDP divided by the population, which removes the impact of a population’s growth rate. Consequently, a higher real GDP per capita indicates a person can buy more goods and services on average.

A growing economy has many benefits for society, which include:

**Benefit 1:** A higher real GDP implies a society has greater incomes. If people earn greater salaries, then they reduce their demand for government aid, like subsidized housing, food stamps, and free medical care. Thus, the government spends less on welfare and social programs.

**Benefit 2:** Greater incomes mean the federal, state, and local governments collect more tax revenues. Thus, the local governments can hire more teachers and police officers. State government can build more parks, universities, highways, or offer medical care to the poor. Finally, the federal government can expand the military or increase grants to the states.

**Benefit 3:** A growing economy experiences a falling unemployment rate. Unemployment can be particularly bad, especially if a country is plagued with high unemployment. Workers lose skills if they remain unemployed for an extended period. Moreover, unemployment could lead to family disintegration and racial tensions, while severe unemployment can lead to a revolution or public unrest.
An economy’s health is difficult to gauge. Thus, the U.S. federal government developed the *Index of Leading Economic Indicators*. Although the index is not perfect, economists can reasonably assess the strength of the U.S. economy. If most indicators are negative, then the economy could be in a recession. If most indicators are positive, subsequently, the economy may be expanding, creating jobs and income. We show all items in Table 1, and the items are self-explanatory, except the interest rate spread. If the economy is growing, then the difference between short-term and long-term interest rates expands. During recessions, the interest rate spread usually narrows because the interest rate spread reflects the demand level in the credit markets.

Table 1. Index of Leading Economic Indicators

<table>
<thead>
<tr>
<th>Items</th>
<th>Expansion</th>
<th>Recession</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Average hours of the workweek</td>
<td>Increasing</td>
<td>Decreasing</td>
</tr>
<tr>
<td>2. Initial claims for unemployment</td>
<td>Decreasing</td>
<td>Increasing</td>
</tr>
<tr>
<td>3. New orders for consumer goods</td>
<td>Increasing</td>
<td>Decreasing</td>
</tr>
<tr>
<td>4. Vendor performance</td>
<td>Improves</td>
<td>Weakens</td>
</tr>
<tr>
<td>5. New orders for capital goods</td>
<td>Increasing</td>
<td>Decreasing</td>
</tr>
<tr>
<td>6. Building permits for houses</td>
<td>Increasing</td>
<td>Decreasing</td>
</tr>
<tr>
<td>7. Stock prices</td>
<td>Increasing</td>
<td>Decreasing</td>
</tr>
<tr>
<td>8. Money supply</td>
<td>Increasing</td>
<td>Decreasing</td>
</tr>
<tr>
<td>9. Interest rate spread</td>
<td>Expands</td>
<td>Narrows</td>
</tr>
<tr>
<td>10. Consumers’ expectations</td>
<td>Improves</td>
<td>Weakens</td>
</tr>
</tbody>
</table>

*The Multiplier Effect*

*Multiplier Effect* is the impact upon the economy (or GDP) when consumer spending, government spending, investment, or net exports change. For example, a computer company is building a new manufacturing plant in Smalltown, USA. Company will spend $30 million to build the facility and hire 1,500 employees with a payroll of $50 million. Thus, the direct impact is the new employees earn a total of $50 million while the construction companies earn $30 million. Consequently, the construction workers earn incomes.

This investment causes the company to inject money into a local community. As the company employees and construction workers earn incomes, they spend more. They buy new houses, new cars, and clothing. Moreover, they wine and dine at restaurants, visit coffee shops, or watch movies at the cinemas. Thus, these businesses have more customers and earn higher profits and incomes. Consequently, these businesses hire more workers or extend the working hours of their employees. Then these employees earn higher incomes, and they increase their spending and savings. Hence, the process continues indefinitely, so a $30 million investment into a community can cause incomes to rise more than $30 million as the investment creates incomes.
An expanding computer company can benefit a community in other ways. Computer companies create a demand for educated workers. Thus, an expanding computer company encourages people to gain computer skills, spurring the growth of white-collar employment. Furthermore, the increase in incomes causes a government to collect more tax revenue because a government has more incomes to tax and more houses and land to assess real estate taxes. Hence, government can boost its spending and provide more services to the community, such as building more schools, roads, and parks.

Changes in government spending, investment, taxes, net exports, and consumption drive the multiplier effect. We can easily derive the multiplier effect. First, we define the *marginal propensity to consume* (MPC) and the *marginal propensity to save* (MPS). If a person receives one more dollar in income after paying taxes, he or she spends the MPC proportion while he or she saves the MPS proportion. Thus, by definition, \( \text{MPC} + \text{MPS} = 1 \) because every person spends and saves his or her after-tax income. Marginal is important because households vary their savings and consumption that reflects their income level. For example, a low-income country with a GDP per capita of $5,000 per year may have many households consume a large portion of their incomes because people spend most their money on food and shelter. On the other hand, a country with a GDP per capita of $80,000 may have households save a sizable proportion of their incomes, so their marginal propensities would be different.

We show a numerical example for the multiplier effect in Table 2. A business increases investment by $100. Consequently, the extra $100 cause households to earn $100 in income because the investment creates income while a business investment injects money into the economy. If households have a MPC = 0.9 and MPS = 0.1, then households spend an additional $90 and save an extra $10 for Round 1. Notation row is important because we relate the change of investment to changes in income. Symbol delta, \( \Delta \), means change while I represents investment.

<table>
<thead>
<tr>
<th>Round</th>
<th>Income</th>
<th>Consumption</th>
<th>Savings</th>
<th>Notation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Round 1</td>
<td>$100.00</td>
<td>$90.00</td>
<td>$10.00</td>
<td>( \Delta I )</td>
</tr>
<tr>
<td>Round 2</td>
<td>$90.00</td>
<td>$81.00</td>
<td>$9.00</td>
<td>( \Delta I ) (MPC)</td>
</tr>
<tr>
<td>Round 3</td>
<td>$81.00</td>
<td>$72.90</td>
<td>$8.10</td>
<td>( \Delta I ) (MPC)^2</td>
</tr>
<tr>
<td>Round 4</td>
<td>$72.90</td>
<td>$65.61</td>
<td>$7.29</td>
<td>( \Delta I ) (MPC)^3</td>
</tr>
<tr>
<td>...</td>
<td>...</td>
<td>...</td>
<td>...</td>
<td>...</td>
</tr>
<tr>
<td>Infinity</td>
<td>$1,000.00</td>
<td>$900.00</td>
<td>$100.00</td>
<td>...</td>
</tr>
</tbody>
</table>

As households increase their spending, businesses receive this money as income. They earn higher profits, and they pay their workers greater salaries or hire new workers. Then Round 2 begins. These new workers earn an additional income of $90. Consequently, they spend an extra $81 (=0.9*$90) and save an additional $9 (=0.1*$90). Notice the change in income equals the investment multiplied by the MPC in the Notation column. Then Round 3 starts. These rounds continue infinitely until we arrive at the totals in the infinity row.
We derive the total change in income for the economy. We take the notation column from Table 2 and write it as an infinite series in Equation 1. Remember, change in income alters a country’s GDP by the same amount. Although GDP measures a country’s value of production, consumers, businesses, and government buy this production.

\[ \Delta GDP = \Delta I + \Delta I \cdot MPC + \Delta I \cdot MPC^2 + \Delta I \cdot MPC^3 + \cdots \] (1)

We factor out the common term, \( \Delta I \), which yields Equation 2.

\[ \Delta GDP = \Delta I \left( 1 + MPC + MPC^2 + MPC^3 + \cdots \right) \] (2)

Terms inside the parenthesis form an infinite series. Since the MPC lies between zero and one, we write the infinite series as Equation 3. Furthermore, we substitute the equation, \( MPC + MPS = 1 \) into Equation 3, yielding the multiplier.

\[ \Delta GDP = \frac{1}{1 - MPC} \cdot \Delta I = \frac{1}{MPS} \cdot \Delta I \] (3)

Using Equation 3, we solve for the increase in GDP, when people and businesses invest an extra $100 into a community. We calculate GDP changes by $1,000 in Equation 4 and show the GDP increase in the last row in Table 2. Furthermore, the difference between the increase in GDP and the increase in investment is $1,000 – $100 = $900. Consequently, the injection of $100 into the economy generates a $900 boost in consumer spending, leading to an extra $100 in savings. Thus, the savings must equal investment because the savings leaks the money from the economy while investment injects money into the economy.

\[ \Delta GDP = \frac{1}{1 - MPC} \cdot \Delta I = \frac{1}{1 - 0.9} \cdot $100 = $1,000 \] (4)

Other events can trigger the multiplier effect, which we call injections. **Injections** are investment, government spending, consumer spending, and exports. For example, a country’s export industry sells more products to foreigners. Thus, the industries produce more and indirectly create more jobs within the country, fueling the multiplier effect.

This simple model hinges on two important assumptions.

**Assumption 1:** Multiplier for our case includes only one leakage from a community. A **leakage** is a government, person, or imports remove money from an economy that reduces the multiplier effect. For example, when people pay taxes, reduce their consumption, increase their savings, or pay a foreign company for imported products and services, they remove money from the economy. Consequently, these leakages reduce the magnitude of the multiplier effect. Did you notice that a leakage has a corresponding injection? Government spending is an injection while taxes are a leakage. Moreover, exports are an injection while imports are a leakage.
Finally, investment is an injection while savings are a leakage. Besides, if leakages did not exist, then the multiplier effect would become infinite. A $1 injection would lead to an infinite growth in incomes.

**Assumption 2:** Savers must deposit their money into the financial institutions that in turn, grant loans to businesses for new investment. Consequently, the investment money originates from the savers. If people hide their money under their mattresses, then the banks will not have money to lend businesses for new investment or lend to households for homes and vehicles.

We use the multiplier to predict a government’s macroeconomic policies. Once we know the MPS or MPC, then we calculate the multiplier using Equation 5. For example, if the public saves 20% of their after-tax income, subsequently, the multiplier would be 5 (or 1 / 0.2). Thus, each dollar a government injects into a community creates $5 in incomes. Consequently, government officials use the multiplier to predict changes in the economy.

\[
\text{multiplier} = \frac{1}{1 - MPC} = \frac{1}{MPS} \quad (5)
\]

Economic advisors for the U.S. President estimated the income multipliers to be around two. In Chapter 17, we derive a more complicated multiplier for a government that uses tourism for economic development.

Multiplier effect can work in reverse. For instance, a large firm or factory shuts down and lay off its workers. Consequently, the workers earn less income, and they reduce their spending and savings. Then other businesses within the community experience weak sales, lower profits, and less revenues. Subsequently, they reduce their workforce, lay off workers, and the process continues indefinitely. Unfortunately, the local government collects fewer tax revenues and usually raises taxes to replace the tax declines. For example, General Motors (GM) shut down its manufacturing plants in Flint, Michigan while the U.S. steel industry severely contracted from the intense competition from Japan during 1980s, sparking plant closures in Gary, Indiana. After the jobs had disappeared, the workers with money and skills left Gary and Flint, leaving the poor and destitute behind. Then crime and drugs became rampant. Finally, the local governments became fiscally strapped as their tax base disappeared while their economies continue a downward spiral.

**Fiscal Policy**

Classical economists believe the economy is inherently stable, and recessions would be temporary. They quote *Say’s Law*, which states, “the supply creates its own demand.” Workers earn wages for producing products for businesses, and in turn, they spend their wages to buy these products. If any market experiences a surplus or shortage, prices would adjust to clear the market. Furthermore, a rational person would never hoard money. If people save more and consume less, then the people deposit their savings into banks to earn the interest. As banks see more savings, they lower the interest rate (i.e. greater supply of loanable funds). Consequently,
businesses borrow more funds from the bank to invest in machines, equipment, and structures while households borrow to buy houses, cars, and appliances.

On the other hand, Keynes believed more savings does not translate into more investment. Businesses are not sensitive to interest rates. Businesses invest if they expect to earn profits and adopt technology if it enhances future profits. During recessions, businesses become pessimistic and reduce their investments. Moreover, banks stop granting loans as bankruptcies and loan defaults rise.

Keynes believed wages and prices are not flexible downward, and they might not fall. Employers and labor unions cannot cut wages. Workers have labor contracts, and they could sue their employers in court for violating contracts. Furthermore, employers may not reduce wages because it hurts workers’ morale, and the workers reduce their productivity. Workers may also steal from their employers, use sabotage, or resign and work for a competing company. Consequently, businesses cannot boost output or reduce prices to spur consumers’ spending while the economy becomes stuck in a recession. Maynard Keynes argued for government intervention in the economy because downturns in an economy may not be temporary.

**Fiscal policy** is the national government changes the levels of taxes and/or government spending to push the economy towards full employment, so real GDP is expanding. We assume the central bank keeps money supply fixed and constant. Refer to Chapter 15 for monetary policy. Hence, fiscal policy changes the government’s budget. Government collects revenue from taxes, tariffs, and fees and spends funds for the military, social programs, and the interest on the debt.

If the government balances its budget, then government revenue equals government spending, or $T = G$ while $T$ is for taxes and $G$ represents government spending. A government does not accumulate debt or repay debt with a balanced budget.

If government operates a **budget deficit**, then government spends more than it collects in taxes, or $G > T$. Subsequently, the deficit creates a shortfall that government must add to the government debt. We keep it straight by thinking of a person digging a hole. Deficit represents the amount of dirt removed from a hole with a shovel while the hole’s depth reflects the total debt. From 1960 to 2013, the U.S. government operated a deficit every year except 1960, 1969, 1998, 1999, 2000, and 2001.

A budget deficit has an expansionary impact on an economy. Government borrows from the future to inject more funds into the economy today. Thus, **expansionary fiscal policy** is government reduces taxes or boosts government spending, expanding the economy. We depict the aggregate supply (AS) and aggregate demand (AD) in Figure 1. Economy is in a recession as GDP falls below the full-employment (FE) level. An expansionary fiscal policy causes the AD function to shift rightward, increasing both GDP and the price level creating inflation.

Degree of the shift is more complicated. If a government increases its spending, then the amount of the shift is the Keynesian multiplier times the increase in $G$. Government spending injects funds into the economy that creates the infinite rounds of consumer spending and growing incomes.

A government decreasing taxes causes the AD to shift rightward, but the degree of the shift is the tax decrease times the multiplier times the Marginal Propensity to Consume (MPC). Why
does the MPC come into play? A tax decrease allows households to keep more of their income. Some households save this income while they spend the rest. Thus, a household that saves money removes the money from the system, avoiding the multiplier effect, while the additional consumption contributes to the multiplier effect. Hence, the MPC is the proportion of income people inject into the economy.

\[
\Delta GDP = \text{multiplier} \cdot \Delta T \cdot MPC \cdot (-1)
\]

\[
\Delta GDP = 2 \cdot (- \text{ $60 billion} ) \cdot 0.9 \cdot (-1) = \text{ $108 billion}
\]

Households must spend this money to increase GDP. If households had saved this money, then GDP would not change. Unfortunately, this became a likely scenario because the 2008 Financial Crisis had scared everyone into saving as much income as possible. If everyone saves his or her money, then the multiplier effect, theoretically, equals zero because the savers removed the injection from the economy.

If a government operates a **budget surplus**, then the government tax revenue exceeds the government revenue, or \( T > G \). Thus, government leaders use the surplus to retire some of the government debt. A budget surplus gives government extra money in its accounts. Hence, **contractionary fiscal policy** is government increases taxes and/or decreases government

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Figure 1. Expansionary fiscal policy

For example, President Bush gave taxpayers between $300 and $600 in 2007 to stimulate the economy. As an illustration, the United States has 100 million households, and each household received an extra $600 in tax refunds. Furthermore, the Keynesian multiplier equaled 2 while the households spent 90% (MPC = 0.9) of this money on consumption and saved the rest. We calculated the total tax decrease on households, which equaled $60 billion or 100 million times $600. Consequently, consumers would fuel economic growth if they spent this money. We calculated the GDP increases by $108 billion using Equation 6. Equation contains a negative one because tax hikes decrease GDP.

\[
\Delta GDP = \text{multiplier} \cdot \Delta T \cdot MPC \cdot (-1)
\]

\[
\Delta GDP = 2 \cdot (- \text{ $60 billion} ) \cdot 0.9 \cdot (-1) = \text{ $108 billion}
\]
spending to slow down the economy and reduce inflation. For example, the economy grows rapidly and creates inflation as depicted in Figure 2. Consequently, a government uses contractionary fiscal policy to shift the AD function leftward. Thus, the economy slows down until it reaches full employment.

![Figure 2. Contractionary fiscal policy](image)

Keynesian multiplier again affects the economy. A government decreasing spending shifts the AD leftward by the multiplier times the decrease in government spending. On the other hand, a government increasing taxes shift the AD leftward by the amount of the multiplier times the MPC and the increase in taxes. Thus, the households pay for the tax increases from their savings and reduced consumption. Households reducing their savings have no impact upon the economy while their decreased spending does, which is why the MPC appears in the multiplier.

Economy grows quickly and creates inflation. Hence, the government reduces its spending. What is the decrease in GDP if the federal government reduces spending by $300 billion with a multiplier of 1.5? Theoretically, we compute the GDP falls by $450 billion in Equation 7. Remember, government spending is negative because government reduces spending.

\[
\Delta GDP = \text{multiplier} \cdot \Delta G = 1.5(-$300 \text{ billion}) = -$450 \text{ billion}
\]  

(7)

Using the same example, the political leaders hike taxes by $300 billion, instead of decreasing government spending. If the MPC equals 0.9, then we calculate GDP falls by $405 billion in Equation 8.

\[
\begin{align*}
\Delta GDP & = \text{multiplier} \cdot \Delta T \cdot \text{MPC} \cdot (-1) \\
\Delta GDP & = 1.5 \cdot ($300 \text{ billion}) \cdot 0.9 \cdot (-1) = -$405 \text{ billion}
\end{align*}
\]  

(8)
Automatic Stabilizers

Several government programs and tax systems are *countercyclical*, which means these programs and systems move in the opposite direction to the economy. Programs and systems slow the economy when it grows too swiftly and expand an economy when it grows too slowly. Furthermore, these programs and systems increase a budget deficit during a recession and decrease a deficit during a business cycle. Thus, these programs and tax system are self-regulating that economists refer to as *automatic stabilizers*. They automatically induce an expansionary fiscal policy as an economy slows down. Then they cause a contractionary fiscal policy as an economy expands rapidly. One benefit of automatic stabilizers is government officials do not change or implement actions and policies.

U.S. economy has three automatic stabilizers:

*Unemployment compensation*: Unemployed workers receive temporary income from a government. During a recession, employers lay off more workers, and more people receive unemployment compensation. Thus, government spending automatically increases to pay the unemployed workers, giving them a temporary income while income taxes automatically fall from the lower incomes. Furthermore, unprofitable firms can bankrupt or reduce their workforce, which contributes to a government losing tax revenue. On the other hand, employers hire more workers during economic expansions. Firms expand, or new firms emerge, and they hire more workers. Therefore, a government collects greater taxes while a government pays fewer unemployment compensation, reducing government spending.

*Corporate taxes*: Corporations pay taxes on their profits while investors pay taxes on their dividends. During a recession, corporations earn smaller profits or earn losses, which reduce the taxes they paid. For example, New York State received roughly 25% of its income taxes from Wall Street before the 2008 Financial Crisis. With many financial institutions bankrupting, New York State collected less tax revenue, causing severe budget deficits. During an economic expansion, corporations pay more taxes as they earn more profits, reducing budget deficits.

*Progressive income tax system*: Households pay higher tax rates as their incomes increase because they become pushed into greater tax brackets. Thus, families pay a greater proportion of their incomes to government as taxes. During a recession, families pay lower average tax rates as the households' incomes drop. Consequently, they pay a smaller proportion of their incomes to government as taxes. Hence, a progressive tax system slows the growth in consumption, counteracting and slowing the economy’s direction.

Problems of Fiscal Policy

Classical economists believe government should not interfere with the economy. Then many economists changed their view during the Great Depression after Maynard Keynes had written and supported the use of fiscal policy. Keynesian Economics developed a strong following until the 1970s. Subsequently, the Organization of Petroleum Exporting Countries (OPEC) successfully boosted petroleum prices during the 1970s, which sparked stagflation. Stagflation hits an economy with both high inflation and high unemployment rates.
Consequently, stagflation changed the view of economists, and they developed different schools of thought to explain macroeconomics.

Several schools of thought strongly support monetary policy, but economists disagree widely on fiscal policy. Classical economists believe government should minimize its interference with its economy because an economy is inherently stable. Keynesians believe government should use its powers to maintain a growing economy. Unfortunately, government leaders usually support Keynesian Economics. Since the 1960s, the U.S. government has been plagued with budget deficits during business expansions and recessions. According to Keynesian Theory, a government should operate budget surpluses during economic expansions and budget deficits during recessions.

A government has nine problems using fiscal policy as an effective tool.

**Problem 1:** A government experiences time lags, when it stimulates the economy. We define three time lags. First, the *recognition lag* (or *information lag*) reflects the time for government officials to collect data. U.S. federal government defines a recession as two consecutive quarters of negative growth for real GDP. If the government takes three months to collect data, then a government would need at least nine months to determine whether the economy has entered a recession. Second, the *administrative lag* (or *legislative lag*) is government requires time to decide. Congress and the President must agree to changes in taxes or government spending. Congress and the President could agree quickly, or they take months or years to devise and implement a fiscal policy. Finally, the *impact lag* is fiscal policy takes time to affect the economy. Fiscal stimulus could take between six and twelve months before it affects an economy. Unfortunately, the time lags could make an economy more unstable. For example, if a fiscal policy takes a year to affect an economy, and the recession is short-lived, then an expansionary fiscal policy would lead to more inflation. As the economy grows and leaves the recession, the fiscal policy kicks in expanding the economy further, fueling more inflation.

**Problem 2:** United States may have a *political business cycle*. Politicians want to be re-elected, and voters usually vote out incumbents when the economy performs poorly. Consequently, they pass fiscal policies that are popular with the public before the election, such as lowering taxes, and boosting government social programs. These policies stimulate the economy before the election, creating economic growth and inflation. Once elected, the politicians remove the fiscal stimulus until the next election.

**Problem 3:** Political leaders may reverse fiscal policy or approve a temporary fiscal policy. A temporary fiscal policy may not expand the economy. For example, the U.S. economy entered a recession in 2007. President Bush approved an economic stimulus package that granted every household between $300 and $600 in tax refunds. President Bush wanted the households to spend this money, but many households simply saved because the 2008 Financial Crisis. People normally save more during financial downturns. Furthermore, the tax refund was temporary, which does not permanently increase households’ spending. Thus, the spending did not change the public’s behavior.

**Problem 4:** State and local governments cancel the federal government’s fiscal policy. State and local governments must balance their budgets. During a business cycle, the economy
has low unemployment, creates jobs, and generates higher incomes. Thus, state and local governments collect more tax revenues. They pay fewer unemployment benefits and welfare payments, but increase spending in other areas. This increased spending boosts the economy. During a recession, the economy experiences higher unemployment and job destruction. Hence, state and local governments collect less tax revenues. However, they must pay more unemployment and welfare payments. Then state and local governments raise taxes to balance their budgets. Consequently, the higher taxes create a drag on the economy and cancel the federal government’s expansionary fiscal policy.

**Problem 5:** Investors invest in the government because they view it as low risk. A government can increase taxes and/or print money to cover loans and interest payments. Furthermore, the U.S. government has never defaulted. However, businesses do not possess these powers and can bankrupt, forcing their investors to take investment losses. Consequently, government deficits and debt crowd out private investment in two ways, which we call the *Crowding Out Effect*.

First, a government borrowing money from the public competes with private companies for loans. An investor buying U.S. government debt cannot simultaneously buy corporate stock or bonds with the same money. If businesses invest less in buildings, machines, and equipment, then the low investment rates cause low economic growth. Usually, a government finances current consumption while it invests a small portion in buildings, machines, and equipment.

Second, if a market has limited funds, a large budget deficit and debt cause greater interest rates. Therefore, the private sector borrows less money because the interest rate is higher.

**Problem 6:** Crowding out effect could lead to higher interest rates. Consequently, the foreign investors are attracted to the higher interest rates and invest in the government securities. Foreign investors demand for a country’s currency causes the currency to appreciate. Residents buy more foreign-made products boosting imports while businesses sell fewer products to foreigners reducing exports. Thus, the large budget deficits could reduce domestic production and encourage that country to import more. Unfortunately, a country experiences greater unemployment as it loses its export industries.

**Problem 7:** A government that overuses and abuses Keynesian Economics may suffer extreme difficulties, when it reaches its borrowing limit. If a government uses Keynesian economics properly, a government must have budget surpluses during business expansions and budget deficits during recessions. Budget surpluses allow a government to reduce its debt during good times. Unfortunately, the U.S. government and many European governments operated budget deficits during recessions and business expansions, accumulating debt year after year. Several European countries, such as Greece, Italy, and Spain hit their debt limits in 2012 because investors had refused to buy their bonds. Consequently, these European countries enacted austerity measures. Governments reduced their spending and increased taxes, which strengthens a recession and stifles economic growth. Unfortunately, their economies are stuck in a perpetual recession for many years until the investors restore their confidence in the government bonds again.
Problem 8: Unfortunately, large budget deficits lead to a larger government. Public sector expands relative to the private sector, which causes many problems. Consequently, a highly taxed and regulated society usually experiences weak economic growth. We provided many examples in Chapters 2 and 8, where we explained government bureaucracies and public enterprises in detail.

Problem 9: Government using its spending power to expand the economy is ineffective in countries with complex legal systems. For example, a government builds new houses for the poor. It boosts government spending to fund nonprofit organizations that build the new houses. However, they spend the money slowly and carefully if they must follow many complicated rules and regulations. U.S. federal government imposes strict regulations and laws about the environment, subsidizing the poor’s rents and mortgages, racial equality, workers’ wages, government contracts, et cetera. If a government agency or organization violates a rule, the government may fine and penalize the organization. Consequently, the organizations spend the money slowly and carefully while the government spending trickles into the economy.

High Government Debt

Public debt is the total amount a government owes, which is the sum of all budget deficits and budget surpluses during a government’s lifetime. For instance, the U.S. government’s debt exceeded $17 trillion in 2013. U.S. government has accumulated a large debt to finance wars, and Congress and the President cannot control their spending because they continually spend more than they collect in taxes.

Federal government made matters worse because it spent the surpluses of Social Security. Social Security is the mandatory government retirement system for retired American workers. Although Social Security had surplus funds in its accounts until 2010, the U.S. government spent these funds and substituted U.S. government securities in its place. U.S. government cannot use Social Security as free money any longer. As Americans age and begin to retire, the federal government will start paying it surplus to retirees around 2020. Consequently, the government must reduce its retirement benefits, reduce other government programs, or increase taxes to reimburse the Social Security fund.

Is it possible for a government debt to become large enough to bankrupt a government? A government usually does not bankrupt because it has more options than a business. A government has the power to tax and to print money. Furthermore, a government can refinance the debt. As old debt matures, the U.S. Treasury issues new debt in its place. U.S. Department of Treasury offers four securities, where investors and savers lend to the government.

- **U.S. Treasury Bills** is a security with a maturity less than a year.
- **U.S. Treasury Notes** is a security with a maturity between 1 and 10 years.
- **U.S. Treasury Bonds** is a security with a maturity exceeding 10 years.
• **U.S. Savings Bonds** is long-term, non-marketable bonds. Usually investors buy them at banks.

A large, growing debt does create the following problems for society.

**Problem 1:** As the level of debt increases, the U.S. government pays more interest on that debt. Currently, the interest is the third largest item in the budget. If the interest becomes the largest item in the budget, subsequently, the government must reduce the budgets for other programs, such as the military, infrastructure, or social programs.

**Problem 2:** Future generations inherit this debt. Furthermore, they may not receive the same level of government benefits, especially if the interest becomes the largest budget item, and the government must reduce other programs in the budget.

**Problem 3:** A high debt could lead to higher taxes in the future. Unfortunately, government does not know how much tax revenues it will collect with certainty. For instance, a growing economy leads to growing incomes, and a government collects more income taxes. Thus, economic growth temporarily defers the tax increases. However, a stagnating economy has flat growth and falling incomes. Consequently, a government must raise taxes to repay the debt. Unfortunately, highly taxed societies usually stagnate or grow slowly, and a government buries itself into a financial pit.

**Problem 4:** Many foreigners invest in U.S. government securities. As they earn interest, the foreigners transfer the interest to their home country. If the foreigners decide to liquidate their investments in government securities, then they transfer money outside the United States.

**Problem 5:** A government could resort to printing money to cover deficit problems if it cannot find investors to buy a government’s securities. However, printing money always leads to inflation. Every hyperinflation episode had resulted from a central bank printing money too rapidly to cover its government’s financial problems.

**Problem 6:** A large government debt can trigger a financial crisis. Every day, some of the debt becomes due, and a government rolls over the expiring debt by issuing new debt. If investors lose faith in the government’s ability to repay the debt, the investors stop buying the debt, triggering a financial crisis.

U.S. public debt had exceeded $17 trillion in 2013. U.S. government agencies hold approximately 32% of the debt. Social Security and federal employees’ retirement plans used their surpluses to purchase U.S. government bonds. We do not include the Federal Reserve System’s holdings of U.S. debt because the Federal Reserve is independent of the U.S. Treasury. Currently, the Federal Reserve holds 11% of the debt. Furthermore, foreigners hold about $4.5 trillion dollars or 32% of the total debt. Unfortunately, the U.S. government must cater to foreigners and cave in to their demands because the U.S. government can experience financial hardship if the foreigners liquidate their U.S. government bonds.

Many economists argue the dollar amount of the U.S. debt is irrelevant. What matters is the U.S. debt-to-GDP ratio because GDP represents the economy’s tax base. We depict the U.S. debt-to-GDP ratio in Figure 3. U.S. debt to GDP ratio had soared as the federal government bailed out the large banks and corporations during the 2008 Financial Crisis, financing the wars in Afghanistan and Iraq, and uncontrolled spending by Congress and the President.
International investors stop buying government debt after the debt-to-GDP ratio has exceeded a threshold. For example, investors stopped buying Greek government bonds after its debt-to-GDP ratio had attained 140%. Investors became worried the Greek government will default on its debt obligations. Unfortunately, the Greek government does not control the European Central Bank and cannot print money to cover its financial problems. Regrettably, Greece’s austerity measures are devastating its economy. Greek government is raising taxes and decreasing government spending while its economy suffers from a depression. Greek government should do the opposite to strengthen the economy. We list the debt-to-GDP ratios for several countries in Table 3. Zimbabwe has the highest debt relative to its GDP while Japan comes in second. Finally, economists ranked Greece the fourth.

<table>
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<tr>
<th>Country</th>
<th>Debt to GDP (%)</th>
<th>Rank</th>
</tr>
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<tbody>
<tr>
<td>Zimbabwe</td>
<td>230.8</td>
<td>1</td>
</tr>
<tr>
<td>Japan</td>
<td>208.2</td>
<td>2</td>
</tr>
<tr>
<td>Greece</td>
<td>165.3</td>
<td>4</td>
</tr>
<tr>
<td>United States</td>
<td>103.0</td>
<td>14</td>
</tr>
<tr>
<td>Canada</td>
<td>83.5</td>
<td>22</td>
</tr>
<tr>
<td>Mexico</td>
<td>37.5</td>
<td>83</td>
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**Key Terms**

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<tr>
<th>Index of Leading Economic Indicators</th>
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<tr>
<td>multiplier effect</td>
<td>automatic stabilizers</td>
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<td>recognition lag (information lag)</td>
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<tr>
<td>marginal propensity to save (MPS)</td>
<td>administrative lag (legislative lag)</td>
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<td>injection</td>
<td>impact lag</td>
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<td>U.S. Savings Bonds</td>
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<td>countercyclical</td>
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</table>

**Chapter Questions**

1. Is a growing GDP per capita a good measure for a society’s well-being?

2. A local government wants to create jobs in its community. Government found a company willing to invest in a new facility. However, the company wants a tax break. Government will grant a $1 million tax break if the firm invests $15 million. If the multiplier equals two, should government approve the tax break to encourage a company to relocate there?

3. Local government does not know the multiplier. However, government recorded a $5 million increase in local investment while local households and businesses earned $20 million more in incomes. Calculate the local income multiplier.

4. Economy has entered a recession. Federal government estimates that GDP is $2 trillion below the full-employment level. If the multiplier equals 3, how much does government boost spending to push the economy to the full-employment level once again?

5. Economy grows rapidly, creating inflation. Federal government increases households’ taxes by $500 billion. If the MPC=0.95, compute the change in GDP.

6. What would happen to the automatic stabilizer if a government had converted a progressive tax system into a flat tax system?

7. If fiscal policy creates more problems than it solves, why do government leaders continually use fiscal policy?

8. If a large government debt imposes many problems on society, why does government
persistently finance massive budget deficits?
15. Monetary Policy

A central bank uses monetary policy to affect the money supply that impacts many variables in the economy, such as the interest rates, gross domestic product (GDP), inflation, the unemployment rate, the strength of the currency relative to other nations’ currencies, and the stock and bond prices in the financial markets. Thus, the leader of a central bank is a powerful person in an economy. We build upon the aggregate demand and aggregate supply analysis in this chapter to explain how changes in a money supply affect interest rates, inflation, and gross domestic product. Students need a firm grasp of aggregate demand and aggregate supply functions before starting this chapter.

Demand and Supply of Money

Money has its own market. On one side, the central bank supplies money while people use money on the demand side. People have a demand for money for three reasons. First, people have a transaction demand for money because they need money to make transactions, purchase groceries, pay rent, or pay credit cards. Second, people have a precautionary demand for money; people hold money to deal with uncertainty, such as medical emergencies, or post bail for a relative who is in jail. Finally, people hold onto money because they save for the future. Consequently, a store of value requires money to retain its future purchasing value.

People base their demand for money on three factors. First, consumers in a growing economy need more money to buy more goods and services. Thus, the demand for money is proportional to nominal GDP. Furthermore, both inflation and a growing economy cause a greater nominal GDP. Consequently, the public requires more money to buy the additional production and/or pay the higher prices. Second, an interest rate represents the opportunity costs for people who hold money because they do not earn the interest from a bank. Hence, a greater interest rate causes people to carry less money. For example, if the interest rate is 1%, many people are not concerned about earning interest. However, if the interest rate climbs to 15%, then many people would deposit money into banks to earn this interest, and their demand for money would decrease. Finally, technology affects people's demand for money. People use credit cards and debit cards, instead of carrying cash. Thus, people reduce their demand for money.

We show the demand for money (D) in Figure 1, and it reflects the relationship between the real interest rate and money. We represent the quantity of money by M while the real interest rate is r. Demand for money has a negative slope because the interest rate is an opportunity cost. As the real interest rate rises, people hold less money. Instead, they deposit their money into banks to earn interest. One has to be careful because the real interest rate removes the impact from inflation. We assume the nominal interest rate has no impact on businesses and people. However, we could debate this assumption because hyperinflation always causes a society to break down. Thus, the nominal interest rate would become important during high inflation rates.
Figure 1. Demand for money

We depict in Figure 2, where a central bank supplies money, which we call the *supply of money* (S). Supply function is vertical because a central bank increases or decreases the money supply that is independent of the interest rate.

Figure 2. Supply of money

We show the supply and demand for money in Figure 3. Intersection determines the equilibrium real interest rate and money supply. As the graph shows, a central bank controls the money supply by setting the money supply at $M^*$. However, the interaction of the demand and supply of money determines the real interest rate, $r^*$.

When a central bank changes the money supply, it always affects the interest rate. For instance, if the real interest rate rises, then the borrowers pay more to borrow; thus, the borrowers’ cost for loans increases. Borrowers include consumers, businesses, and government. Consumers use loans to buy houses, cars, or appliances while businesses borrow to invest in machines, equipment, and structures. Moreover, a government borrows money, when it has budget deficits. A budget deficit is government spends more than the amount it collects in taxes. Government borrows to cover the shortfall.
Savings is on the other side of borrowing. For example, if the real interest rate increases, then savers earn more on their investments. Furthermore, savers have a variety of investment options; they can deposit their savings at banks, buy corporate bonds and stock, or purchase government securities. Thus, the investors’ options differ in maturity, number of payments, and risk. Maturity is the date a financial security expires, and the final date a borrower makes the last payment. Thus, financial securities have distinctive interest rates. Although different securities have different interest rates, monetary policy moves all interest rates in the same direction.

We use three examples to show how interest rates work.

**Example 1**: A saver deposits $1,000 into a savings account that earns 15% interest. We state the 15 percent annually. At the end of the year, he still has $1,000 from the starting balance and earns $150 (= $1,000 x 0.15) in interest. Thus, his balance grows to $1,150.

**Example 2**: A company borrows $10,000 from a bank and agrees to repay the loan with a $1,000 for interest. Hence, the business pays 10% interest (= $1,000 / $10,000).

**Example 3**: U.S. government issues Treasury Bills, where investors lend short-term loans to the federal government. A Treasury Bill has a face value but does not state an interest rate. When a Treasury bill matures, the investor gets the entire face value. Thus, the U.S. federal government always sells the Treasury Bills for a value less than the face value. This difference becomes the interest that investors earn.

For example, an investor pays $9,000 for a $10,000 Treasury bill. Market price of the bill is $9,000, and the investor earns $1,000 interest or 10% when the Treasury bill matures in one year. If the interest rate falls, and the investor pays $9,500 for the same Treasury bill, then he or she earns $500 in interest or 5%. Consequently, we illustrate with this simple example an important result. *As market interest rates increase, market prices for bonds decrease, and vice versa.*

**Monetary Policy**

A central bank uses *expansionary monetary policy* to spur economic growth. We depict in Figure 4, where a central bank expands the money supply by injecting reserves in the banking
system. Then the banks use these reserves to grant loans. Thus, they inject the money into the economy. (This mechanism is more complicated. Refer to a money and banking textbook for a complete explanation.) Furthermore, an expansionary monetary policy causes the real interest rates to decrease. Although a society has a variety of interest rates, all interest rates would decrease. Besides, an expansionary monetary policy affects the short-term interest rates quicker than the long-term interest rates.

![Figure 4. Impact of expansionary monetary policy on interest rates](image)

We show in Figure 5 how expansionary monetary policy causes economic growth. Aggregate demand function increases and shifts rightward because, as the Fed inject more money into the economy, businesses and people spend more. A lower real interest rate causes businesses to invest more while households borrow more for houses, home improvements, cars, and appliances. Furthermore, the low interest rates cause foreigners to invest less in the country, depreciating the currency. Export industries could sell more as the foreigners buy the cheaper products. Finally, a lower interest rate increases the stock and bond prices, creating a wealth
effect. Households feel wealthier and boost their consumption. Unfortunately, expansionary monetary policy may create demand-pull inflation.

For example, the Federal Reserve Bank kept interest rates extremely low between 2000 and 2007, which strengthen the real estate bubble. As people borrowed from banks to buy land and houses, their strong demand caused housing prices to appreciate rapidly, and the U.S. economy grew strongly. Unfortunately, the housing bubble collapsed in 2007. Currently, the property values are falling, and people, businesses, and government will feel the bubble’s effect for a decade. Government is involved because local governments collect property taxes, and the government ties the taxes to a property’s value. Thus, local governments are experiencing budget shortfalls and crises as they collect less property taxes. Some claim the Federal Reserve should have slowed down this bubble by raising the interest rates that would slow the rapidly growing housing prices.

A **contractionary monetary policy** is a central bank decreases the money supply as depicted in Figure 6. Thus, the real interest rate rises while the central bank removes money from an economy. Central bank contracts the money supply by removing reserves from the banking system, and the banks can grant fewer loans. Consequently, the higher real interest rate causes businesses to invest less while households may cut back on loans and credit.

![Figure 6](image)

**Figure 6. Impact of contractionary monetary policy on interest rates**

We shoe in Figure 7 how contractionary monetary policy slows economic growth. Aggregate demand function shifts leftward, which decreases both the GDP and the price level. The economy’s impact depends whether prices are rigid or flexible. High real interest rate reduces investment and decreases bond and stock prices, lowering the wealth effect. Furthermore, foreign investors are attracted to the greater interest rate that strengthens a nation’s currency. Unfortunately, the export industries sell fewer products to foreigners, which contract an economy further. Finally, a strong currency encourages consumers to buy more imports because they are relatively cheaper.

A central bank uses contractionary monetary policy to reduce inflation. Unfortunately, a central bank stomping on the brakes for inflation can push an economy into a recession. Consequently, a central bank rarely uses contractionary monetary policy.
Figure 7. Impact of contractionary monetary policy on aggregate demand and supply

**Monetary Policy Tools**

Federal Reserve uses three tools to change monetary policy. First, the Fed’s most important tool is Open Market Operations. *Open Market Operations* is the Fed buys or sells assets, usually U.S. Treasury Securities. However, the Fed can buy any asset. Fed uses this tool for monetary policy because it is very flexible. For example, if the Fed bought too many U.S. securities, it can turn around and sell them. If the Fed pursues expansionary monetary policy, it purchases U.S. government securities and injects money into the banking system. In turn, the banking system injects the money into the economy as banks grant loans to customers. If the Fed pursues contractionary monetary policy, then it sells U.S. government securities and removes money from the banking system. In turn, banks have fewer reserves and grant fewer loans. Hence, the banking system removes money from the economy.

Fed can buy any asset, but it usually buys U.S. government securities. Furthermore, the Fed buys U.S. securities from the private markets because the Fed wants to remain independent from the U.S. Treasury. If the Fed bought directly from the U.S. Treasury, then the Fed is too close to the Treasury Department. Moreover, the Fed has no limit in buying assets. Fed simply writes a Fed check. After the person had deposited the check in a commercial bank, the bank sends the check to the Fed for payment. Consequently, the Fed raises that bank’s reserves by the amount of the check. Theoretically, a central bank has no bounds when buying assets.

Fed uses Discount Rate as the second tool. *Discount Rate* is the interest rate the Fed charges for loans to financial institutions. For example, a bank experiences a financial crisis and asks the Federal Reserve for a loan. Usually the bank puts up collateral for the Fed loan. If the Fed raises the discount rate, then banks borrow less, which is contractionary monetary policy. If the Fed reduces the discount rate, then banks borrow more, which is expansionary monetary policy.
Discount Rate has one benefit. Fed is the “Lender of the last resort.” This was why Congress and the President established the Fed in 1914. If a bank has financial trouble, and it needs cash or reserves, then the Fed is the last place to go and ask for a loan. For example, the Fed extended credit to financial institutions during the stock market crash in 1987, preventing a recession. Furthermore, the Fed has extended $2 trillion in loans to financial institutions during the 2008 Financial Crisis.

Discount Rate has two problems. First, a bank may profit from a Fed loan. A bank borrows from the Fed at a low interest rate and grants loans for higher interest rates. However, borrowing from the Fed is a privilege and not a right! European central banks corrected this problem by charging a higher interest rate than the market rate, thus penalizing banks from borrowing from the central bank. Second, the Discount Rate is not a good tool for monetary policy. If the Fed expands the money supply, it cannot force banks to take loans. On the other hand, it would be unwise for the Fed to reduce the money supply by reducing the emergency loans to banks that are experiencing financial hardship.

Fed uses reserve requirements as the last tool. Reserve requirement is the ratio of reserves to deposits that banks must hold to meet depositors’ withdrawals. For example, if the reserve requirement is 5%, then every $100 in checking accounts a bank has the bank must hold $5 as vault cash or deposits at the Federal Reserve. Fed rarely changes the reserve requirement because small changes in the reserve requirements have a significant and disruptive impact on the banking system. If the Fed pursues contractionary monetary policy, then it raises the reserve requirements. Thus, banks must hold more reserves and grant fewer loans. Then fewer loans mean the banking system injects less money into the economy. (This is more complex. Refer to a Money and Banking textbook for more information). If the Fed pursues expansionary monetary policy, then it lowers the reserve requirement. Hence, banks hold fewer reserves, and they can lend more, injecting this money into the economy.

**Effectiveness of Monetary Policy**

Board of Governors controls the Federal Reserve System. They meet regularly and decide quickly. Although they can implement monetary policy faster than fiscal policy, monetary policy suffers from the following time lags:

**Recognition lag** (or information lag): Federal Reserve needs time to collect data. For the government to know the economy has entered a recession, economists must report two consecutive quarters of negative growth for real GDP. If the government takes three months to collect data, then government needs nine months to know whether the economy has entered a recession.

**Administrative lag**: A government requires time to decide. However, the Fed can make decisions much quicker than Congress and the President.

**Impact lag**: Monetary policy usually takes from six to twelve months to affect the economy.

Time lags can make the economy more unstable as a central bank uses monetary policy. For example, the U.S. economy enters a recession that lasts exactly one year. By the time the Fed devises an expansionary monetary policy, the economy already has left the recession. However,
by the time, the monetary policy impacts the economy, the economy is growing and consequently, the monetary policy amplifies that growth, creating inflation.

### The Liquidity Trap

Maynard Keynes explained why monetary policy becomes ineffective during a severe downturn in an economy, which he called the **Liquidity Trap**. Traditionally, a central bank buys bonds from the private markets that inject cash into the banking system. Consequently, the higher demand for bonds causes market bond prices to rise while the market interest rate falls. If the market interest rate for bonds approaches zero, then bond prices effectively become cash, which is a liquid asset, and hence, the name Liquidity Trap. If a central bank buys bonds to expand the money supply, subsequently, the interest rate decreases slightly, which has little impact on an economy.

We can view the Liquidity Trap from a different angle. Lower interest rate should encourage businesses to invest in machines and equipment while consumers invest in new homes, cars, and appliances. However, people, banks, and businesses hoard the cash and not spend it. Unfortunately, the lower interest rate does not stimulate economic growth, and expansionary monetary policy becomes ineffective.

When Japan entered its two-decade recession in the 1990s, and the United Stated entered the 2007 Great Recession, expansionary monetary policy became ineffective. As the short-term interest rates approached zero, monetary policy had little impact on economic growth. Unfortunately, three factors hinder monetary policy.

1) When a central bank buys assets from private banks or individuals, they give the central bank the asset and deposit the central bank's check into the banking system. During normal times, the banks lend the funds, but during severe contractions, the banks, instead, hoard the funds, refusing to inject money into the economy.

2) Households and families reached their loan limits and do not want new bank loans. Therefore, banks have no customers for new loans. Furthermore, asset prices can fall during severe contractions. Consequently, families may not want to buy assets that tumble in value, especially houses and condominiums. On the other hand, banks may not lend for assets with falling property value, particularly if borrowers use the property as loan collateral.

3) Businesses reduce investment during downturns in the economy, despite extremely low interest rates. Businesses will expand production if they believe they can earn profits. However, market demand and prices fall during recessions, creating uncertainty and losses.

Although a central bank injects trillions into its banking system, which drives the short-term interest rates towards zero, the funds remain trapped in the banking system. Consequently, expansionary monetary policy becomes ineffective.

Another problem is monetary policy can become ineffective. For instance, Japan entered a perpetual recession in the early 1990s. Business and consumers were very pessimistic; when the
Japanese central bank lowered the interest rate, it had no impact on the economy. After the housing bubble had deflated in 2007 in the United States, the Federal Reserve vigorously used expansionary monetary policy. Nevertheless, the U.S. economy has grown weakly since 2008.

Economists use cyclical asymmetry to explain the problems in the Japanese and U.S. economies. **Cyclical asymmetry** is contractionary monetary policy is always effective, but expansionary monetary sometimes becomes ineffective. Thus, the low interest rates do not change behavior, but high interest rates do. Some experts believe a central bank only should pursue one target - inflation. Consequently, a central bank should not focus on economic growth but maintaining a low inflation rate. For example, the central banks in Canada, Eurozone, New Zealand, Sweden, and United Kingdom maintain low inflation rates, and their currencies strengthen over time. If an economy experiences a 10% inflation rate or higher, then we know a central bank is expanding the money supply quickly. Countries that keep their central banks independent of government have low inflation rates because central bankers can focus on low inflation.

**Key Terms**

- demand for money
- transaction demand
- precautionary demand
- store of value
- interest rate
- supply of money
- maturity
- expansionary monetary policy
- contractionary monetary policy
- open market operations
- discount rate
- reserve requirements
- recognition (or information) lag
- administrative lag
- impact lag
- liquidity trap
- cyclical asymmetry

**Chapter Questions**

1. Appraise the change to the demand for money if a new technology like debit cards and credit cards cause people to carry less money?

2. If the interest rate rise, what happens to market bond prices?

3. The 2007 Great Recession was a severe recession. What should the Federal Reserve do to ease the recession?

4. What should a central bank do if a country grows too rapidly, experiences little inflation, and the stock and real estate prices are soaring?

5. Which monetary policy does the Fed follow if it decreases the Discount Rate?
6. Which monetary policy does the Fed follow if it sells assets?

7. Identify a reason why low interest rates may not stimulate the economy.

8. Why do some countries remove the independence between central banks and government?
16. Regulation of the Commercial Banks

Financial markets are the heart of an economy because they link the savers and borrowers, thus helping to create a society’s wealth. As households and businesses save money, they deposit their money into financial institutions. In turn, the financial institutions lend to businesses and households. Businesses invest in machines, equipment, and buildings while consumers buy homes, cars, and appliances. If businesses and households have no faith in the financial institutions and save their money by hiding it in a safe or under a mattress, then they do not re-invest this money into the economy. Consequently, an economy needs well-functioning financial markets, and financial institutions to create wealth. One vital, financial institution is banks, and the U.S. federal and state governments have a long history of heavily regulating the banking industry.

U.S. Banking Regulations

Early in the United States history, the public and government feared big banks. Consequently, the state and federal governments passed regulations that encouraged a large number of banks to form with small asset sizes as compared to other industrialized countries. Government has five reasons to regulate the banking system, which are:

- **Reason 1:** United States government wants a stable financial system. A wave of bank failures could cause the economy to enter a recession. Banks help create a nation’s money supply and form the backbone of the financial system. A wave of bank failures could trigger a severe contraction in the money supply, pushing an economy into a recession.

- **Reason 2:** Central bank regulates the banks to achieve national economic goals and helps control the money supply. Central bank wants a growing economy that creates jobs and wealth.

- **Reason 3:** U.S. government wants to promote efficiency in the financial intermediation process. *Financial intermediation* is borrowers save money by depositing money in financial institutions. Then the financial institutions lend money to businesses, and the businesses invest in buildings, machines, and equipment. Consequently, the investment lets businesses expand production.

- **Reason 4:** U.S. government wants to provide low-cost financing for homebuyers. However, the government’s push for banks to grant mortgages to anyone with a heartbeat may have worsened the collapse of the U.S. housing bubble in 2007 that triggered the 2008 Financial Crisis.

- **Reason 5:** U.S. government wants to protect consumers. Financial system, such as a bank can be complicated because many depositors may not understand the financial instruments. Therefore, they cannot assess the financial soundness of the institution or make rational decisions. For example, in competitive markets for TVs, DVD players, and computers, the consumers can evaluate and compare different products. However, depositors may not understand complex financial instruments.

United States banking system differs from other industrialized countries. U.S. government passed the *McFadden Act* that prohibited any commercial bank to open a bank branch in
another state. This law placed national and state banks on equal footing and helped foster competition. However, this law encouraged many, small inefficient banks to remain in business and caused the U.S. to have more banks per capita. U.S. banks have smaller assets than other industrialized countries. Consequently, the United States has the largest number of banks in the world, which were 9,459 banks in 2010.

United States has a **dual banking system**. A bank chooses a charter from either a state government or the U.S. federal government. Charter is a document that legally establishes a corporation and allows a financial institution to participate in banking activities. When a bank receives a charter from the federal government, we call it a **national bank**. If a bank receives a charter from a state government, then we call it a **state bank**.

If a bank receives a charter from the federal government, then that bank is subject to three federal regulatory agencies, which are:

**Comptroller of the Currency** is an office in the U.S. Treasury Department and regulates national banks. Office grants charters on behalf of the U.S. federal government and requires national banks to become members of the Federal Reserve and Federal Deposit Insurance Corporation. As of 2010, the United States had 1,500 national banks and 50 foreign national banks.

**Federal Deposit Insurance Corporation (FDIC)** insures deposits at banks. If this agency insures, then it also regulates. FDIC is a public corporate that receives funding by assessing insurance fees on banks. FDIC had insured 8,195 member banks in 2009.

**Federal Reserve System (Fed)** is the central bank of the United States. Fed is a **lender of the last resort**. When a bank has financial difficulties and cannot receive a loan from another financial institution, then the bank can ask the Fed for a loan. Of course, the Fed also regulates banks.

A state-chartered bank has fewer regulations. A state government agency regulates state banks, and state banks have the option to join the Fed and/or FDIC. Therefore, a state bank could have **one** regulatory agency to deal with or up to a maximum of **three** regulatory agencies.

**The Glass-Steagall Banking Act**

United States government had passed numerous laws during the Great Depression, expanding the regulatory powers of the United States. One law, the Glass-Steagall Banking Act of 1933, imposed large changes in the U.S. financial markets. **Glass-Steagall Banking Act** divided the functions of investment banking and commercial banking. An **investment bank** is a marketing agent for selling new stocks and bonds, while a **commercial bank** is a bank that accepts deposits and grants loans. Politicians and the public thought that commercial banks should not underwrite new stock and bonds for corporations. They believed banks were underwriting “risky” securities, and banks had enormous power to create monopolies. In practice, the Glass-Steagall Banking Act shielded investment banking from competition. Consequently, corporations paid more for issuing new stocks and bonds than they would have if commercial banks could underwrite new securities.

Glass-Steagall Banking Act established the Federal Deposit Insurance Corporation (FDIC). U.S. government created the FDIC to lower the rate of bank failures by preventing bank runs. A
bank run is depositors believe their bank has financial trouble. Consequently, everyone runs to the bank to withdraw their deposits. A bank holds merely a fraction of the total deposits because the bank grants loans, and the banks cannot easily convert the loans into cash. Thus, only some depositors will get their money back. A bank will close its doors after it drains all the cash from the vault. Unfortunately, a bank could be financial healthy, but people spreading a rumor the bank has financial trouble can trigger a bank run that causes a bank failure.

A bank run on one bank can lead to bank runs on other banks, which we call a contagion. As depositors line up at one bank to withdraw their accounts, few depositors will get their money back. Then the depositors tell friends and family, and they begin to question the financial health of their banks. Many people cannot gauge the financial health of banks. Subsequently, the friends and family start going to their banks to withdraw their accounts, triggering more bank runs. As the contagion spreads, it causes a wave of severe bank runs called financial panics. Financial panics can cause the economy to enter a recession or even a depression.

FDIC was very successful in preventing bank runs. Between 1934 and 1981, bank failures average 10 per year. Before the U.S. government created the FDIC, bank failures had averaged 2,000 per year during the Great Depression.

Member banks must pay insurance premiums to the FDIC, which is roughly $100,000 per year. Unfortunately, the insurance rates doubled in 2009 because 140 banks failed during 2009, the aftermath of the 2008 Financial Crisis. FDIC assesses the deposit insurance by using a formula that includes the probably of a bank failure and the total of a bank’s insurable deposits. Then the FDIC insures the deposits of every depositor in commercial banks to $250,000. For example, if you deposited $150,000 in your checking account and $150,000 in certificates of deposits, the FDIC only insures up to $250,000. If your bank fails, FDIC guarantees you will get at least $250,000, potentially losing $50,000. In some cases, the FDIC has insured all deposits for amounts exceeding $250,000, and, in other cases, it did not insure. It depends how the FDIC handles the bank failure.

FDIC uses two methods to handle bank failures.

First Method: FDIC closes the bank and seizes the bank’s assets. Then the FDIC sells all the bank’s assets and returns the money to the depositors. If FDIC does not receive enough money to pay all depositors from selling the bank’s asset, then FDIC pays the difference from its own funds. Hence, the FDIC does not use the first method often.

Second Method: FDIC purchases and assumes control of the failed bank. Then the FDIC keeps the bank open and searches for another bank that will purchase the failed bank. If the FDIC cannot find a buyer, then the FDIC can give extra incentives, such as low-interest rate loans, or the FDIC buys the bad loans from the failed bank’s portfolio.

Federal government has circumvented its own law. U.S. government passed the McFadden Act to prohibit banks from crossing state lines and opening banks in another state. However, the FDIC allows a bank located in one state to buy a failed bank in another state. Furthermore, the Glass-Steagall Act separated investment and commercial banks, but President Clinton and Congress repealed the law in 1999. Thus, the federal government allows commercial banks and investment banks to merge. When many investment banks teetered on bankruptcy during the 1998 Financial Crisis, the federal government encouraged investment and commercial banks to
merge. Federal Reserve and the FDIC could not cover the investment banks’ losses. FDIC took control of billions in non-performing loans as an incentive to get a bank to buy failed banks while the Federal Reserve granted $2 trillion in emergency loans.

Circumventing Bank Regulations

U.S. and state governments always heavily regulated their financial institutions. Consequently, these institutions ingeniously circumvented these regulations by creating new financial instruments or new financial institutions. Banks and financial institutions can use six methods to circumvent a country’s rules and regulations.

**First method:** Banks formed bank holding companies to circumvent banking regulations. A **bank holding company** is a corporation obtaining ownership or control of two or more independent banks. A bank holding company can do three things.

**First:** Bank holding company can branch within states or across state lines. For example, a corporation buys enough common stock of two banks to become the majority shareholder. Majority of shareholders elect the Board of Directors and vote on corporate policy. Therefore, the holding company controls several banks in different states.

**Second:** Bank holding companies can buy other non-bank companies and enter other spheres of economic activity, such as data processing, investment advice, and insurance. **Universal banking** is a government allows banks to participate in non-financial activities.

**Third:** Bank holding company can raise non-deposit funds. For example, a bank holding company controls one bank, and this bank needs funds. Holding company issues financial securities and diverts the funds to the bank. For example, before the 1970s, banking regulations set many restrictions on interest rates that banks can pay on bank deposits. Consequently, bank holding companies circumvented these restrictions.

**Second method:** Financial institutions created **nonbank bank** to circumvent federal and state regulations. Legal definition of a bank is an institution that accepts deposits and makes loans. What happens if a bank stops taking deposits? Legally, it is no longer a bank, so the bank can circumvent the extensive bank regulations.

**Third Method:** Financial institutions created new financial securities to circumvent federal regulations. Before the 1970s, banks could not pay interest on checking accounts. Thus, the banks created mutual funds that circumvented this restriction. A **mutual fund** pools together money from many investors into a fund, and the fund manager invests the fund in a variety of stocks. Consequently, the investors have lowered risk through diversifying stocks. For example, you started your own mutual fund and bought 30 different corporate stock. Coca-Cola stock rises one day while IBM stock falls. Overall, the average of the fund’s 30 stocks will earn a return. Then you sell shares of your mutual fund to friends and family.

Non-bank financial institutions started **Money-Market Mutual Funds** (MMMF). MMMFs are similar to mutual funds, but the fund managers invest only in money market securities. **Money market** securities are securities that have a maturity less than a year, such as U.S. Treasury Bills and certificates of deposit. Money markets do not include stocks and corporate bonds because they are long-term securities. Moreover, the investors of MMMFs have check writing privileges. Money-Market Mutual Funds were enormously successful.
Banks saw their depositors withdraw money from their checking accounts and invest them in MMMFs. Consequently, banks created their equivalent, which was the Money Market Deposit Accounts (MMDA). MMDA and MMMF are the same except commercial banks offer MMDA that the FDIC insures. Therefore, banks could now pay interest on checking accounts through MMDAs.

Fourth Method: Banks could circumvent regulations by using the automated teller machine (ATM). Modern computer technology allows bank customers to receive banking services through computer terminals located at banks, stores, and shopping malls. Customers can deposit or withdraw funds or do credit-card transactions. Technically, ATMs are not bank branches, and are not subjected to branch banking restrictions. Therefore, banks located ATMs a distance away from the main bank. Many banks created networks, so customers have access to their accounts from any place around the world, using any bank’s ATM, even ATMs that are from different banks. Cirrus and Star are the two largest networks that let consumers use ATMs around the world.

Banks offer debit cards in conjunction with ATMs. A customer uses a debit card to pay for goods and services by electronically transferring funds from his checking account to a store's bank account. Consumers replaced checks with debit cards because some businesses do not accept checks. However, they take debit cards because the store is certain the customer’s bank will pay the funds.

Fifth Method: Businesses and people can move money outside of their country to avoid their government. Globalization is countries allow the transfer of products, services, and money to flow easily between countries. Globalization rapidly increased since the World War II and has three causes. First, many countries repealed their laws that restricted investment from foreign countries. Second, countries are economically growing. Thus, savers channel more money into the international financial markets. Finally, corporations are international. Corporations produce products in one country and ship them to another. Corporations need financing to engage in business in foreign countries and thus work with international banks.

Sixth Method: Some countries have little regulations, low tax rates, and strict banker-customer confidentiality laws. We refer to these countries as offshore banking, and the leading offshore markets are the Bahamas, Dubai, Hong Kong, and Singapore. Many corporations, international banks, and people open account at offshore banks. They hide money in offshore accounts to avoid taxes, launder money from illegal activities, or protect their savings from overzealous governments. Moreover, the United States government has difficulties regulating activities outside the country, or even gathering information about a bank’s activities outside the country. After the September 11, 2001, the terrorist attacks on the United States caused many countries to crack down on offshore banking because they want to identify and seize funding for terrorist activities. However, governments have broadened their power to seize funds from any activity.

Political climate is changing in the United States. Innovation, rising interest rates, and deregulation have eroded the regulatory structure set up in the 1930s. Banks can cross state lines, open branches in other states, offer investment advice and brokerage services. Banking industry will experience two trends. First, banks would acquire other banks, reducing the number of
banks in the United States. Second, as banks merge, they become larger as their asset size continues to grow. Consequently, U.S. banks will approach the size of Japanese and German banks, which traditionally have been much greater.

The 2008 Financial Crisis caused many commercial and investment banks to teeter on bankruptcy. U.S. federal government bailed out the banks and corporations by purchasing their stock. Consequently, the government infused corporations with taxpayer money. Then the U.S. government helped and approved many bank mergers, including mergers between commercial and investment banks. U.S. government bailed out these banks because they were too big to fail. Having the nation’s largest banks fail would cause the whole U.S. financial system to implode. Trend is the U.S. banks will grow larger with more government ownership and interference.

**Central Banks**

A central bank lies at the center of every country’s financial system. Central bank in the United States is the Federal Reserve System, or we refer to as the “Fed.” Every central bank provides the following six functions:

- **Function 1:** A central bank regulates member commercial banks.
- **Function 2:** A central bank collects and publishes data for the public.
- **Function 3:** A central bank manages the currency. It issues new currency and removes old currency from the economy through the banking system. More importantly, it can increase or decrease the money supply.
- **Function 4:** A central bank clears checks between banks in different regions or countries. For example, all national U.S. banks have deposits at the Fed. Fed clears a check by adjusting banks’ deposits. If a person wrote a $500 check drawn from a Miami bank to pay for goods in California, the Fed subtracts $500 from the Miami bank reserves at the Fed and adds $500 to the California bank reserves at the Fed. Thus, the Fed clears the check.
- **Function 5:** A central bank sets reserve requirements. A reserve requirement is a commercial bank must hold a percentage of deposits as cash or as a deposit at the Fed. Thus, banks have cash, when depositors come to the bank to withdraw their funds.
- **Function 6:** A central bank prevents financial panics. Federal Reserve is a “lender of the last resort.” A bank having financial trouble can ask the Fed for a temporary emergency loan. For example, a bank needs money, so the bank hands a $10,000 asset to the Fed as collateral. Then the Fed lends the bank $9,000 by increasing the bank’s reserves by $9,000. We call the difference the **discount**, which reflects the interest rate that the Fed charges for the loan. Fed can change the interest rate on its loans, which we call the **discount rate**.

U.S. government did not create the Fed to alter the money supply, manipulate interest and currency exchange rates, or manipulate the financial markets to achieve economic goals. Fed learned to do this during the 1920s.

A central bank has immense powers because the money supply is intertwined with the financial markets. When the Fed changes the money supply, the money supply also indirectly influences the financial markets and the whole economy. Thus, the goal of the Fed is to increase the well-being of society as measured by the gross domestic product. Consequently, a growing society produces more goods and services and creates more jobs and wealth.
Whenever the Fed uses its powers to influence the economy, we call this *monetary policy*. Fed uses *expansionary monetary policy* to increase the money supply, while *contractionary monetary policy* reduces the money supply. We list the impact of monetary policy on an economy in Table 1. Therefore, the Fed indirectly influences the financial markets, the interest rates, exchange rates, inflation, the growth rate of the U.S. economy and unemployment.

**Table 1. How Monetary Policy Impacts an Economy**

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<th>Expansionary Monetary Policy</th>
<th>Contractionary Monetary Policy</th>
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<tr>
<td>Money Supply</td>
<td>Increases</td>
<td>Decreases</td>
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<td>Interest Rates</td>
<td>Decreases</td>
<td>Increases</td>
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<tr>
<td>Asset Prices (Stocks and bonds)</td>
<td>Increase</td>
<td>Decrease</td>
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<tr>
<td>Inflation</td>
<td>Increase</td>
<td>Decrease</td>
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<td>Exchange Rate (U.S. dollar)</td>
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<td>GDP Growth (for low inflation)</td>
<td>Increases</td>
<td>Decreases</td>
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<tr>
<td>Unemployment Rate (for low inflation)</td>
<td>Decreases</td>
<td>Increases</td>
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Board of Governors manages the Fed, and the board chairperson is the leader. Consequently, the chairperson of the Federal Reserve is a powerful person. Chairperson can advise the President, informs Congress of the Fed’s actions, and spokesperson of the whole Federal Reserve System. When he speaks, the financial markets listen. Current chairperson is Ben Bernanke, whom many consider the second most power man in the United States, next to the U.S. president.

A central bank uses monetary policy to influence six important variables in the economy. We list the variables:

**Variable 1: Price stability** is the Fed maintains stable prices because prices communicate information to households and businesses. Households determine many goods to buy while businesses determine how many goods to produce. *Inflation* is a continual rise in prices of goods and services, and inflation erodes the value of money. If a central bank continually expands the money supply, it creates inflation. If inflation is low, the Fed injecting money into the economy causes the economy to grow quickly and lowers unemployment. If the inflation rate exceeds 100% per year, then people stop accepting money, causing society to break down. Unfortunately, as the inflation rate becomes higher, it becomes more variable. Variability causes businesses, consumers, and workers to become uncertain about the future, and they change their behavior and decision that lower economic activity.

**Variable 2: Economic growth** is an economy produces more goods and services, increasing the real GDP. A high real GDP growth rate reduces the unemployment rate as producers earn profits and hire workers. Moreover, businesses invest in capital that fuel higher production of goods and services. Another important benefit is the local, state, and federal governments collect more tax revenues as people and businesses earn greater incomes. Consequently, the Fed uses expansionary monetary policy to boost strong economic growth.

**Variable 3: Low unemployment** is the Fed and federal government want to lower unemployment as much as possible because high unemployment causes human misery. Workers
are idle while manufacturers and businesses do not use factory space and equipment. When a society does not use all its resources, then the economy’s GDP grows slowly or even contracts. Less activity means the government collects less tax revenues. Unfortunately, the government cannot lower the unemployment rate to zero. Unemployment results from workers who quit their jobs and look for new ones, or students who graduate and enter the labor market. Every economy will have unemployment that economists call the natural rate of unemployment. Fed tries to reduce the unemployment rate to the natural rate of unemployment. Currently, economists estimate the natural rate of unemployment to be 6% for the United States. If the Fed strives for an unemployment rate less than 6%, then the Fed’s monetary policy creates inflation.

Variable 4: Financial market and institution stability is the Fed stabilizes the financial system by lending funds to financial markets during financial panics. Financial panics, bank runs, stock market crashes, or large financial institution bankruptcies can trigger a chain reaction that causes other financial institutions to bankrupt. Unfortunately, a financial panic severs the link between savers and investors. Consequently, businesses will not receive loans they need to invest, while the customers do not borrow to buy homes, cars, and other assets. If the financial market and institutions break down, then the economy enters a recession, causing high unemployment and negative GDP growth rates. If the Fed lends to banks, then the Fed uses expansionary monetary policy increasing the money supply indirectly. On the other hand, the Fed reducing its loans uses contractionary monetary policy, contracting the money supply.

Variable 5: Interest rate stability is the Fed stabilizes the interest rates because fluctuating interest rates create uncertainty in the economy because people and businesses cannot plan for the future. Businesses become uncertain about investing in new buildings, machines, and equipment. Consumers are uncertain about long-term investments, such as buying a house or car. Interest rate stability relates to the stability of the financial markets. Large swings in interest rates cause large capital gains and losses in the financial markets. Some investors will earn profits while others earn losses. Thus, expansionary monetary policy lowers the interest rates, while contractionary monetary policy increases them.

Variable 6: Foreign-exchange market stability is the Fed stabilizes the value of the U.S. dollar against the other major currencies, such as the Japanese yen, British pound and euro. A strong U.S. dollar causes foreigners to buy fewer U.S. products because they are expensive while U.S. citizens buy more foreign-made products because they become cheaper. Consumers buying the cheaper foreign products boost imports while U.S. businesses sell fewer products abroad, decreasing exports. If the U.S. dollar becomes weaker, then the exact opposite effect occurs. Expansionary monetary policy weakens the dollar, while contractionary monetary policy strengthens it. We keep it straight by expansionary monetary policy puts more dollars into the economy and world. If the world has more U.S. dollars relative to the other currencies, then the people value dollars less because dollars are less scarce and weakens against other currencies. A contractionary monetary policy removes dollars from the economy and the world, strengthening the dollar.

Some of these goals conflict with each other. For example, if the Fed pursues expansionary monetary policy to increase the national output and reduce unemployment, then it could create inflation and weaken the U.S. dollar on the exchange markets.
Key Terms

financial intermediation  
McFadden Act  
dual banking system  
national bank  
state bank  
Comptroller of the Currency  
Federal Deposit Insurance Corporation (FDIC)  
Federal Reserve System (Fed)  
lender of the last resort  
Glass-Steagall Banking Act  
investment bank  
commercial bank  
bank runs  
contagion  
financial panics  
bank holding companies  
universal banking  
nonbank bank  
mutual fund  
Money Market Mutual Funds (MMMF)  
money market  
Money Market Deposit Accounts (MMDC)  
automated teller machine (ATM)  
debit cards  
globalization  
offshore banking  
discount  
discount rate  
monetary policy  
expansionary monetary policy  
contractionary monetary policy  
price stability  
inflation  
economic growth  
high employment  
financial market and institution stability  
interest rate stability  
foreign-exchange market stability

Chapter Questions

1. Identify whether a state bank has any incentive to become a national bank.

2. If a government imposes regulations to maintain a stable financial system, why did the 2008 Financial Crisis occur?

3. During the 2008 Financial Crisis, the FDIC increased its deposit insurance from $100,000 to $250,000. Why did the FDIC do this?

4. If a government allows a commercial bank to help a corporation issue new stocks or bonds, does the bank create a conflict of interest?

5. Americans save little of their incomes. However, the U.S. housing markets attracted a large pool of funds, expanding the U.S. housing bubble. Where did the banks get this money?

6. Internet is another financial innovation. How could people and businesses use the internet to circumvent regulations?
7. Housing prices soared in the United States and created the U.S. housing bubble that popped in 2007. Some blame the Fed because the Fed kept low interest rates. Could the Fed have prevented the housing bubble?

8. Federal Reserve wants to strengthen the U.S. dollar. Which monetary policy should the Fed use? Does the Fed have any consequences to use this policy?

9. How could the Federal Reserve reduce the large U.S. trade deficit?
17. Tourism and Economic Development

National governments in the United States and Europe are usually not involved directly in a tourism industry. Private businesses own the tourist industry, and supply and demand determine market prices and quantity. Consequently, the tourist industry is highly competitive in developed countries, and it creates seasonal jobs with low salaries, and high turnover rates. Many people consider these jobs low status that entail menial work. Furthermore, developed countries offer alternative employment with better pay and benefits. Usually local governments become involved in their tourist industry because tourism boosts spending in a local economy.

National governments in developing countries, on the other hand, take an active role on tourism and economic development. Tourism increases incomes, creates jobs, increases the tax base, and becomes an important source of foreign-currency earnings for a country. Consequently, a national government in a developing country may intervene heavily in a tourist industry to maximize the gains from the tourist industry and prevent exploitation and waste. Thus, many consider tourism an industry without smokestacks. Hence, we provide in this chapter an overview for tourism and economic development.

Government’s Role in Tourism

Important step that many overlooks is a tourist destination must have something to attract the international tourists. For example, Thailand has beautiful sandy beaches; Switzerland has tall, majestic mountains, and Italy and Greece have ancient sites, ruins, and culture that attract the tourists. Other attractions include health tourism. Tourists flee expensive healthcare cost in the United States, and head to China, India, and Malaysia for cheaper healthcare or visit doctors who perform experimental, non-approved surgeries and treatments. Finally, tourism by definition is a hedonistic activity where the tourists wants pleasure and satisfaction. Consequently, some tourist destinations have thriving black markets filled with drug dealers and prostitutes.

A government faces a high risk to develop a new tourist destination because the tourist industry is a competitive industry. If a government builds it, the tourists may not necessarily come. For example, Flint, Michigan is a city that fell on hard economic times after General Motors closed down several factories and lay off over 40,000 autoworkers during the 1980s. City government tried to revive the local economy by developing a tourist industry. City attracted $13 million in investment for a brand-new luxury Hyatt Regency Hotel, and $100 million to construct an indoor theme park. Unfortunately, the tourists never came, and both ventures quickly bankrupted. On the other hand, some risks have paid off. Dubai government attracts millions of tourists every year to its oasis – a modern city that borders hot, sweeping deserts on one side and juts against the shores of the Persian Gulf on the other side.

Public safety and security are important concerns for international tourists. International tourists come from high-income countries, such as Australia, Canada, Europe, and the United States because a tourist must have leisure time and the financial resources to pay the traveling cost to another country. Consequently, the international tourists visit politically stable areas and
shy away from countries with coups, protests, violence, and terroristic activities. Thus, government must protect the public safety of the tourists. Furthermore, a government institutes regulations to protect tourists and enhance their travel experiences. Accordingly, a government implements consumer protection laws and rules, fire safety laws in hotels, health and food-safety regulations for restaurants, and issues licenses for persons and businesses, such as tour operators, travel agencies, hotels, restaurants, and others.

Government pays many costs to use tourism for economic development. First, it must improve the infrastructure and facilities. Government is usually the lead developer and controls the development of a new tourist destination because a private sector may not have the financial resources. Furthermore, government controls zoning laws and building safety codes, and it invests in an international airport, builds new roads and highways, and installs the network of pipes for drinking water and wastewater. Moreover, a government passes new laws and regulations to protect the environment, and the natural and cultural resources. It may invest in national parks, market the country and tourist destination to the world, and subsidize education and training for the workers in the tourist industry.

Tourism development imposes high opportunity costs upon a government. A government invests in the infrastructure, and controls and monitors the border. Government enforces custom regulations, controls the entry and exit points for the country, and issues visas to foreigners. Moreover, developers may want tax breaks and tax credits to invest at tourist destinations. Consequently, a government may reduce programs for its citizens, such as education and health programs. Opportunity costs may not be bad. Although a government may invest heavily into the tourist industry, it could improve the quality of life for residents because they can also enjoy the tourist destination.

Political stability influences the image at tourists’ sites. Thus, books, magazines, newspapers, satellite and cable links influence tourists, and where they visit. Usually, tourists do not visit countries with turmoil, unrest, wars, coups, political strikes, or protests. For example, the Yugoslavian (Serbian) Army attacked Slovenia and Croatia in 1991, and then they attacked Bosnia-Herzegovina in 1992, sparking the Bosnian War. Tour operators for Yugoslavia lost over one million bookings in 1991. Two years after the war, Slovenian tourism was still below pre-war figures. For another example, the Maoist terrorist group, the Shining Path, attacked the Peruvian government during the 1980s. Tourists avoided Peru as international visitors to Peru dropped from 350,000 in 1989 to 33,000 in 1991.

A government can use tourism as a political tool because leaders use tourism to convey a positive image. For example, Ferdinand Marcos was a president in the Philippines. He used tourist arrivals to legitimize his regime during his second election because corruption, mismanagement, and massive fraud surrounded his election and his government. Then terrorists tried to bomb Marcos in 1980, and many tourists from the United States stopped visiting the Philippines.

Western governments issue travel advisories for their citizens and warn risks in traveling to certain destinations. Tourists usually listen to the warnings and avoid countries with warning advisories. Consequently, governments could apply political pressure to promote or sanction
specific countries. A **sanction** is one country punishes another country, such as a country advising its citizens to visit a country, creating economic hardship for a nation.

**Economic Impact of Tourism**

Tourism is a potential strong source of economic development. Using Equation 1, a country’s **gross domestic product (GDP)** equals the sum of a country’s four spending sectors: Consumers, businesses, government, and the international sector. Every year, consumers buy goods and services, which we denote by consumption, \( C \). Businesses invest in buildings, machines, and equipment, which we represented by gross investment, \( I_g \). Gross investment includes all investments, including businesses replacing worn out, outdated machines and equipment. Furthermore, government funds a military, and police departments, or subsidizes healthcare and education for its citizens. We denote government spending by \( G \). Finally, a country exports goods and services to another country while it imports goods and services from other countries. A trade balance \( (X_n) \) is exports \( (X) \) minus imports \( (M) \). A positive trade balance indicates a country exports more goods and services than it imports, causing a net inflow of foreign currencies into a country. A negative trade balance is a country imports more than it exports, causing its currency to flow out of the country.

\[
GDP = C + I_g + G + X_n
\]  

(1)

Tourism can lead to higher GDP because government views the international tourists as the invisible exports. Tourists bring their foreign currencies with them as they buy local goods and services in a foreign country. Consequently, a sizable tourist industry becomes a significant source of foreign currencies that could swing the trade balance towards positive, or it could significantly reduce negative net exports. Furthermore, businesses may invest and build new hotels, restaurants, and entertainment facilities. Finally, a government spends more because it maintains and updates the infrastructure at the tourist destination.

Tourism creates a **Keynesian multiplier effect**. As the tourists buy goods and services at a tourist destination, the tourists inject spending into the economy that creates jobs and boosts local residents’ incomes. We derive the multiplier in the last section of this chapter.

A developing country relies on international investment from developed countries. Consequently, tourism fosters an awareness of a market economy, and a government establishes a pro-business environment that encourages investment from private companies and businesses. Hence, foreign investment creates many benefits for developing country. First, foreign investment is still investment with a Keynesian multiplier effect on the economy. Second, the foreign companies bring technology and expertise to the tourist destination. Third, the foreign companies improve the quality, sell products and services for cheaper prices, and pay taxes to the government. Finally, a foreign company trains workers, who earn higher real wages.

Foreign investment poses several problems for a developing country. First, the local companies cannot compete with foreign companies. International companies may have vertical and horizontal integration; granting monopoly power to the foreign companies, or the local
companies lack the know-how or technology. Second, strong foreign investment may increase investment costs, again putting local companies at a disadvantage. For example, foreign companies buy properties along a beach, causing real estate prices for coastal properties to spike. Then the local businesses cannot afford the beach properties. Third, foreign companies hire expatriates, especially for high-level managers and technicians. Thus, they send most of their salaries to their home country. Fourth, foreign companies may not buy from the local suppliers. Instead, they import their machines, equipment, and supplies. Finally, foreign companies transfer their profits to their home country.

Developing countries usually have a large informal sector, which comprises between 40 and 50% of the labor force. Informal sector goes beyond supplying illegal goods and services. Instead, the workers in the informal economy are usually self-employed, and they may not pay income or social security taxes. Furthermore, some tourist business owners do not pay taxes or follow all the rules and regulations. Consequently, their economic contribution to the economy is not included in GDP, and a government has problems regulating the informal sector.

Informal sector thrives and grows in developing countries. Many tourist businesses are small-scale operations that can easily enter a market. A family may own the business enterprise, which includes small shops, cafes, food stands and carts, tour guides, and they rely on local resources and suppliers. Furthermore, the tourist industry is labor intensive, and they acquire skills from outside of formal schooling. Although the informal sector may be large, a symbiotic relationship can exist between the formal and informal sectors. Informal sector depends on the formal for supplies in specific inputs, while the formal sector depends on the informal for low-cost labor, and low-cost products and services.

Workers usually earn greater wages in the informal sector than the formal sector. They gain greater skills, more education, and speak one or more foreign languages. Moreover, the informal workers gain marketing techniques and learn to fix or maintain equipment. Consequently, the informal workers are exposed to foreign lifestyles, languages, and materialism, and they may even emulate the tourists. Tour guides are popular, and the community in developing countries considers tour guides a good status that pays well. Finally, women work in the informal sector because they can work flexible hours. They can return home when kids return from school, or they bring young children with them to work.

**Benefits of Tourism for a Developing Country**

Developing countries use tourism as a source of growth and development, and tourism has several benefits. First, tourism helps diversify an economy. For example, Gambia, a small poor African country, relies on nut exports. Consequently, it diversified its economy by expanding tourism. Second, a government uses tourism to develop rural areas and/or islands, to offset declines in manufacturing, or to revitalize urban areas. Moreover, countries with little natural resources or lacks export industries can benefit from tourism. Third, tourism is important for investment, especially for developing countries, where people have low savings rates, and paltry incomes. Thus, they have no resources to invest in their communities. Instead, a government uses tourism as a crutch to develop a poor community. Finally, a government could reduce its
dependence on foreign aid and reduce its trade deficits since international tourists bring foreign currencies.

Tourism is a labor-intensive industry, and it creates income and employment opportunities for the local population. Although tourist jobs are seasonal or part-time jobs, they reduce the ranks of the unemployed. Furthermore, the local staff may have multiple jobs, or work in more than one occupation. Thus, wages in developing countries may be high enough to last through the low season because the tourist industry pays relatively higher than the agriculture and fishing industries. Moreover, tourism creates opportunities for students and women, increasing their standard of living.

People in developing countries view tourist jobs favorably, and the tourist industry can be a vital industry for employment in some countries. For instance, Cyprus has about 25% of its population employed in its tourist industry. Furthermore, developing countries have formal schools to train workers for the hospitality industry, so they provide a better service and experience for the tourists. Finally, a country may have unique traditions and culture that it can share with the world. Subsequently, tourism can lead to a better understanding between different civilizations.

The Tourist Industry in Bali, Indonesia

Bali, Indonesia has a thriving tourist industry that helps the country leap over obstacles to economic development. First, most of the population has a primary education, and some parts of Indonesia are extremely poor. Second, the craftsmen who create trinkets, knickknacks, and souvenirs for the tourists earn higher salaries than the local farmers and peasants. Finally, Indonesia has a large informal sector, and many guides and vendors do not obtain the government licenses, or they evade taxes. Nevertheless, the workers in the informal sector are not marginalized. They are independent, entrepreneurs who speak one or more foreign languages. Furthermore, the formal sector does not dominate the workers in the informal sector because they earn more than the minimum wage.

Poor males migrate to Bali from the depressed areas of Indonesia. Migrants work the vending jobs, which the native Balinese consider low status. Consequently, the migrants fill a niche that does not create conflict and tension with the local Balinese.

Tourism is changing the caste system in Bali. Caste system is a society conforms to a strict hierarchy of the social classes. Bottom social class is the poor and the largest class. Then the priests, merchants, and nobles hold higher positions in the caste system. However, tourism in Bali is transforming the caste system to an economic class system. Public views the hotel employees, tour guides, and owners of a kiosk or tourist business favorably, and they hold high positions in the new caste system.
Problems of Tourism

Tourism, unfortunately, brings many problems that counter economic development. For instance, international tourists pay higher prices than domestic tourists, which create inflation. Tourism creates greater demand for land, property, and goods and services, which boost the market prices. Unfortunately, the price increases are usually permanent, and the cost of living rises for the residents, even the residents who are not involved or employed in the tourist industry. If the prices rise too much at the tourist destination, then residents may not enjoy and visit the recreational areas and facilities.

Tourism imposes high opportunity costs upon government. If government invests in a tourist facility, program, or service, then the government cannot use the funding for something that benefits its citizens directly. Consequently, government should use cost-benefits analysis to determine if its investment and commitment are efficient in creating a tourist destination. A cost-benefits analysis itemizes all the benefits and costs for developing a tourist destination.

A tourist destination could rely on tourists from one country. Unfortunately, an event could trigger a drop in the number of tourists, which negatively affect the tourist destination. For example, approximately 22.4 million tourists visited Malaysia in 2010, and 13.0 million tourists came from Singapore. We calculate the dependency ratio from the equation below, which equals 58% in this case. If Singaporeans decide not to visit Malaysia, then Malaysia’s economy would be devastated as the tourism industry contracts.

\[
\text{dependency ratio} = \frac{\text{tourist arrivals from primary market}}{\text{total tourists}} \cdot 100\%
\]

\[
\text{dependency ratio} = \frac{13.0 \text{ million}}{22.4 \text{ million}} \cdot 100\% = 58\%
\]

Tourist destinations are sensitive to changes in demand. Wars, terrorism, and natural disasters scare tourists away. Several examples that decimated the tourist industry were the 2011 Riots in Egypt, the SARS outbreak in China in 2003, and the tsunami that struck Thailand in 2005.

A tourist destination may have one or two peak seasons. Thus, tourist businesses earn large profits during the high season and low profits or losses during the low season. Employers lay off workers who become idle for part of the year. Unfortunately, employers do not guarantee employment for workers from season to season, and workers suffer from job and income insecurity, lack of medical benefits and unsatisfactory housing and working conditions. Consequently, workers in the tourist destination have high turnover rates and rarely are union members. Some businesses, such as hotels and restaurants shut down for part of the year. Thus, a tourist destination with a strong seasonality can have difficulty recouping investment. For example, Turkey, Greece, Egypt, Spain, and Thailand experience strong seasonality in tourist arrivals.

A government investing heavily into a tourist destination has social consequences. Unfortunately, the government displaces the local people if it builds and constructs new airports,
resorts, nature reserves, and attraction sites. Furthermore, economic development from tourism is unequal because the tourist destination develops economically while the surrounding areas remain poor and disadvantaged. Moreover, residents living in poor areas of the country will migrate to the tourist site, encouraging urbanization and overcrowding. Unfortunately, traffic in overcrowded, large cities has traffic jams and severe congestion. Consequently, the local residents may resent the inflow of new residents to their city, leading to friction, and conflicts. Finally, the tourists perceive their travel experience unfavorably, telling friends and family the horrible vacation they had at a particular tourist destination. Word of mouth advertising may harm future tourist arrivals.

A tourist industry may damage family structures. Women earning excellent salaries in the tourist industry may fight with their husbands and parents. For instance, Mexico has more female head of households living in tourist destinations. Furthermore, tourism may decrease morality, and the poor beg and harass the visitors. In addition, a tourist destination can have an increase in crime, especially crimes against visitors because the locals view them as rich. Unfortunately, drug users and prostitutes thrive at tourist destinations. Finally, tourism causes more health risks and spreads diseases, such as AIDS, malaria, hepatitis, and influenza.

Tourism could lead to a loss of cultural identity because tourist businesses commercialize a country’s traditions and customs to make profits. Furthermore, tourism could lead to misunderstandings between visitors and the local community. Finally, a high inflow of tourists could damage archaeological and historical sites and monuments. After the international tourists had damaged the tourist destination, they then travel to other destinations.

Tourist industry, especially in developing countries has a high leakage of tourist earnings. For example, visitors prefer to travel using an airline from their home country rather than the airline of the destination country. Consequently, 80% of travelers’ expenditures go to the airlines, hotels and other international companies. Some tourists, in addition, may prefer imported food, goods, and services that cause more foreign currency to leak from a country. Unfortunately, the local businesses and workers are excluded from the revenue generated from tourist activities.

**Derivation of the Tourist Multiplier**

International tourists create a *Keynesian multiplier effect* that boosts GDP, create jobs, and increase the tax base at a tourist destination. Every dollar a tourist spends creates the following effects:

**Effect 1:** Every dollar a tourist spends creates a direct effect because a tourist spends money on transportation, hotel, restaurants, and entertainment. *Direct effect* is the first line of businesses that cater to the tourists and receive their money.

**Effect 2:** Tourists’ spending creates *indirect effects* because hotels, restaurants, and transportation and entertainment companies earn greater revenues from the tourists. Consequently, the tourist businesses purchase supplies and use local services, and they hire more workers and/or increase their workers’ salaries. They inject the tourist spending into the economy.
**Effect 3:** Tourists’ spending creates *induced effects*. Local residents have higher incomes and spend more, creating an economic growth at the tourist destination. Furthermore, businesses increase their investment, while a government increases spending or upgrades its infrastructure. Consequently, the Keynesian multiplier effect is one dollar in tourist spending could boost income by more than one dollar at the tourist destination.

We derive the tourism multiplier by starting with the aggregate expenditures, which is Equation 2. Aggregate expenditures are the sum of all expenditures in a society by the parties: Consumers, businesses, government, and the international sector. Consumers have a total consumption level of $C$; businesses invest a total gross investment of $I_g$; government spending is $G$ while the international sector is total exports ($X$) minus total imports ($M$):

$$AE = C + I_g + G + X - M$$  \hspace{1cm} (2)

Second equation is the equilibrium condition, $AE = GDP$. Aggregate expenditures are the total spending of goods and services in an economy, while GDP is the total production of goods and services. Consequently, total spending must equal total production. If GDP exceeds aggregate expenditures, then that economy produces more than what the economy consumes. Thus, businesses accumulate unwanted inventories, which causes them to decrease their production until GDP = AE again. If GDP is lower than aggregate expenditures, then the economy consumes more than its production. Hence, business inventories fall, and the producers expand production again, until GDP = AE, replenishing their inventories.

Another equilibrium condition is present but not obvious. For the economy to be in equilibrium, total leakages must equal total injections. A *leakage* is an activity that causes a government, business, or person to remove money from the economy, which is savings, taxes, and imports. Imports are a leakage because money leaves the country. On the other hand, an *injection* pumps money into an economy, causing economic growth. Injections include government spending, investment, and exports. Consequently, the injections match the leakages. For example, the investment match savings because people save money, deposit it at banks, and the banks lend the money to businesses for investment. A government levies taxes, and then spends it. Finally, exports and imports are opposites.

If total injections exceed leakages, subsequently, the economy expands. Government, businesses, and people inject extra money into an economy than what they remove. Furthermore, aggregate expenditures must exceed aggregate GDP, expanding the economy. Of course, the opposite could occur. If total leakages exceed the injections, then the economy must be contracting as government, businesses, and people remove money from the economy. Consequently, aggregate expenditures must be lower than GDP.

We show a consumption function in Equation 3. People need a level of spending for food, shelter, and clothes that are independent of income, which we call the autonomous level of spending, $A$, in the consumption function. *Marginal propensity to consume (MPC)* is the slope of the consumption function. Every dollar of after-tax income a consumer earns, he saves a portion, which is the *marginal propensity to save (MPS)*, and spends the remaining proportion, which is the marginal propensity to consume.
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\[ C = A + \text{MPC} \cdot GDP \]  

(3)

Gross investment, government spending, and total exports are independent of income and GDP. Thus, these variables do not have equations.

We define total imports proportional to GDP, which is Equation 4. **Marginal propensity to import (MPM)** is the proportional increase in imports if GDP increase by one dollar. For example, if MPM = 0.5, a one dollar increase in GDP leads to a 50 cent increase in imports.

\[ M = \text{MPM} \cdot GDP \]  

(4)

Marginal propensity to import could be high for a tourist destination because a tourist destination has high import leakages. Small developing countries may leak from 40 to 50% of its foreign-currency earnings because the tourist industry imports some goods and services for tourists, and may hire foreign workers. Furthermore, foreign-owned hotels, airlines, and businesses send their profits out of a country. For example, 70% of all money spent by tourists leaves Thailand; the Caribbean leaks 80% of its tourist earnings, while India’s outflow rate is approximately 40%.

Developing countries have higher import leakages than developed countries. Developed countries have leakage rates that range from 10% to 20% because they have more backward linkages than developing countries. A **backward linkage** is the supply chain that supports a tourist industry. Tourists create a demand for accommodations, food and beverages, transportation, souvenirs, and entertainment. Thus, a developed country has the industries to supply the tourist industry. A developing country may import a large share of goods and services that tourists buy, causing a high leakage from the tourist destination. If the local people owned more tourist businesses, such as hotels, then money remain inside the country. Moreover, the local tourist businesses buy from local suppliers. Therefore, if a country wants to retain its foreign-currency earnings from tourists, it must manufacture and provide most the goods and services a tourist consumes.

A tourist destination may experience a high leakage from tax revenue flowing out of the tourist region, or the workers in a tourist industry are phenomenal savers. Currently, we did not include taxes in the analysis. However, if workers are high savers, then the marginal propensity to save is high, while the marginal propensity to consume would be low. Furthermore, corporations, especially in the hotel industry, are usually from developed countries. Thus, they send their profits to the home country, generating lower foreign exchange earnings than locally owned hotels. Moreover, the expatriates hold the high managerial positions, and they send a portion of their salaries to their home countries.

We assume the supply is perfectly elastic in the analysis because the producers can supply the greater demand caused by the multiplier effect. We begin with the aggregate expenditures equation and substitute the equilibrium condition into it, which yields Equation 5.

\[ AE = GDP = C + Ig + G + X - M \]  

(5)
We substitute both the consumption function and total import equation into Equation 5 that yields Equation 6.

\[
GDP = A + MPC \cdot GDP + Ig + G + X - MPM \cdot GDP
\]  

(6)

Collect and move all the GDP terms to the left-hand side of the equation yielding Equation 7:

\[
GDP - MPC \cdot GDP + MPM \cdot GDP = A + Ig + G + X
\]

(7)

We factor the GDP term out of all the terms on the left-hand side and solve for the equilibrium GDP, which yields Equation 8:

\[
GDP = \frac{1}{1-MPC+MPM} [A + Ig + G + X]
\]

(8)

Then we solve the following equation, MPC + MPS = 1, for MPS and substitute it into the Equation 8. Equation, MPC + MPS =1, is true by definition. If a consumer receives one more dollar in income after paying taxes, he or she has two choices: save or spend it: We can calculate the GDP in Equation 9.

\[
GDP = \frac{1}{MPS+MPM} [A + Ig + G + X]
\]

(9)

Consequently, the Keynesian multiplier equals \(\frac{1}{MPS+MPM}\). Since we are interested in changes in GDP, we manipulate the equation yielding Equation 10. Delta, \(\Delta\), represents a change in a variable. Thus, \(\Delta X\) means exports could increase (or decrease).

\[
\Delta GDP = \frac{1}{MPS+MPM} \Delta X = \text{multiplier} \cdot \Delta X
\]

(10)

Since we consider tourists the invisible export (X), then each dollar of tourists’ spending increases the GDP of the tourist destination by the multiplier. For example, the Thai people save 60 cents out of every dollar, so MPS = 0.6, while the marginal propensity to import is 0.7. Thus, every $1 increase in GDP boosts imports by 70 cents. Consequently, the Keynesian multiplier is 0.80. Every dollar a tourist spends, the tourist creates additional incomes of $0.80 at the tourist destination.

Developed countries usually have income multipliers around two. Unfortunately, small island countries and developing countries have small multipliers because the high leakage of foreign currency. Consequently, the developing countries want the economic development from a tourist industry. However, they obtain the least benefits from tourism.
Key Terms

- opportunity costs
- sanction
- gross domestic product (GDP)
- Keynesian multiplier effect
- informal sector
- caste system
- inflation
- cost-benefits analysis
- dependency ratio

- direct effect
- indirect effects
- induced effects
- leakage
- injection
- marginal propensity to consume (MPC)
- marginal propensity to save (MPS)
- marginal propensity to import (MPM)
- backward linkage

Chapter Questions

1. Most international tourists come from the rich developed countries. What would happen to the tourist market if the world economy enters a recession in 2012?

2. Could a developing country reduce its informal sector by hiring more enforcement officers and tax inspectors to scrutinize its labor force and businesses?

3. Identify the three ways tourist-spending leaks from a tourist destination, especially from a developing country.

4. Why do small tropical islands and developing countries have problems with leakages?

5. Why do economists refer to international tourists’ spending as the invisible exports?

6. Does inflation pose a problem at tourist destinations?

7. Calculate the dependency ratio for Mexico if Mexico had 22.6 million tourists and 15.1 million tourists came from United States in 2008.

8. Calculate the tourist multiplier if a developed country has a marginal propensity to import of 0.2, and a marginal propensity to save of 0.1.

9. Compute the increase in incomes at the tourist destination if the international tourists spent $30 million there last year, and the Keynesian income multiplier equals 1.5.
10. We define the equations below. We add the tax rate, t, to the consumption function. Hence, $1 - t$ becomes the portion a consumer can spend and save. Solve for the multiplier that you would use for tourists’ spending.

| Aggregate Expenditures (AE): | $AE = C + Ig + G + X - M$ |
| Consumers’ spending: | $C = A + (MPC) (1 - t) (GDP)$ |
| Imports: | $M = (MPM) (GDP)$ |
| Equilibrium Condition: | $AE = GDP$ |
18. Regulation of Natural Resources

Governments regulate their natural resources because they are critical for a society’s needs. Common natural resources include energy, water, forests, wildlife, and fisheries. Furthermore, a country with economic growth or growing population consumes more of its resources. Thus, government imposes regulations and policies to conserve resources or slow down its consumption. Consumption and prices of natural resources depend on the market structure, the ownership type, and resource type, and whether nature can replenish the resource or not.

An Overview of Natural Resources

Economists classify natural resources into exhaustible and renewable resources. An exhaustible resource is a society cannot consume a resource in the future if it consumes the resource today. For example, petroleum, natural gas, and coal are exhaustible resources. Exhaustible resources could include minerals and metals; however, society can recycle some minerals and metals. Recycling extends the life of an exhaustible resource. On the other hand, renewable resources are natural resources that grow overtime and include fish, wildlife, and forests.

Natural resources are common property, open resource, or privately owned. Ownership type determines how people treat or mistreat the resource. Common property is a group of individuals holds the property, and the group can exclude outsiders. A small community may manage the resource well. However, as a community becomes larger, then common property evolves into an open-access property. Open-access property is property owned collectively by society, or it has the absence of ownership. Unfortunately, the community cannot exclude outsiders from using the property. Economists call this the Tragedy of the Commons. People have little incentive to develop, improve, or maintain land if they cannot exclude outsiders from consuming it. For example, fishermen overfish in public waters. Fishermen catch too many fish, causing fish populations to decrease to a low level that harms future fish catching. Another example is dumping wastes onto public lands or waters. Air can also be an open-access resource. Some firms and people emit pollution into the air. On the other hand, owners of privately own resources have a strong incentive to care for their property, which includes a permit to harvest or mine a resource.

Two factors put stress on natural resources: population growth and economic growth. As the world’s population increases, more people place more pressure on the environment. For example, more people consume more water, energy, fish, and other resources. Thus, they consume the resources, especially the exhaustible resources at a faster pace. Once the resources are consumed, they are gone forever. Another factor, urbanization, is the migration of people into the cities from the countryside. Large cities require massive amounts of infrastructure to support the populations. Cities require fresh water and energy; they collect and treat wastewater, and dispose of wastes. Consequently, large cities put enormous pressure on their surrounding resources and environment.
Economic growth also strains resources. Economists use Gross Domestic Product (GDP) to measure economic growth. GDP is the value of all final goods and services produced in a country during a year. GDP does not include sales of intermediate goods and services. Furthermore, GDP does not include degradation to the environment or depletion of resources. For example, a country’s GDP experiences strong growth as it cuts down its trees or extracts it petroleum. However, after a country has depleted its resources, then its GDP grows much slower or even contracts.

Rapid consumption of natural resources leads to Malthusian economics. Mathis was a priest, who stated that if the human population grows too quickly relative to the food supply, then part of the population dies. Society does not have enough food to feed this population. Mathis assumed that population grew geometrically while the food supply grew arithmetically. However, he did not include technology. Consequently, food shortages, disasters, and wars would keep the population in check. That is why economics is called the dismal science. Malthusian ideas are still with us. For example, the world is running out of natural resources, like petroleum. We have a population growth time bomb. Global warming and pollution will destroy human kind.

**Exhaustible Resources**

One feature of exhaustible resources is Hotelling’s Prices. **Hotelling’s Prices** occur when a natural resource price continuously increases over time as society depletes the resource. Figure 1 shows Hotelling’s Prices for an exhaustible resource. At time 0, we define the market price as $P^*$ and the market quantity as $Q^*$, where the solid supply and demand lines intersect. Society consumes some of the resource, reducing resources for the future. At time 1, the supply function decreases and shifts leftward as fewer resources are available. Consequently, the market price rises, and market quantity falls. At time 2, the supply function decreases again and shifts leftward as society depletes more resources. Thus, the market price continually increases over time, while the market quantity decreases. Therefore, the natural resource price perpetually increases until society consumes all the resource.

Hotelling’s Prices have two benefits. First, Hotelling’s Prices place a value on the resource in the ground, which we call “in situ” values. Second, as the resource price increases over time, society conserves more of the resource. However, firms that mine exhaustible resources accrue economic rents. **Economic rent** is long-run profits that we also call user costs. We define economic rent as the difference between the market price (P) and marginal cost (MC), or economic rent = $P – MC$, measured in $s$ per unit. Even if a competitive industry extracts a resource, the firms still earn rent.

Empirical evidence is mixed concerning Hotelling’s Prices because Hotelling’s Prices ignore three factors. First, technological improvements cause resource (marginal) extraction costs to fall over time. In other words, technology allows producers to extract the resource cheaper. A competitive industry passes the lower costs to consumers as a lower price. Second, Hotelling’s Prices depend producers knowing where the locations and size of the petroleum reserves. Natural resource companies do not know the location of all reserves and deposits. However, when resource prices are high, petroleum companies have an incentive to explore and
drill for new reserves and deposits. Of course, higher resource prices allow producers to extract from high-cost areas. For example, high petroleum prices allowed companies to extract from the deep waters of the Gulf of Mexico or the cold climate of Alaska. Finally, consumers conserve the exhaustible reserve as the market price increases. Moreover, high fuel prices cause consumers to reduce their demand, i.e. the Law of Demand. Over time, consumers buy more fuel-efficient cars, or they move closer to work. Thus, consumers greatly reduce their consumption of fossil fuels when market prices are high in the long run.

Figure 1. Hotelling’s Prices

M. King Hubbert, a petroleum engineer, devised a better hypothesis, called *Hubbert’s Life Cycle Hypothesis* or *Peak Oil*. He hypothesized the petroleum industry was young and expanding its infrastructure; the petroleum companies discovered and developed new large petroleum fields. Thus, market prices decrease over time as producers drilled and pumped more oil out of their fields. As discoveries become rarer and smaller, and petroleum depletion caused (marginal) extraction costs to increase, producers extracted less petroleum, boosting market prices. Thus, petroleum production should be parabola shaped. We depict the U.S. petroleum production in Figure 2, and it matches his description. Petroleum prices should show a “U-shape” over time. However, petroleum prices exhibit complicated patterns.

Hubbert underestimated the U.S. oil production peak by 10 years because technological advances extend the extraction time. Companies use technology to extract more oil, to drill deeper wells, and to become better at locating new reserves. Many experts focus on the declining portion of the petroleum production curve, where *oil depletion* occurs. Many experts believe the world’s petroleum production is declining because the world's petroleum production peaked in 2005. Out of the largest 21 petroleum fields, at least 9 are declining. Saudi Arabia admitted its mature fields were declining at a rate of 8% per year. Moreover, Kuwait has the
second-largest oil field in the world, the Burgan field, which has been declining since November 2005.

Figure 2. U.S. aggregate petroleum production

Economists use Malthusian economics to predict disasters about petroleum depletion. However, Malthusian economics ignores the role of high prices that spur innovation or backstop technology. **Backstop technology** is a resource becomes a perfect substitute for another natural resource at a higher cost. Hence, market prices must rise to a high level, to make society use the alternative resource. Alternative resources have higher extraction costs or require expensive technology. For example, shale rock contains petroleum. If the petroleum price becomes high enough, then someone invents new technology that allows companies to extract petroleum from shale rock. For another example, companies can convert coal into gasoline and diesel fuel via cracking and liquefaction. Thus, the United States can use its large reserves of coal to produce gasoline and diesel fuel.

Government can implement four policies for exhaustible resources:

**Policy 1:** Exhaustible resources generate economic rent, even for the competitive industries. Thus, government can tax the rent. Tax causes a greater market price and lower extraction rate, conserving the natural resource. Moreover, government receives tax revenue.

**Policy 2:** Governments usually nationalize their exhaustible resource industries, like the petroleum and natural-gas industries. For instance, the members of the Organization of Petroleum Exporting Countries (OPEC) own their petroleum resources. Consequently, government slows down the extraction rate and uses its profits for investment.
**Policy 3:** Government allows a monopoly to control the exhaustible resource. For this case, a monopoly provides a benefit in economics. A monopolist reduces production and increases market price. Thus, consumers decrease their consumption because of the higher market price. Monopoly causes higher market prices that result from the monopoly rent and user costs. Thus, these high prices cause consumers to conserve exhaustible resources! Moreover, the government could also tax the monopolist’s profits.

**Policy 4:** Government funds research and development. Then scientists and researchers develop new backstop technologies that supplant the diminishing natural resource. For example, many European countries and the United States push for more renewable-energy, such as electricity produced from wind and solar power, or biofuels produced from agricultural sources.

**Renewable Resources – Fisheries**

Renewable resources are natural resources that grow and replenish over time, such as fisheries and forests. Renewable resources have two features. First, the biological growth and harvest rates determine the resource amount. Second, the market structure influences the level that producers harvest the resources. Monopolies have lower harvest rates and greater market prices, while competitive markets have lower prices and higher harvest rates. If a renewable resource is open-access and is coupled with a competitive market, then suppliers can overharvest the resource causing declining fish stocks, or a species become extinct.

Renewable resources have one unique feature; the supply functions could bend backwards. For example, we show a fish market in Figure 3. Demand function represents consumers who eat fish, and the supply function represents the fishermen. If the market prices are low for fish, the supply function is normal. Hence, a higher price for fish causes fishermen to catch more fish. If the market price becomes too high, then fishermen over harvest the fish, causing fish populations to fall. Consequently, the quantity supplied begins to decline as the market price increases. Unfortunately, a high market price causes an extinction of a species.

Government can correct the over harvesting by creating property rights for renewable resources. Government estimates the population growth rate and sets the harvest rate at the optimal rate, which ensures the fish and animal populations grow. Government creates the number permits based on the optimal harvest rate. Government either gives the permits freely or auctions them to the fishermen. Thus, the permits limit the amount of fish that fishermen can catch because one permit equals one fish. Consequently, fishermen can sell or buy permits. We call these permits individually transferable quota (ITQ). Australia, New Zealand, Canada, Iceland, and Alaska use ITQs. For example, Canada successfully used ITQs for fishing and lobster stocks, and Alaska uses ITQs for the Alaskan halibut and king crab fisheries. Before the ITQs, the fishing season lasted three days. In those three days, fishermen would race and catch as many fish as they can. With ITQs, the fishing season lasts eight months.

ITQs have many benefits. First, the fish becomes a property right, and fishermen have an incentive to take care and manage this resource. Fishermen monitor their area and report poachers and illegal fishermen to government. Then the government can monitor the permit holders. Second, the ITQs could reduce the supply, so fishermen receive a higher price.
Although fishermen earn rents, the fishermen sell fresher fish, and the fish populations stay high and healthy that future generations can enjoy.

Figure 3. Backwards bending supply function for a renewable resource

ITQs have several problems. First, government has difficulty applying the ITQs in international waters. Second, how does government allocate the ITQs? Should government give the ITQs freely to the fishermen or distribute them equally? Finally, the fishermen earn economic rent. Hence, government helps the fishermen gain market power.

A government could impose a quota. A quota sets a limit on the amount of fish that all producers can harvest. Quota applies to the whole market and differs from an ITQ. Problem is the economic incentive. For instance, producers race to harvest as much fish as possible in order to satisfy the quota. After the producers had met the quota, nobody else can harvest anymore. Quotas are first come, first serve basis. Consequently, the quota is not a property right and a government may have trouble enforcing the quotas.

Government could impose taxes on the amount harvested. Thus, a tax decreases a firm’s revenue; reducing a firm’s harvest rate. Government could also tax effort. Effort is the number of man-hours and capital needed for the harvest. Consequently, the tax increases costs, reducing the amount harvested. Unfortunately, government may have problems in enforcing the taxes.

Government can impose other polices to stop over harvesting and declining fish and animal populations:

Policy 1: Government places ownership of the resource under one person. This is not a problem if a person or firm owns a lake. However, this solution would not work for seas and oceans that cross international borders. Owner becomes a monopolist and protects his private property. Furthermore, the owner could charge a fee to fish.

Policy 2: Government prohibits catching, fishing, or hunting during mating season. Then the species procreate and replenish the stocks.

Policy 3: Government restricts technology. Then fishermen have more difficulty in catching fish. Unfortunately, government may have difficulties restricting technology in international waters.
**Policy 4:** Government requires licenses for boats. A fisherman purchases one license for each boat. Consequently, fishermen pay a price to enter the fishing market. However, they could over invest in equipment to catch the most fish as possible.

**Policy 5:** Government prohibits and outlaws the catching, fishing, and hunting of a particular species. For example, some species of whales were becoming extinct. Man found a petroleum-based product that substituted for whale blubber.

These government policies are not perfect because some species migrate. For example, tuna and swordfish travel across large distances, migrating from a place with good management of resources to another area where fishermen overfish.

**Renewable Resources – Forests**

Economics for a forest is a dynamic decision. Unlike the fish, the lumberjacks know where the trees are. If a lumberjack cuts down a tree today, he could sell lumber to earn revenue, or he can let the tree grow another year. Then the tree becomes larger and yields more lumber next year. A problem arises when a country allows large-scale harvesting of trees, which leads to deforestation. **Deforestation** is people and communities clear the land by burning the trees or selling the timber.

Deforestation causes four problems. First, trees prevent soil erosion. Tree roots hold the soil together. If land becomes bare, then rainwater easily washes away the soil. Second, the land can become more arid. Trees provide surface cover that reduces evaporation, and the tree roots bring water deep from the ground and pull it towards the tree. Thus, water quality and supply both decrease during deforestation. Third, trees prevent the loss of biodiversity and animal habitat. Finally, carbon dioxide emissions increase because forests convert carbon dioxide into oxygen. Deforestation boosts greenhouse gases by 20%. Unfortunately, developing countries do not devote resources to solve problems, such as biodiversity or global warming.

Deforestation has five sources, which are:

**Source 1:** People earn money from selling the timber. Government or the people cut down the trees to export the timber products as a source of income. Therefore, poor countries may over harvest their forests until they become bare.

**Source 2:** Farmers and cattle ranchers clear the land for crops or pastures. Then they raise livestock. Some countries give subsidies to clear land. For example, Brazil offered tax breaks for converting forests into pastures used in cattle ranching.

**Source 3:** A country lacks property rights. People who do not own the land has little incentive to preserve it. Some people illegally cut down and sell the trees to earn profits. Illegal logging cost governments approximately $15 billion in 2002.

**Source 4:** A growing population and human settlements encroach on forests. If the people lack energy supplies, then they cut down the trees to use as a fuel.

**Source 5:** A country cuts down an enemy’s forest during a war. For example, the United States destroyed forests in two wars. First, the United States destroyed German forests during World War II to hurt the German nation. Second, the U.S. cleared forests with Agent Orange during the Vietnam War because the enemy easily hid within the dense jungles and attacked U.S. soldiers.
Government has three policies to correct deforestation.

**Policy 1:** Government creates a permit system for trees located on public lands. Subsequently, the government auctions the permits or gives them freely to the lumber companies. Furthermore, government can mark which trees the lumberjacks can cut down.

**Policy 2:** Government encourages people and businesses to plant and maintain trees.

**Policy 3:** If private property rights are lacking, then government converts the forests into private property rights. If government ignores property rights and the forest is an open-access resource, then government must monitor the resource to prevent people and communities to over harvest the resources.

**Water Resources**

Society’s demand for freshwater has tripled over the last 50 years. During this period, the world’s population grew from 2.5 to 6.45 billion people. Experts predict global water needs will increase by 2025. Cities will require 40% more water while agriculture will require another 20%. According to United Nations Educational, Scientific, and Cultural Organization (UNESCO) estimates, by 2030 global demands for fresh water will exceed the supply with potentially disastrous consequences.

Water is abundant in the world. However, people have a strong demand for fresh water, which comprises nearly 0.5% of the world’s total water supply. Agricultural producers consume about 69% of fresh water as they sprinkle and disperse water onto the crops. Some of the water evaporates or runs off the fields. Water runoff is bad because the runoff carries fertilizers and pesticides with it. Communities can suffer extreme circumstance if people’s water usage exceeds nature’s supply. One extreme case was the Soviet Union diverted river water to irrigate the cotton fields in Uzbekistan. This river recharges the Aral Sea, and the Aral Sea is drying up, losing half its original size.

Heavy industry uses approximately 15% of the usable fresh water. Power plants use water for cooling. (Hydroelectric plants use water to generate electricity; however, they do not consume the water.) Furthermore, ore and oil refineries use water in chemical processes. If oil refineries open new wells, they use water in drilling. As roughnecks drive a drill bit into the earth, they pump water down the well to cool the drill bit. Water also dissolves and carries the rocks and residues to the surface. Finally, manufacturing plants use water as a solvent.

Households use roughly 15% of the usable fresh water. People use water for drinking, bathing, cooking, sanitation, and gardening. Moreover, government purifies water to a quality standard, which it pumps to households and industries. Last demand for water is recreation and environmental activities. For some activities, the people do not consume the water because they swim, boat, or fish on the water. Other activities consume the water like golf courses. People play golf, and the golf courses use massive amounts of water to maintain a healthy, green grass. Finally, government may build an artificial lake to help an endangered species thrive and grow.

Demand for fresh water in some areas exceeds nature’s ability to regenerate it. Consequently, water scarcity has led to new forms of technology. For example, farmers use drip irrigation. **Drip irrigation** is they line thin pipes with holes along the crop rows. Then water gradually drips out of the pipes, only wetting the soil near the plants. Although drip irrigation is
more expensive, it delivers water more efficiently. Adopting drip irrigation becomes an economic decision; farmers compare the cost of the drip irrigation to the savings (benefits) in water costs. For another example, governments, especially in dry regions use brown water. Brown water is used water from households and business, which government minimally cleans and then ships to agricultural producers. Although brown water requires more infrastructure and separate water lines for this water, the government charges a cheaper price.

Water companies can use technologies to convert salt water into fresh water. For instance, desalination is producers convert seawater into fresh water through distillation and reverse osmosis. Distillation is the producers use heat to evaporate the water, and then they cool the water vapor, converting to a liquid, and leaving the salts behind. Evaporation is expensive because producers use heat to evaporate the water. Middle East and the resorts in Western Mexico use distillation to purify water. Their climates are arid and dry, and they have money to pay for cleaning water. Reverse osmosis passes water through a permeable membrane. Membrane allows water to pass, but it leaves the salts, minerals, and microorganisms behind. Some cities, like Singapore, use reverse osmosis to purify its wastewater, creating pure water. Nevertheless, the public is afraid to drink recycled water, and Singapore sells the reclaimed water to its industrial customers.

In many places, government pumps more water out of the ground than nature can replenish. Thus, Hotelling's Prices apply to this depletable resource. Overtime, water prices and extraction costs should rise for water. Governments must drill deeper wells and install more wells farther from the city; then it pumps the water to the city. For example, Florida has further complications from pumping water from the ground because salt water surrounds the state. As government and people pump fresh water out of ground, the salt water from the Gulf of Mexico and Atlantic Ocean seeps into the fresh water wells. Only the rain and storms replenish the ground water in Florida.

Key for Hotelling’s Prices is how fast nature replenishes the fresh water. If nature replenishes the water quicker than the amount a society uses, then the market price for water should fall. Thus, Hotelling’s Prices would not apply in this case. However, if nature replenishes the water slowly as a society consumes the resource, then Hotelling’s Prices would apply because water becomes a depletable resource.

Local government usually owns the infrastructure for fresh and wastewater because government must install an extensive infrastructure. Government must install pipes for both waste and fresh water, and add more pipes for different water types, such as brown water. Furthermore, government builds plants to purify drinking water and facilities to treat sewage water. Thus, customers usually pay a small portion of the costs. Government uses other tax revenue sources to subsidize this extensive infrastructure.

A government should charge a price for water that reflects its scarcity. For instance, the United States and many countries install water meters that measure a households water consumption, and consumers pay a low price. Some local governments maintain low price for water usage, even in dry, arid places, such as Southern California, the mid-West, and Florida. Government can force people to conserve by increasing the price for fresh water. Unfortunately, some local governments resorted to complicated rules, and then fine violators for violating the
rules. For example, local government imposes rules and regulations for special days to wash your car, or people can only water their landscaping during the nighttime to reduce evaporation. Of course, a government could simply raise water rates. Higher market prices always cause consumers to conserve resources and use less water.

**Waste Disposal and Recycling**

Landfill capacity in the United States is decreasing, while solid waste disposal costs and regulatory requirements are rising. Municipal governments usually finance and manage the landfills. Unfortunately, two problems confound waste disposal. First, a large household size or high-income families create more wastes. Second, municipal governments usually charge every household and businesses a flat fee (i.e. price) for garbage pickup. It does not matter if a family disposes garbage using one trash bin or three. They pay the same price. Consequently, people and businesses have no incentive to reduce their waste with a flat-fee.

Some municipal governments implemented *block pricing*. Block pricing forces the households and businesses to pay more if government picks up more garbage. Block pricing encourages households and businesses to reduce wastes and to increase recycling. However, block pricing may increase littering and illegal dumping as some violators refuse to pay a greater price to dispose their wastes.

City of Portland, Oregon uses block pricing. City government charges a flat fee for the first garbage bin and additional fees for additional bins. More garbage a family creates, the more they pay to dispose it. Furthermore, the city picks up recycled items for free, such as paper, glass, and cans. Although disposal companies pay more costs, they bury less at the landfill, extending the landfill’s life. Consequently, producers can use recycled materials and use less virgin materials.

Government can impose several policies to encourage recycling.

**First Policy:** A government or the public installs the infrastructure for recycling. Government or a firm installs collection centers at various places in a city. Moreover, households have a trash can and separate bins for recyclable materials, such as paper, glass, and plastic. Then the households sort their wastes and let the disposal companies collect the waste and recycled materials. They process the materials and sell them to the companies that use the materials to make products. Public must be aware of recycling, and they want to recycle.

**Second Policy:** Some states charge a deposit on items. For instance, the State of Michigan requires all consumers to pay a deposit of $0.10 per bottle or can. Deposit applies to all soda and beer containers and places an economic value on them. Furthermore, the consumers return bottles and cans to the stores and receive refunds. Even if consumers still litter, kids, young people, and the homeless collect the cans and bottles and return them to the stores. Unfortunately, some people bring in cans and bottles from other states to receive deposits too. Finally, some automobile parts stores charge deposits on car batteries, brake parts, and alternators. Then mechanics return the used parts to the stores, and the stores can recycle the car parts into new products.

**Third Policy:** Government bans the waste. Some states prohibit people and business to dispose old batteries, worn-out tires, ancient paints, and garden wastes. These states require
consumers to return those items to collection centers. Unfortunately, the prohibition and bans could encourage people to dump their wastes illegally.

**Fourth Policy:** Government mandates (requires) manufacturing to include a minimum percentage of recycled materials. Producers pay a greater cost because they must collect documents showing where the recycled material went, and the producers pay higher processing costs because recycled materials require more processing. Furthermore, the recycled materials may have a greater price than virgin materials.

**Fifth Policy:** A government requires producers to list recycling information on product labels. Environmentally conscious consumers can check labels and buy products that use recycled materials. Finally, government is a large consumer of products and services. It can use its purchasing power to buy products with recycled materials.

**Resource Sustainability**

*Sustainability economics* ensures future generations are no worse off than today’s generation. Sustainability economics is an equity issue and not an efficiency issue. For example, the markets may efficiently extract and consume petroleum. However, if a nation consumes its entire petroleum today, then future generations cannot use the petroleum. Consequently, it is not fair to future generations who also want to consume petroleum. Government could impose the following policies that protect the welfare of future generations (Daley 1995).

Government can use the following policies:

**Policy 1:** Renewable resources should be sustainable. Rate of harvest should not exceed the rate of regeneration. For fisheries, the producers set the harvest rate below the net birth rate, causing fish populations to thrive and grow.

**Policy 2:** Government sets the depletion rate for non-renewable resources to equal the same rate of development of renewable substitutes. For example, a country extracts petroleum from the ground. Then this country creates an income stream and investment stream. Society uses the income stream for current consumption and uses the investment stream to invest in alternative technologies that are substitutes. For example, electric cars replace fossil fuel cars, and drivers can use ethanol and biodiesel made from agricultural sources to replace fossil fuels.

**Policy 3:** Government should set degradable pollution levels and waste generation below the assimilative capacity of the environment. *Assimilative capacity* is the amount of wastes and pollution the environment can absorb with no ill effects. Some pollution and waste naturally break down over time. For example, the environment will decompose buried, household wastes. Furthermore, electric power plants emit sulfur dioxide into the air as they burn coal. Sulfur dioxide breaks down over time. We discuss pollution in detail in Chapter 19.

**Policy 4:** If the pollution or waste does not degrade, then government should set the emissions close to zero. Some examples include radioactive wastes and pollution like greenhouse gases. Greenhouse gases like carbon dioxide, methane, and nitrous oxide slowly degrade and break down over time.
Key Terms

- exhaustible resource
- renewable resources
- common property
- open access property
- urbanization
- Malthusian economics
- Hotelling’s Prices
- economic rent
- user costs
- Hubbert’s Life Cycle Hypothesis
- Peak Oil
- oil depletion
- backstop technology
- individually transferable quota (ITQ)
- quota
- effort
- deforestation
- drip irrigation
- brown water
- desalination
- reverse osmosis
- block pricing
- sustainability economics
- assimilative capacity

Chapter Questions

1. Is gold an exhaustible or renewable resource since producers extract gold but do not consume it?

2. Many Malthusian scenarios never come to fruition because humankind continues consuming resources while the population grows. Why do people believe these disastrous predictions?

3. Is the electric car a backstop technology for petroleum? Remember, cars use gasoline that producers create from petroleum.

4. Is it advantageous for a government to own and extract an exhaustible resource, like petroleum?

5. What would happen if government underestimated the optimal growth rate of a particular species? For example, government thought the optimal harvest rate was 1,000,000 fish per year, but it was actually 50,000.


7. Why do developing countries have a higher deforestation rate than developed countries?

8. European Union created a permit system for carbon dioxide. Heavy industry must buy carbon permits because they emit large amounts of carbon dioxide. Should producers include deforestation in a permit system?

9. What would happen if government charged everyone the same monthly fee each month, and
this fee was not connected to a household’s water use?

10. Is it a good policy for a local government to maintain artificially low rates for water usage?

11. Many people dump their used automobile oil in the trash or pour it along a fence to kill bugs. Should government ban the dumping of used car oil?

12. Greenhouse gases cause global warming, and the gases degrade slowly over time. Unfortunately, cars and trucks emit a significant level of greenhouse gases. Identify a suitable policy for cars and trucks if a government sets greenhouse-gas emissions close to zero.
19. Environmental Regulations

Government imposes environmental regulations to reduce pollution and protect the environment. Scientists know pollution can cause problems, such as burning coal to generate electricity because coal contains trace amounts of sulfur and mercury that firms release into the atmosphere. Moreover, the sun converts the sulfur into acid rain, while mercury in large concentrations kills all life forms. Other forms of pollution could have an impact on future generations, such as global warming. Consequently, government imposes numerous regulations to protect the environment. However, many businesses in developed countries believe government overburdens them with regulation costs, while government and environmental groups strive for stronger environmental regulations. Therefore, governments in developing countries encourage businesses to relocate to their countries because they have lax or no environmental regulations.

**Point Source Pollution**

**Point source pollution** is government can easily identify and monitor the pollution sources. For example, electric power plants emit pollution into the atmosphere using smokestacks. United States has approximately 600 coal burning electric power plants that the government can easily monitor. Furthermore, pollution is a negative externality. A firm creates pollution that impacts or harms others and the environment. Consequently, the firm treats the environment as common property and freely pollutes the environment without paying a price. Unfortunately, the pollution harms other parties, who use the environment. Thus, property rights are not well defined because polluting firms do not pay for the right to pollute the environment.

Government has three tools to force environmental regulations upon industries that pollute, which are command-and-control regulations, lawsuits, and market incentives. **Command-and-control regulations** are government uses laws and regulations to tell which standards and technology firms must use to reduce pollution. It is another name for an unfunded mandate. Moreover, government could impose the technology and machines that an industry uses, and it fines and penalizes companies that violate the rules. For instance, the U.S. government requires electric power companies to install “scrubbers” to clean power plant emissions. An advantage of command-and-control regulations is government easily enforces the rules, and the regulatory agency assesses fines and penalties on violators. However, these regulations limit a firm’s flexibility and freeze technology. Thus, firms do not produce at minimum costs and command-and-control regulations may force firms to produce inefficiently.

United States has many laws that allow people to sue firms and companies that pollute. Hence, lawsuits have two benefits. First, firms that pollute are punished, and they, most likely, will pay large damage awards if they lose their court case. Second, companies take a proactive approach in reducing pollution. If firms know that they are creating negative externalities, they reduce their negative externalities to reduce the likelihood of being sued. Unfortunately, lawsuits may not be a good policy to reduce pollution. First, lawyers seek large legal fees and damage awards that may exceed the true cost of damage to the environment. Second, courts are
slow, and judges rarely devise comprehensive plans to reduce pollution. Instead, they hear cases as they arise. Finally, some firms fled the United States and relocated to countries with fewer harsh environmental laws.

A government can use **market incentives**, such as a market’s price or quantity to internalize the externalities. Price incentives are pollution taxes while quantity incentives are tradable pollution permits. Consequently, market incentives give firms more flexibility, and firms could meet pollution objectives with lower costs. However, market incentives raise a government’s enforcement costs.

For the first market incentive, a government imposes a **Pigouvian Tax** directly on the pollution. If a government imposes a tax on anything else other than pollution, then government can create perverse incentives. For example, an electric power plant burns coal to produce electricity. If government imposed a tax on the amount of coal that an electric power plant burns, then power plants could lower costs by buying a “dirtier” coal. Consequently, government must place a tax on emissions and not a resource input.

We show a market in Figure 1, where the market price equals $P^*$ while market quantity is $Q^*$. Firms freely pollute, and they represent the supply function, while the consumers form the demand function. Government imposes a tax on the pollution, forcing companies to pay for their pollution. Polluting firms reduce their supply, and the supply function shifts leftward by the amount of the tax. Pollution tax causes a higher market price and a lower market quantity. From Chapter 4, we considered taxes inefficient because they reduced a society’s social welfare; however, a Pigouvian Tax is efficient! Pollution tax causes firms to internalize the externality because firms pay all costs, including the pollution costs. Consequently, firms still pollute, but they pollute less.

![Figure 1. Pigouvian Tax on polluting firms](image)

Pigouvian Tax creates two benefits. First, a tax encourages firms to develop new technology that reduces pollution. Therefore, a polluting firm reduces its pollution tax if the firm implements new technology to reduce pollution. Second, government collects tax revenue. Thus, government could reduce other taxes, reducing distortions in other markets. Pigouvian Tax has a
problem. Pigouvian Taxes require the government to collect a massive amount of information to implement the tax correctly.

** Tradable emission permits** create a market incentive. Government sets the maximum limit of pollution or concentration level that any firm can discharge into the environment. Government gives companies transferable emission permits. Consequently, each permit sets the maximum amount of pollution that the permit holder can emit. Transferable emission permits are similar to individually transferable quotas used in renewable resources in Chapter 18.

Government distributes permits among producers in a region. Government has two methods to distribute permits. First, government could auction the permits, which gives government revenue. Second, government gives permits freely to the firms (called *grandfathering*). Although a government does not receive revenue, the firms may not resist the government as it implements a permit system if a government gives those permits freely.

A pollution permit creates two things. First, firms can buy or sell permits in a market. For example, one permit allows the release of one-ton of sulfur emissions into the atmosphere. Second, the permit creates a market price of pollution, converting the right to pollute into a property right.

For the tradable permit system to work, the permits must be identical, standardized, and divisible, in order for firms and traders to buy and sell them. Divisible is a company can split a permit into smaller units. U.S. government created tradable pollution permits for the electric power industry because they emit sulfur dioxide and mercury. In theory, the emissions permit has the same impact as a Pigouvian Tax if a government has designed the market correctly.

Theory behind pollution permits is simple. Permits cause some firms to invest in pollution reduction technology. If these firms have permits, then they can sell them because they lower their pollution emissions. Other firms that do not invest in technology could increase their level of pollution by buying permits from the market. Thus, a government converts a resource such as air into a property right. Moreover, environmental groups could buy these permits and retire them. Hence, environmentalists never use these permits, and they reduce the pollution level.

Tradable pollution permits have problems. First, regulators must have sufficient knowledge to design the market, and a government must monitor pollution levels. Moreover, government must implement a legal system to ensure property rights are well defined. Second, the pollution permit market may be small, so one or several firms could dominate the market.

Polluting firms and people harmed by the pollution may not need government intervention. They can negotiate among themselves to reduce pollution, which we called the *Coase Theorem*. Economists named the Coase Theorem after the Noble laureate Ronald Coase (1960), who stated disputing parties would work out an efficient, private agreement that does not depend which party holds the property right. For example, a firm dumps pollution into a lake that kills the fish. This situation has two possibilities:

**Possibility 1:** If a government gives the right to use the lake to the fishermen, then the polluting firm will negotiate and pay the fisherman to pollute the lake.

**Possibility 2:** If a government gives the right to the polluting firm, then the fishermen will pay the firm not to pollute the lake.
Coase Theorem would work for a small group of people. One benefit is private parties solve a pollution problem without the government’s help. However, the Coase Theorem has several problems. First, a large group of people would have difficulty agreeing. Second, the Coase Theorem requires all parties to have perfect knowledge and pay zero transaction costs. Third, a court system enforces contracts freely. Fourth, property rights are well defined. Finally, no parties have a wealth effect. From the example above, if a government gives the right to pollute the lake to the firm, and the right makes the firm wealthier, then fishermen must pay a greater compensation, contrary to whether government gave the right to the fishermen.

Countries with tough environmental regulations can create leakages. A *leakage* is companies relocate to countries with lax environmental laws, thus, increasing their pollution emissions. For example, the U.S. federal government has been passing tougher environmental laws, causing some U.S. firms to relocate to Mexico. Then they export their products to the U.S. and even pollute more because Mexico is lax on environmental laws. Furthermore, the pollution can drift north, affecting the United States.

**Nonpoint Source and Transboundary Pollution**

*Nonpoint source pollution* is pollution emitted from many sources. Consequently, government cannot identify and monitor the pollution sources. Examples include soil erosion, fertilizer, and chemical runoffs from agricultural fields, and pollution emissions from automobiles. Thus, these pollution forms have so many sources that government cannot monitor and regulate the pollution. Unfortunately, nonpoint source pollution causes an asymmetric information problem. Polluters have more information than the government and public. Consequently, polluters can use this asymmetric knowledge to pollute more.

Although a government has difficulties monitoring nonpoint pollution, it can use a technology standard or prohibition. A *technology standard* is government dictates a technology that people and businesses must use. For example, the State of Texas uses a technology standard for the large cities of Austin, Dallas, and Houston. These great cities suffer from air pollution with cars and trucks being the large source. Thus, all residents must have certified technicians at service stations check their car’s emission levels every year. If a person’s car fails the emissions test, the station attendants do not issue an inspection sticker. Consequently, the state imposes fines if an officer or agent catches a person driving without an inspection sticker. Unfortunately, the Texas Air Quality Standards have several problems. First, the state must monitor the service stations, ensuring employees are certified and the technicians perform the tests correctly. Second, people who know their cars will not pass can avoid this inspection. These people use relatives’ addresses outside the cities to obtain inspection stickers that do not require the emissions test. Finally, people could bribe the technicians to pass them, or they just drive without the inspection sticker, hoping the police never pull them over.

Government could prohibit an activity. A *prohibition* is government makes a particular activity illegal. For example, many large cities and counties prohibit the burning of garbage. Consequently, all households and businesses must dispose their waste through a city’s waste disposal system. Furthermore, many cities and counties prohibit people and business to dispose used car oil or car batteries. Residents and businesses must take their wastes to collection
centers. Then a local government assesses large fines when it finds a person who has violated the prohibition.

**Transboundary pollution** is one country emits pollution, and the pollution drifts to other countries without pollution problems. Transboundary pollution could be a point source or nonpoint source. For example, the U.S. electric power companies emit sulfur dioxide as a point source emission. Unfortunately, the sulfur dioxide drifts north to Canada and forms an acid in the clouds. When it rains, the slightly acidic rain accumulates in lakes, killing the fish, or it kills the forests by depleting the soil’s minerals. Acid reacts with minerals, causing rainwater to dissolve the minerals and carry it away. Thus, Canada suffers from acid rain damage. For another example, one country pollutes the oceans and seas, and the polluted water drifts to the shores of other countries.

**Global warming** is both a transboundary and nonpoint source pollution. Scientists believe global warming is greenhouse gases building up in the atmosphere. Greenhouse gases trap more of the sun’s heat warming the earth. Global warming may cause ocean levels to rise as a warmer earth melts the ice and snow at the south and north poles. Then coastal cities will disappear under the rising oceans. Moreover, various species may become extinct, and we experience more extreme weather events, such as stronger hurricanes and catastrophic tornadoes.

Greenhouse gases include carbon dioxide, methane, nitrous oxide, and water vapor with the largest source of greenhouse gas being carbon dioxide. When a society burns fossil fuels, such as diesel fuel, gasoline, or coal, the combustion releases carbon dioxide into the atmosphere. Consequently, carbon dioxide builds up in atmosphere, allowing the earth to trap more heat. It makes no difference where the carbon dioxide was emitted. Moreover, humans, animals, and bacteria breathe out carbon dioxide while plants and algae recycle the carbon dioxide, creating oxygen and storing the carbon within the plant.

Global warming is a theory. Scientists do not know if the earth is experiencing a warming trend as one of the earth’s natural cycles, or if greenhouse gases are warming the world. However, lawyers filed lawsuits over global warming. For instance, one lawsuit forced the Environmental Protection Agency (EPA) to add carbon dioxide to its list of regulated pollutants. Thus, this lawsuit has given the EPA vast authority to regulate the U.S. economy. Furthermore, U.S. Congress is discussing and debating a permit system for greenhouse gases, and governments at all levels in U.S. are imposing new restrictions on heavy industry and manufacturing. Again, these regulations encourage firms to flee to countries with lax environmental standards, such as China.

Countries can form an international agency or agreement that corrects transboundary pollution. For example, the **Montreal Protocol** banned the production of chlorofluorocarbons (CFCs) for member countries. CFCs are gases used in air conditioning and refrigerators. Scientists believe CFCs destroy the ozone layer, widening the ozone hole that hovers around the South Pole. Unfortunately, the hole in the ozone layer allows more ultraviolet radiation to enter the earth’s atmosphere. Montreal Protocol successfully eliminated CFCs because several companies produce CFCs, and these companies discovered a substitute refrigerant. Usually, these bans are not effective because some countries will violate the ban.
Kyoto Protocol is another international agency. Kyoto Protocol requires member countries to reduce their greenhouse-gas emissions to their 1991 levels. Unfortunately, this international agency has a severe problem. Some countries did not join international agency, and they pollute at higher levels. For instance, the United States signed the Kyoto Protocol but failed to implement it. United States is one of the world’s largest sources for greenhouse-gas emissions. Moreover, China did not sign the Kyoto Protocol as its economy rapidly catches up to the United States in greenhouse-gas emissions.

Water Pollution

Water is an important resource because humans, animals, and plants require water. Unfortunately, humans dump wastes or chemicals into water, polluting the water and harming the life that needs it. Pollution could be a point source or nonpoint source. A point source is the water pollution has an identifiable source. Polluted water has four sources, which we identify as:

**Source 1:** Discharge from a sewage-treatment plant is a point source. A sewage-treatment plant collects wastewater from a city. Then it treats and releases the water to the environment. Sewage water contains 99% water and 1% organic wastes. A treatment plant can remove 90% of these wastes. As the plant cleans the wastewater, it creates sludge. Then the plant transports the sludge to landfills, spreads the sludge over land, incinerates it, or dumps it in the sea. Usually, a water-treatment plant cannot handle industrial wastes.

**Source 2:** A factory discharges wastewater into a river, lake, or ocean. Governments in developed countries require factories to discharge their wastes to a water-treatment plant or treat their own wastes if a local treatment plant cannot handle it. In developing countries, the factories dump the wastes into ponds, lakes, rivers, or oceans.

**Source 3:** A city’s storm drainage system creates polluted water. When rain falls on a city, a city has a system that collects the rainfall. Unfortunately, the rainwater picks up chemicals, oils, and wastes and carries it in the water. In developed countries, treatment plants treat both storm drain water and wastewater. However, a government allows companies to discharge the rainwater into a lake, river, or ocean in developing countries. Although we should consider the storm drainage system as a nonpoint pollution source, the city’s system collects the water and converts it into a point source.

**Source 4:** Farmers raise livestock and poultry that create animal wastes. In developed countries, the farmers collect the runoff from animal wastes into lagoons. Then the farmers mix the animal wastes with water, creating a slurry. Subsequently, they spray the slurry onto the grasslands, or they mix the wastes with straw. After the wastes finish decomposing, the farmers sell the organic material to gardeners and farmers as compost. If the runoff from animals wastes contaminates a river or lake, it kills the life in the water. Although bacteria break down the wastes into organic substances, the bacteria consume the oxygen in the water, killing the fish and other life forms.

Government has only two policies: Prohibit the pollution and command-and-control regulations. For example, government imposes command-and-control regulations where local governments must treat their wastewater in wastewater treatment plants. Since they are a government institution, they can be bureaucratic, inefficient, and corrupt. Privatization could be
just as bad since privatization would create a monopoly. In developing countries, treatment plants discharge 90% of sewage without treatment because the companies cannot pay the high infrastructure costs, and a government does not have the resources to treat the wastes. In developed countries, local governments collect a variety of taxes that they can use to subsidize the infrastructure. Thus, water companies charge low prices for fresh water and wastewater treatment in developed countries.

Government can enforce a regulation that forces farmers to collect the animal wastes in lagoons, and then the farmers dispose their wastes properly. Furthermore, the local and state governments in the U.S. have created a permit system for water, and the right to discharge wastes into water. However, companies rarely use the permits, and they remain not popular.

Water pollution is a nonpoint source pollution because its sources are so numerous that government cannot monitor them or identify the source. Common nonpoint pollution is water runoff from farmers’ fields. Unfortunately, the rainwater carries wastes, pesticides, and chemicals, such as nitrogen from manure, phosphorous from fertilizers, and animal wastes. Both algae and bacteria thrive on these wastes. If algae grow thickly on top of the water, then the sunlight cannot penetrate the bottom of the lake, ocean, or river. Thus, the underwater plant life dies off, which harms the ecosystem. Furthermore, bacteria consume the oxygen in the water, suffocating and killing the fish.

For example, animal wastes create dead spots in the Gulf of Mexico, which we call the Red Tide. Farms scattered throughout the mid-West create the animal wastes as water runoff from the fields carries animal wastes, organic materials, and fertilizers to the rivers that feed into the Mississippi River. Then the Mississippi River carries the polluted water to the Gulf of Mexico. Consequently, the bacteria feed off these wastes and chemicals, consuming all the oxygen in the water. Then the wildlife in the Red Tide dies. Unfortunately, the Gulf of Mexico has large dead spots in the ocean, and the bacteria give the water a reddish hue.

Government’s policies to correct nonpoint source water are similar to point source: command-and-control regulations or prohibition. For example, government prohibits people, businesses, or governments to dump sewage, sludge, garbage, and even toxic pollutants into water. Furthermore, governments require farmers to build riparian buffers that reduce water runoffs from the fields. A riparian buffer is a farmer plants trees and fields around the irrigation ditches. As rainwater washes off the field, a riparian buffer traps the runoff, preventing flows into irrigation ditches. Some experts proposed a permit system, but a government would have difficulties to monitor this system.

The Porter Hypothesis

Porter Hypothesis is environmental regulations can spur innovation, increasing a firm’s competitiveness. Although an environmental regulation imposes costs, an innovation may offset this cost by increasing product quality or decreasing other production costs. For example, Robbins Company manufactures jewelry. U.S. government planned to shut down this company for discharging too much contaminated water. However, the company’s engineers found a way to clean the polluted water, which was 40 times purer than purchasing water from the city government. Consequently, the company produced higher-quality jewelry and rejected fewer
products. Furthermore, the innovation allowed the company to purchase less water because the company recycled its water. Thus, environmental regulations led to technological advances and reduced manufacturing costs.

Porter (1995) identified the following benefits of environmental regulations:

**Benefit 1:** A company gathers information about pollution, when it submits reports to government. Consequently, a company learns about its pollution level and production inefficiencies. Then a company knows where to focus technological improvements.

**Benefit 2:** A regulation creates pressure that encourages firms to innovate and progress technology.

**Benefit 3:** A regulation levels the playing field because all companies must comply to the same regulations.

**Benefit 4:** Even if firms do not innovate, government imposes regulation to improve the environment.

Some economists criticized the Porter Hypothesis. They admit firms can theoretically innovate to reduce regulation costs, but innovations are not common (Palmer, Oates, and Portney 1995). Regulations raise costs because firms pay more to comply with the regulations. A business hires compliance specialists, invest in new machines and equipment, and sends lengthy reports to government. Moreover, companies are always searching for technologies and innovations that reduce costs and increase profits. If scientists and engineers discover a better way to produce something, then companies would already be using it.

*The Environmental Kuznet Curve*

*Environmental Kuznet Curve* is a relationship between environmental degradation and income per capita for a country. It has an upside down U-shape that we show in Figure 2. A country with a low income per capita as measured by GDP does not invest in pollution abatement. As income per capita increases, a country invests in more pollution abatement. Thus, societies go through the following transitions:

![Environmental Kuznet Curve](image.png)

**Figure 2. Environmental Kuznet Curve**
Stage 1: An agricultural society transforms into a heavy industrial society. An industrial society pollutes more. Over time, services and light industries replace the heavy industries that generate less pollution.

Stage 2: Environmental regulations can strengthen over time as a country develops. A more developed country collects more taxes and strengthens regulatory agencies to enforce pollution laws.

Stage 3: A high-income country has more wealth and income to invest in pollution equipment.

Stage 4: A country experiences a cycle of deforestation and then afforestation.

Some economists criticize the Environmental Kuznet Curve. Some pollution levels increase over time and never decrease. For example, a high-income country uses technology to reduce a car’s emissions; however, people have more wealth and incomes to buy more cars, increasing the pollution. Furthermore, some countries do not exhibit the Kuznet Curve, but the relationship could be obscured. As developed countries develop pollution abatement technologies, developing countries implement these technologies at a faster pace, obscuring the Kuznet curve. Consequently, the developing countries quickly learn from the developed countries, skipping stages in transition.

Key Terms

point source pollution
command-and-control regulations
market incentives
Pigouvian Tax
tradable emission permits
grandfathering
Coase Theorem
leakage
nonpoint source pollution
technology standard
prohibition
transboundary pollution
global warming
Montreal Protocol
Kyoto Protocol
Red Tide
riparian buffer
Porter Hypothesis
Environmental Kuznet Curve

Chapter Questions

1. Identify the best methods to minimize pollution for the lowest cost.

2. Environmentalists do not like permit systems because they believe permits reward polluters for doing something bad to the environment. Do you agree with this statement?

3. Appraise whether lawsuits are effective in reducing nonpoint source pollution.

4. Which percentage of dry air is composed of carbon dioxide?
5. How can government correct the problem with the Red Tide in the Gulf of Mexico?

6. San Diego, California is located in a dry region with little water resources. A wastewater treatment plant has become very efficient at cleaning the water; treatment plants possess the technology to convert wastewater into drinking water. Should all communities implement this technology?

7. Do businesses and institutions always adopt the most-recent technology?

8. Economists debate whether the Environmental Kuznet Curve exists. Could developing countries learn and adopt new technologies quickly, thus obscuring the relationship in the Kuznet Curve?
Economists use game theory to analyze strategic behavior. For example, a firm with few competitors in the market must consider how its rivals will react when the firm introduces a new product, pricing strategy, or a new service. Furthermore, political leaders must consider how the public would respond if they had passed a new regulation or tax. Public would react to the public policies. Consequently, we can structure any situation into a game theory problem, where two or more parties have choices. Thus, this chapter explains game theory for two players. Students learn to solve for a game equilibrium for simultaneous and sequential games. Then we introduce examples where government becomes one or both players.

Introduction to Game Theory

Games have rules that set the game’s structure. Games have a variety of forms and rules, and some are:

- Games vary in the number of players. For this chapter, we study games involving two players.

- Games have different timing and limit a player’s moves. A **simultaneous game** is both players move at the same time while **sequential game** is one player moves first and then the other. A game limits the number of player’s moves. A **static game** allows each player to move once, while a **dynamic game** lets players move sequentially.

- A game may end with **equilibrium**, which is the solution to the game. Out of all players’ strategies, players pursue a route that would lead to equilibrium. However, some games may not have equilibrium.

- Players make actions by selecting strategies and choices. After each player moves, each player receives a payoff. **Payoff** can be a benefit or punishment. We assume the players are rational because they maximize positive payoffs and minimize negative payoffs. Consequently, players strategize to maximize his or her gains from the game.

- Players have access to different levels of information. If players have **perfect information**, then all players know the entire game’s history when it is time for a player to move. Games can have **complete information**, where the players know their payoffs and the payoffs of his or her rivals. Therefore, players can predict action by others. Finally, some games contain **incomplete information**, where players know their payoffs, but not his or her rival’s payoffs.

- We assume players have common knowledge, where the players know the game’s structure.
We have the game below for two players in Figure 1. We show a static, simultaneous game, where the players have complete information and possess common knowledge. We denote Row Player by a R, and Column Player by a C. Row Player has three strategies or choices: R1, R2, and R3 while Column Player has three strategies: C1, C2, and C3.

<table>
<thead>
<tr>
<th></th>
<th>C1</th>
<th>C2</th>
<th>C3</th>
</tr>
</thead>
<tbody>
<tr>
<td>R1</td>
<td>10, 3</td>
<td>7, 10</td>
<td>5, 7</td>
</tr>
<tr>
<td>R2</td>
<td>20, 7</td>
<td>15, 12</td>
<td>10, 6</td>
</tr>
<tr>
<td>R3</td>
<td>7, 7</td>
<td>6, 14</td>
<td>9, 5</td>
</tr>
</tbody>
</table>

**Figure 1: Row and Column Players**

Numbers in each cell are the payoffs. First number in each cell is the payoff to the Row player while the second number is the payoff to the column player. Players can receive profits, money, or utility. A greater payoff yields a larger benefit to the player. However, a payoff can be negative such as prison time or spanking. In this case, players would strive for lower numbers. Bottom right cell has a 9 and 5. If Row player selects strategy R3 while Column Player selects C3, Row player gets a 9 payoff while column player receives a 5 payoff.

A **dominant strategy** is a player can maximize his payoff, regardless of the other player. For example, if Column player chooses C1, he or she may receive a 3, 7, or 7, depending on the Row Player. If Column player chooses C2, he or she may receive a 10, 12, or 14. Did you notice the Column player would earn a greater payoff if he or she always selected C2 over C1? Just compare them piecewise. A payoff of 10 is better than a 3. A payoff of 12 is better than 7. Finally, a payoff of 14 is better than 7. Nevertheless, we are not finished. Compare strategy C2 to C3. Clearly, Column player always would choose C2 relative to C1 and C3 because the player receives a greater payoff. Consequently, Column player has C2 as a dominant strategy and never would choose C1 or C3.

Does the Row player have a dominant strategy? If the Row player selects strategy R1, he or she receives 10, 7, or 5 depending which strategy Column player selects. If Row player selected R2, he or she would receive 20, 15, or 10, which is better than R1. Just compare the payoffs piecewise. Compare 20 to 10. Then compare 15 to 7, and finally, 10 is better than 5. However, we are not finished. Does strategy R2 dominate R3? Compare the payoffs piecewise, and R2 does dominate R3. Consequently, Row player has a dominant strategy R2.

We know the solution to the game. Row player always would choose R2 while Column player always would choose C2. Therefore, Row player earns a payoff of 15 while Column player receives 12. However, many games do not have dominant strategies, but we search for dominant strategies first.

**Prisoner’s Dilemma** is the most common example in game theory. Economists apply prisoner’s dilemma to many situations across many disciplines in economics. Original Prisoner’s Dilemma is two criminals commit a crime together, and the police arrest both at the same time. Police separate the criminals in separate interrogation rooms. Criminals face the
payoff in Figure 2. Payoffs are negative because the criminals receive a punishment, and they want to spend the least amount of time in prison.

<table>
<thead>
<tr>
<th></th>
<th>Rat</th>
<th>Clam</th>
</tr>
</thead>
<tbody>
<tr>
<td>Criminal 1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rat</td>
<td>-2, -2</td>
<td>-0.5, -5</td>
</tr>
<tr>
<td>Clam</td>
<td>-5, -0.5</td>
<td>-1, -1</td>
</tr>
</tbody>
</table>

**Figure 2. Two criminals face prison time for their crime**

Criminals would prefer Cell 4. If they clam up and remain silent about their crime, they spend a year in prison. However, the police convince one criminal to confess and implicate his partner, so he gets a half year in prison while his partner spends 5 years in prison.

Criminal 2 has a dominant strategy to rat on his partner. If he rats, he spends either 2 years or a half-year in prison. If he clams up, he serves either 5 years or one year in prison. Similarly, Criminal 2 has a dominant strategy to rat on his partner. Consequently, they both rat on each other, and we end up in Cell 1, where each criminal spends 2 years in prison.

By changing the payoff, we change the game’s outcome. Let us say both criminals serve in a mafia crime family. Mafia imposes a strict code: Death to all rats! We have the new payoff in Figure 3.

<table>
<thead>
<tr>
<th></th>
<th>Rat</th>
<th>Clam</th>
</tr>
</thead>
<tbody>
<tr>
<td>Criminal 1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rat</td>
<td>death, death</td>
<td>death, -5</td>
</tr>
<tr>
<td>Clam</td>
<td>-5, death</td>
<td>-1, -1</td>
</tr>
</tbody>
</table>

**Figure 3. Criminals are members of a mafia**

Criminals prefer life to death, and they would never rat on their partner. Their dominant strategy becomes to clam up and remain quiet. Consequently, both partners clam up, and they both serve one year in prison.

Players may not have dominant strategies in many games, so we introduce a method to solve for these games’ equilibrium. We call it **Nash Equilibrium**, where every player’s strategy plays the best response to the other player’s strategies. Nash Equilibrium also works for games where players do not have dominant strategies.

For example, we show a Prisoner’s Dilemma with no dominant strategies in Figure 4. For instance, if Prisoner 2 rats, he may serve two years in prison or a half year. If Prisoner2 clams, he may serve five years in prison or no time in prison. Clearly, the prisoner views two years better than five years for the rat strategy. However, the prisoner views the zero years to the half year in prison for the clam strategy. Thus, Criminal 2 has no dominant strategy. Similarly, Criminal 1 does not have a dominant strategy either. Note, we can have games where one player has a dominant strategy while the other player does not.

We use a trick to solve for the Nash Equilibrium. We must analyze every player’s choices.
**Part 1:** If Criminal 2 chooses “Rat”, what should Criminal 1 do? Thus, Criminal 1 selects “Rat” because two years in prison is better than five years.

**Part 2:** Since Criminal 1 chooses “Rat,” which strategy should Criminal 2 choose? Criminal 2 selects “Rat” because Criminal 2 rather would serve two years in prison than five years. Did you notice Criminal 1 and Criminal 2 selected the same cell? Thus, a Nash Equilibrium is Rat-Rat. If both criminals selected different cells, then we would not have a Nash Equilibrium.

\[
\begin{array}{ccc}
\text{Criminal 1} & \text{Rat} & \text{Clam} \\
\text{Rat} & -2, -2 & -0.5, -5 \\
\text{Clam} & -5, -0.5 & 0, 0 \\
\end{array}
\]

**Figure 4. Prisoner’s Dilemma with no dominant strategies**

We are not finished because we must analyze every player’s choices. Thus, we do this trick again.

**Part 1:** If Criminal 2 chooses “Clam,” what should Criminal 1 do? Criminal 1 would choose “Clam” because he rather would serve zero years in prison than a half year.

**Part 2:** Since Criminal 1 chooses “Clam,” what should Criminal 2 select? Criminal 2 would choose “Clam” because he rather would serve zero years in prison than a half year.

Thus, we have a Nash Equilibrium, Clam-Clam because Criminals 1 and 2 have selected the same cell. Of course, this game yields two Nash equilibriums. A natural question arises – do players prefer one Nash Equilibrium over the others? For this game, the criminals would prefer the Clam-Clam strategy because they would serve zero years in prison.

We show a game of male-female dating in Figure 5. Couple plans a dating activity, and they receive a payoff in utility. Analyzing the game, the man and woman have no dominate strategies. Hence, we search for a Nash Equilibrium.

\[
\begin{array}{ccc}
\text{Man} & \text{Football} & \text{Ballet} \\
\text{Football} & 10, 1 & 0, 0 \\
\text{Ballet} & 0, 0 & 1, 10 \\
\end{array}
\]

**Figure 5. Game of male-female dating**

We start with the woman. If she chooses football, what is the man’s best strategy? Man chooses football because he receives more pleasure watching football with her than watching ballet alone. If the man chooses football, what is the woman’s best strategy? Woman chooses football because she receives a greater utility watching football with a man than watching ballet alone. Consequently, this game yields a Nash Equilibrium of Football-Football.

We move to the woman’s next choice. If the woman chooses ballet, what is the man’s best strategy? Man chooses ballet because he receives more utility watching ballet with the woman.
than watching football alone. If the man chooses ballet, what is the women’s best strategy? Hence, she chooses ballet because she receives a greater utility watching ballet with a man than watching football alone. Thus, this game bears a Nash Equilibrium of Ballet-Ballet.

We can ask the next question – do the players have a preferable equilibrium? We cannot add utility together because utility reflects a person’s preferences. For the Football-Football Equilibrium, the man receives 10 units of utility while the woman receives one unit. For the Ballet-Ballet Equilibrium, the women receives 10 units of utility while the man receives one unit. Consequently, both players do not prefer the same equilibrium unless we want to argue one person’s utility is more important than the other person’s utility.

Some games can be a Zero Sum Game, where one player gains while the other player loses. We depict a Zero Sum Game in Figure 6. Did you notice the payoffs? For Cell A-A, the Column Player receives a payoff of one unit while the Row Player loses one unit for his payoff. All payoffs in every cell must sum to one for a Zero Sum Game. These games include players who steal or gamble.

<table>
<thead>
<tr>
<th>Column Player</th>
<th>A</th>
<th>B</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>-1, 1</td>
<td>3, -3</td>
</tr>
<tr>
<td>B</td>
<td>0, 0</td>
<td>-2, 2</td>
</tr>
</tbody>
</table>

Figure 6. Zero sum game

Players never have dominant strategies for Zero Sum Games, and these games never bear a Nash Equilibrium. Solving for the Nash Equilibrium, if the Column Player selects A, what should the Row Player choose? Row Player selects B. If the Row Player selects B, what should the Column Player do? Column Player selects B. Since the players choose different cells, we have no Nash Equilibrium for these choices.

We search for the Nash Equilibrium for the next choice, if the Column Player selects B, what should the row player choose? Row Player selects A. If the Row Player selects A, what should the Column Player choose? Column Player selects A. Again, both players chose different cells. Thus, we have no Nash Equilibrium. Consequently, Zero Sum Games never have a Nash equilibrium. We call these strictly competitive games.

We show a complicated game in Figure 7. Column Player has choices: C1, C1, C3, and C4 while the Row Player has strategies: R1, R2, R3, and R4. We check if any player has a dominant strategy, and they do not. Although this example appears more complex, we use Nash Equilibrium iteratively to search for the game’s equilibriums. We analyze the game in four parts.

Part 1: If the Column Player selects C1, what would the Row Player choose? Row Player chooses R4. If the Row Player chooses R4, what would the Column Player choose? Column Player chooses C1. Thus, both players chose the same cell, so C1-R4 yields a Nash Equilibrium.

Part 2: If the Column Player selects C2, what would the Row Player choose? Row Player chooses R3. If the Row Player chooses R3, what would the Column Player choose? Column Player chooses C2. Thus, both players chose the same cell, so C2-R3 bears a Nash Equilibrium.
Figure 7. Complicated game with several strategies

Part 3: If the Column Player selects C3, what would the Row Player choose? Row Player chooses R2. If the Row Player chooses R2, what would the Column Player choose? Column Player chooses C3. Thus, both players chose the same cell, so C3-R2 yields a Nash Equilibrium.

Part 4: If the Column Player selects C4, what would the Row Player choose? Row Player chooses R1. If the Row Player chooses R1, what would the Column Player choose? Column Player chooses C2. Thus, both players chose different cells, so we have no Nash Equilibrium.

Finally, the players would prefer the Nash Equilibrium, C2-R3 because the players receive the greatest payoffs from this cell.

Mixed Strategies

We have seen some games with no pure Nash Equilibrium. Pure means a player selects the same strategy repeatedly. However, if the players play the game repeatedly, a player can randomly select a strategy for a fraction of the time that would maximize the player’s payoffs. We call these mixed strategies because at least one player has a partial strategy. Thus, all games with mixed strategies have a Nash Equilibrium for partial strategies.

We show a game in Figure 8, where two competitors, McDonald's and Burger King maximize their profits by charging either high prices or low prices. Payoffs are profits. Both players do not have a dominant strategy, and the game has no pure Nash Equilibrium.

<table>
<thead>
<tr>
<th></th>
<th>Burger King</th>
</tr>
</thead>
<tbody>
<tr>
<td>McDonald’s</td>
<td>High Price</td>
</tr>
<tr>
<td>High Price</td>
<td>40, 30</td>
</tr>
<tr>
<td>Low Price</td>
<td>35, 25</td>
</tr>
</tbody>
</table>

Figure 8. Game with mixed strategies

We start with Burger King. If Burger King chooses the high price, it expects to earn a payoff in Equation 1. Consequently, Burger King receives either 30 or 25. The $P_M$ is the probability that McDonald's chooses the high price while $1 - P_M$ is the probability McDonald's chooses the low price.

If we add $P_M$ and $1 - P_M$, we get one. In mixed games, players have a finite number of choices and each player selects a choice with a probability between zero and one. Consequently, all probabilities for all choices must sum to one, so the game accounts for all a player’s choices.
payoff = 30 × P_M + 25 × (1 − P_M)                   \( (1) \)

If Burger King chooses the low price, it expects to earn a payoff in Equation 2. Burger King receives a payoff of either 35 or 20, depending on McDonald’s strategies.

\[
payoff = 35 \times P_M + 20 \times (1 − P_M)\]

(2)

Burger King plays this game repeatedly and wants to maximize its payoffs. We set the two payoffs from Equations 1 and 2 equal to each other and solve for the probability, \(P_M\).

\[
30 \times P_M + 25 \times (1 − P_M) = 35 \times P_M + 20 \times (1 − P_M) \]
\[
P_M = 0.5 \]

(3)

Thus, Burger King should charge a high price for half the time and a low price for the other half.

Similarly, McDonald's has the payoff in Equation 4 if it chooses the high price. McDonald’s choice relies on Burger King selecting the high price with a probability of \(P_B\) and a low price with a probability of \(1 − P_B\).

\[
payoff = 40 \times P_B + 30 \times (1 − P_B) \]
\[
(4) \]

If McDonald’s chooses the low price, it receives the expected payoff in Equation 5 given Burger King has the probability to choose a low price.

\[
payoff = 35 \times P_B + 32 \times (1 − P_B) \]
\[
(5) \]

We set the payoffs equal to each other in Equation 6 and solve for \(P_B\). Probability that Burger King chooses the high price is \(P_B\).

\[
40 \times P_B + 30 \times (1 − P_B) = 35 \times P_B + 32 \times (1 − P_B) \]
\[
P_B = 0.286 \]

(6)

Consequently, McDonald’s should charge high prices 0.286 of the time and low prices for 0.714 of the time to maximize its profits. This example illustrates both players playing partial strategies. Nevertheless, we can have games with a Nash Equilibrium with one player having a partial strategy and the other uses a pure strategy.

**Sequential Games**

A sequential game is one player makes a move, and then the other player. Since we change the timing, we change the nature of the game and its equilibrium. We use two methods to solve these games. For the first method, we use **backward induction**, where we start at the last game
and work backwards to the first game. For the second method, we can convert a sequential game into a simultaneous game in some cases.

For example, we have a game in Figure 9 with two people: Ben and Jerry. Each player receives a payoff, which is his profit. We define the profit as (Ben’s Profit, Jerry’s Profit). Moreover, Ben has the choice. He can stay out of the market or enter the market. Jerry decides to be aggressive if Ben enters, or Jerry maintains the current price and ignores Ben.

![Figure 9. Sequential game between Ben and Jerry](image)

We solve for the Nash Equilibrium. Ben chooses to “stay out” of the market. Jerry earns one unit regardless of his decision. Both choices lead to the same payoff.

We must analyze both choices. If Jerry chooses to be aggressive, then Ben stays out of the market because Ben receives a payout of zero, which is better than -0.5. Thus, the strategies, Stay Out and Aggressive if Entry, are the Nash Equilibrium. Remember, we still have the other choice. If Jerry maintains the current price, subsequently, Ben enters the market. Consequently, this combination of strategies does not yield a Nash Equilibrium.

We analyze Ben’s next choice. If Ben enters the market, Jerry maintains the current price because Jerry receives zero profit, which is better than a minus one. If Jerry chooses to maintain current price, then Ben enters the market. Ben earns one unit of profit, which is better than zero profit. Strategies, Enter and Maintain Current Price, are a Nash Equilibrium.

We can convert this sequential game into a simultaneous game, which we show in Figure 10. Ben and Jerry do not have a dominant strategy, and the game bears two Nash Equilibriums: Stay out-Aggressive and Enter-Maintain Current Price.

![Figure 10. Simultaneous game between Ben and Jerry](image)
been in the market for a while. They earn payoffs as profits in the millions that we write as (Entrant’s profit, Incumbent’s profit). We use backwards induction to solve this game.

![Diagram of simultaneous game between an entrant firm and incumbent firm](image)

**Figure 11. Simultaneous game between an entrant firm and incumbent firm**

We solve for the Nash Equilibrium and check the firm’s choice to stay out of the market. Consequently, the incumbent firm continues to maximize profits. In this case, the incumbent firm does not have a choice, and it earns $80 million. Since the incumbent firm continues to maximize profits, the entrant firm enters the market. Thus, this combination of choices does not bear a Nash Equilibrium.

We examine the entrant’s firm’s other choice. If the entrant firm enters the market, the incumbent firm continues to maximize profits. It earns a profit of $50 million, which is better than $10 million. If the incumbent firm continues to maximize profit, then the entry firm enters the market. Thus, the strategies, Enter and Continue to maximize profit, yield a Nash Equilibrium.

We can convert this sequential game into a simultaneous game in Figure 12. What makes this game odd is the missing cell, which we shaded a gray. Did you notice each player has a dominant strategy? Incumbent firm always would choose to continue maximizing profits while the entrant firm always enters the market. Thus, the Nash Equilibrium is entrant firm enters the market and incumbent firm maximizes profit.

![Table of sequential game between an entrant firm and incumbent firm](image)

**Figure 12. Sequential game between an entrant firm and incumbent firm**

We show the last sequential game in Figure 13, and every worker and manager plays this game every day. Worker moves first and then the manager moves. Employee has a choice to
arrive on work on time or arrive late while the manager chooses to fire or not fire his employee. They both receive a payoff in utility, which we define as \((\text{worker’s utility, manager’s utility})\).

![Figure 13. Sequential game between a worker and manager](image)

We solve for the Nash Equilibrium. We check the worker’s choice to arrive late. Consequently, the manager receives a utility of 50 units to fire the worker or -10 units not to fire the worker. Thus, the manager feels better by firing the worker. If the manager fires the worker, then the worker receives a greater utility to arrive late. Worker receives -10 units of pleasure to arrive late rather than -50 units to arrive on time. Combination of strategies, Arrive late and Fire worker, yields a Nash Equilibrium.

We check the second choice. If the worker arrives on time, the manager does not fire the worker. Manager receives 50 units of pleasure not to fire the worker and 10 units to fire the worker. If the manager does not fire the worker, the worker receives greater utility to arrive on time. Combination of strategies, Arrive on time and don’t fire the worker, bears a Nash Equilibrium. Furthermore, the players would prefer the strategies, arrive on time and don’t fire the worker because both players receive a greater utility.

**Government as a Player**

We can change the game where government becomes one or both players. For the first example, we illustrate the problem a government has when it provides a public good. Game involves two people with the following rules:

- Each person pays a maximum reservation price of $150 for the public good, and they both move at the same time, a simultaneous game.

- Government must pay $150 to supply the public good. If both people contribute, then each person pays $75 each. However, if one person contributes, then that person pays the full $150.

Payoffs are the amount a person keeps after paying for public good, and we show the payoffs in Figure 14.
Each person has a dominant strategy. He or she does not contribute for the public good. If Person A contributes, he or she keeps either $75 or $0. However, if that person does not contribute, he or she keeps the whole $150 regardless of Player B’s choice. Similarly, Player B has the identical dominant strategy. Consequently, the Nash equilibrium is Cell D, where both players do not contribute. People want benefits from their government, but they do not want to pay for them, which is why many countries experience tax evasion problems.

We can use a prisoner’s dilemma to study how two countries, the United States and Canada, agree to reduce pollution that drifts across their border. They have the choices:

- If both countries choose tough environmental laws, their GDPs grows slowly at 1% per year.
- If one country imposes soft environmental laws and the other imposes tough laws, then industries with the weak laws have a cost advantage. They produce more output, increasing GDP to 6% while the country with the tough environmental laws grows slowly at 1% per year.
- If both countries pass soft environmental laws, then their GDPs grow at 5% per year.

We show the payouts in Figure 15.

We can solve for the Nash Equilibrium easily. A higher GDP growth is better than slow GDP growth because both governments want their economies to grow quickly, creating jobs and wealth. If the United States government enforced tough environmental laws, its economy grows at 1% per year regardless what Canada does. If the United States imposes soft environmental laws, then its economy grows either 5 or 6%. Thus, the United States always imposes soft environmental regulations, which is a dominant strategy. Similarly, Canada has the same
dominant strategy to impose soft environmental regulations. Consequently, the Nash Equilibrium is Cell D, where both countries impose soft environmental regulations.

![Figure 15: United States and Canada agree to lower their pollution levels](image)

Cell A could never be a Nash Equilibrium. If both countries impose tough environmental regulations, then one country has an incentive to deregulate, spurring economic growth and creating jobs and wealth. Then the other country follows until we finish in Cell D.

We base the next game on a real example that occurred in March 2013. Many foreigners including the British and Russian deposited their money in Cyprus banks, but the Cypress banks experienced financial hardship. Cyprus government asked the European Union (EU) to bail out the Cypress banks, but the EU would agree to a bailout if the Cypress government imposed a tax on bank accounts with balances exceeding 100,000 €.

We have a sequential game between the Cypress government and foreign depositors. Their choices or strategies are:

- Cypress government wants to tax bank deposits to pay for the EU bailout package. Cypress government can tax or not tax bank deposits.

- Depositors can withdraw their deposits or keep funds at the bank.

Players receive the payoffs in millions of euros, which we define as (government tax revenue, depositors’ wealth) and show in Figure 16.

Government moves first, and it taxes bank deposits because it would gain either 10 million or 50 million in tax revenue. Depositors can choose to withdraw funds or not withdraw funds. They would choose to withdraw funds because they lose 10 million instead of 50 million. We end up at Cell (10, -10). Now, we let the depositors move first. If depositors withdraw funds, they get either minus 10 million or 10 million. If they do not withdraw their funds, their payoffs are either minus 50 million or 5 million. Thus, they withdraw funds because their payoff is
greater. If government taxes deposits, it gains 10 million. If it does not tax bank deposits, it obtains zero tax revenue. Thus, government taxes bank deposits. We end up at Cell (10, -10) again. Consequently, the Nash Equilibrium is the government taxes bank deposits and the depositors withdraw their bank funds from Cypress.

**Figure 16: Sequential Game between Cypress Government and Foreign Depositors**

We check the other decision for the government. Government moves first, and it does not tax bank deposits. Thus, it gains zero tax revenue. Then the depositors can choose to with funds or not withdraw funds. They would choose to withdraw funds because they lose 10 million instead of 50 million. Hence, we end up at cell (0, 10). Now, we let the depositors move first. If depositors withdraw funds, they get either minus 10 million or 10 million. If they do not withdraw their funds, their payoffs are either minus 50 million or 5 million. Thus, they withdraw funds because their payoff is greater. If government taxes deposits, it gains 10 million. If it does not tax bank deposits, it obtains zero tax revenue. Thus, government taxes bank deposits, and we end up at Cell (10, -10), which differs from the government’s first move. Consequently, government’s decision to not tax deposits does not bear a Nash equilibrium.

Another sequential game is between the Greek government and the European Union (EU) in 2012. Unfortunately, Greece entered a severe recession after the 2008 Financial Crisis and has been plagued with high unemployment. Greek government experienced a budget deficit of 9% as government collect less tax revenues, and government spending has soared. This case illustrates the failure of Keynesian economics as the Greek government can no longer sell bonds to investors to finance its budget deficits. Greek government has forced their bondholders to take a 50% loss on their bonds, and investors no longer lend to the Greek government. Greek government went to the EU and asked for a bailout. Greek government and EU choices or strategies are:

- Greek government has a choice to withdraw from the Eurozone and reintroduce its currency, the drachma. Then the government can print money to cover its budget deficits, but if it remains in the Eurozone, it must use the euro.

- EU has a choice to grant or not grant a loan to the Greek government.
Players receive the payoffs, which are the change in GDP in millions of euros, which we define as (Greece's GDP, EU's GDP) and show in Figure 17.

![Figure 17: Sequential game between the EU and Greek government](image)

We solve for the Nash Equilibrium. We check Greek government first decision – withdraws from the EU. EU has a choice to grant a loan or no grant a loan. If it does not grant a loan, the EU’s economy plunges by -10 million euros. If it grants a loan, its economy increases by 5 million euros, so the EU will grant a loan. Now, we let the EU choose first. If the EU grants a loan, Greece has a choice to remain in the EU or withdraw. If Greece withdraws from the EU, its economy plunges by 20 million euros. If Greece remains in the EU, its economy grows by 20 million euros, so it chooses to remain in the Eurozone. Thus, Greece’s choice to withdraw from the EU and EU granting a loan does not yield a Nash Equilibrium.

We check Greek's decision to stay in the Eurozone. EU has a choice to grant a loan or not grant a loan. EU would be indifferent because both changes do not impact the EU’s GDP. If the EU does not grant a loan, then the Greek government would withdraw from the Eurozone because Greece’s GDP grows by 10 million euros. This is not a Nash Equilibrium. However, if the EU grants a loan, the Greek government would remain in the Eurozone. Consequently, the Nash Equilibrium is Greece remains in the EU while the EU grants a loan.

We show the last sequential game in Figure 18 that North Korea and the United Nations (UN) played in 2013. North Korea has a choice to develop or not develop nuclear weapons while the United Nations can impose or not impose trade sanctions on North Korea. North Korea receives first payout, the change in North Korea’s GDP while UN members receive the second payout, the change to the world’s GDP, or (Change in North Korea’s GDP, Change in UN member’s GDP)

We solve for the Nash Equilibrium. If North Korea develops nuclear weapons, then the United Nations does not impose sanctions because the world’s GDP is greater for this choice. If the United Nations does not impose sanctions on North Korea, then North Korea receives the same payoff for both choices. However, the combination of strategies, Develop Nuclear Weapons and Don’t impose sanctions, yields a Nash Equilibrium.

We check the other branch for North Korea’s decision. If North Korea does not develop nuclear weapons, the United Nations does not impose sanctions because the world’s GDP is
greater for UN’s choice. If the United Nations does not impose sanctions, subsequently, North Korea does not develop nuclear weapons. Thus, this combination yields a Nash Equilibrium.

![Figure 18: Sequential game between North Korea and the United Nations](image)

**Figure 18: Sequential game between North Korea and the United Nations**

**Key Terms**

- simultaneous game
- sequential game
- static game
- dynamic game
- equilibrium
- payoff
- perfect information
- complete information
- incomplete information
- dominant strategy
- Prisoner’s Dilemma
- Nash Equilibrium
- Zero Sum Game
- strictly competitive games
- mixed strategy
- backward induction

**Chapter Questions**

1. We have a prisoner’s dilemma. Police captured two criminals, and they convince one prisoner to confess. Prisoners receive the payoffs, which is the time they spend in prison. Thus, the lower the payoff, the better it is for the criminals. Rules are:

   - If both prisoners confess, then they each spend 5 years in prison.
   - If one prisoner confesses, he stays one year in prison while the other prisoner spends 10 years in prison.
   - If both criminals do not confess, then they each spend one year in prison.
   - Payoff matrix is (Criminal 1, Criminal 2). Be careful! Remember, lower numbers are better than higher numbers because higher numbers means more punishment.
Identify the dominant strategy, the Nash equilibrium, and the best strategy for both criminals.

<table>
<thead>
<tr>
<th>Criminal 1</th>
<th>Criminal 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Confess</td>
<td>5, 5</td>
</tr>
<tr>
<td>Don't confess</td>
<td>10, 1</td>
</tr>
</tbody>
</table>

2. We have a game, where a man and woman are dating. They both select a dating activity. Payoffs are the utility for each person. Did you notice the man gets a utility of 5 when eating alone because men love to eat.

Identify any dominant strategies, the Nash equilibriums if any, and the preferable Nash Equilibrium.

3. You have the game below: Identify the dominant strategy, the Nash equilibriums if any, and the preferred Nash equilibrium.

4. You have the simultaneous game below with a row and column player. Game is rock, scissors, and paper. Players receive their payoff after each game. Identify if any player has a
dominant strategy, the Nash equilibriums if any, and the preferred Nash equilibrium.

<table>
<thead>
<tr>
<th>Row Player</th>
<th>Rock</th>
<th>Scissor</th>
<th>Paper</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rock</td>
<td>0, 0</td>
<td>1, -1</td>
<td>-1, 1</td>
</tr>
<tr>
<td>Scissor</td>
<td>-1, 1</td>
<td>0, 0</td>
<td>1, -1</td>
</tr>
<tr>
<td>Paper</td>
<td>1, -1</td>
<td>-1, 1</td>
<td>0, 0</td>
</tr>
</tbody>
</table>

5. We have two pharmaceutical companies, Company X and Company Y, and they participate in a simultaneous game. They have the following strategies:

- Innovate: A company pays 5 units to develop a new drug.
- Imitate: One company pays zero units to reverse engineer the other company’s new breakthrough drug.
- Players pay a cost, which is a payout, which we show in the matrix below.

Identify if a player has a dominant strategy, the Nash Equilibriums if any, and the preferred Nash Equilibrium. If government imposed a patent system that prevented a company to imitate another company’s product, how would this change the game?

6. We have a sequential game between China and Japan, illustrating their conflict over the Diaoyu Islands in the South China Sea during 2013. Japan controls the uninhabited islands, but China claims the islands belong to China. Thus, China can use its navy to capture or not capture the islands while Japan can start a war with China or do nothing. Payoffs are changes in the country’s GDP, which we define as (China’s GDP, Japan’s GDP).

Identify the Nash Equilibriums if any.
A Game of War

China
- Capture Islands
  - Japan
    - Don't Capture Islands
      - Start War (-10, -10)
      - Do nothing (0, 0)
    - Capture Islands
      - Start War (-5, -10)
      - Do nothing (10, 0)
Index A - Answers to Chapter Questions

Answers to Chapter 1 Questions

1. This is a judgment call. Several former students place the United States in the middle of the scale.

2. Last four presidents of Mexico have opened Mexico to free trade and competition. Thus, Mexico is becoming freer, while the Venezuelan and Russian Presidents have imposed more government controls, reducing economic freedom.

3. At the beginning of the lease, people would treat the property as if they are owners and take care of it. Towards the end of the lease, owners would extract as much value as they can from the land. For example, if the land is a rental property, the owners stop investing and maintaining the property. If forests grow on the land, the owner would cut down the trees and sell the wood to a lumber company.

4. You want to charge a high price for your phone as much as possible, increasing your profits.

5. You mow a neighbor's lawn, and in turn, the neighbor fixes your car. You and your neighbor do not exchange money.

6. During the 1900s, the U.S. government became alarmed at the growth of monopolies and then passed laws to break them up into smaller companies. Thus, government is not completely in the hands of the capitalists.

7. Cost-Benefits Analysis involves long time spans for public projects. A new highway can provide a society with benefits for generations, evening leading to new growth and development. In the long run, society may benefit from this highway, while, in the short run, it would be inefficient to construct this highway.

8. No, we have no free lunch. Society still produces the same level of goods and services. If government injects more money into this society, then all prices increase in society. When prices increase in society, economists call this inflation.

9. Answers will vary. Government tries to reduce drug abuse by imposing large fines or prison sentences for anyone caught with illegal drugs.

10. Answers will vary. Government forces drivers to purchase car insurance as a condition to drive a vehicle on a road or highway.
Answers to Chapter 2 Questions

1. Controls and reasons are interrelated. Control could be a quantity or quality control because government limits the pollution emissions (quantity) or improves vehicle quality. Furthermore, pollution is a negative externality, but the definition of social regulation works too.

2. Car buyers could check the used-car dealer’s rating at the Better Business Bureau or search for complaints on the internet. Many states passed Lemon Laws that require car sellers to disclose all vehicle defects.

3. A state government, like California, spends its tax revenues on social programs and budgets for regulatory agencies. Parkinson’s Law definitely applies because government agencies’ budgets continuously increase. Principal Agent View also applies because the California State legislature has problems balancing budgets, making them dysfunctional.

4. Capture Theory explains this behavior well.

5. First, government cannot collect tax revenue from this market. For example, Arizona taxes marijuana, although its laws make it illegal. Second, some people will ignore this ban and still use marijuana. Thus, a government expands police forces, courts, jails, and prisons to find and punish violators. Finally, government must raise taxes to pay for expanding the criminal-justice system.

6. This is Parkinson’s Law. People in the regulatory agencies have self-interest. They want high salaries, prestige, and job security. An expanding regulatory agency creates all three.

Answers to Chapter 3 Questions

1. Consumers’ surplus decreases.

2. Students see college tuition as a price. Since many students transferred because of the tuition hike, a private education must be an elastic product because the students were sensitive to a price hike.

3. You must be careful. Consumers with lower incomes will decrease their demand for normal products, causing a leftward shift. However, consumers will increase demand for inferior products, like Ramen Noodles and rice.

4. Government helped these businesses by boosting the number of consumers. These businesses should see more consumers buying their products and services.

5. Scientific study changes people's tastes and preferences. Thus, the consumers reduce their demand for aspartame, shifting the demand leftward.
6. Console and games are complements. A cheaper console means consumers will buy more games for this console, increasing the demand and shifting it rightward.

7. Producers’ surplus decreases because a lower market price causes producers to earn fewer profits.

8. Supply elasticity depends on the time horizon. Supply elasticity is inelastic in the short run because these companies can only expand production to 100% of their production capacity. In the long run, if these companies believe prices will remain high, they will build new factories, greatly increasing production. Thus, the supply elasticity is more elastic in the long run.

9. Soybean supply function will decrease and shift leftward. Farmers will start growing corn because of the higher corn prices.

10. Free health care is not really free. Since the businesses and producers must pay for it, they pay greater costs. Thus, the supply function for many goods and services will decrease, shifting leftward.

11. Genetic engineering is technology, so supply of corn increases and shifts rightward.

12. Supply function for cigarettes decreases and shifts leftward.

13. No, the key is markets are free from government interference. In socialistic countries, government sets the price of markets. Producers and consumers cannot change the price. Thus, government price controls create persistent shortages or surpluses.

14. Demand for cars shifts leftward and decreases. Market price and quantity for cars both decrease.

15. Car companies sell fewer cars. Thus, they make fewer cars, which reduce the demand for auto workers. Hence, the market wages (i.e. price) and quantity of labor employed both fall.

16. Demand for coffee shifts leftward and decreases because consumers switch to the cheaper tea. Therefore, both the market price and quantity for coffee decrease.

17. Producers earn profits on the LCD and plasma TVs but earn losses on the tube TVs. Thus, producers will expand production for LCD and plasma TVs, and close down production for the tube TVs.

Answers to Chapter 4 Questions

1. Price ceiling causes a shortage for medical insurance. Long-consequences are the insurance company will closely screen the applicants. Medical insurance companies offer insurance to
the applicants with the best health and least health problems.

2. Price floor has no impact upon the market for computer programmers. Their salaries already exceed the government’s minimum.

3. Price floor creates a surplus of corn in the market. Government may stockpile or destroy this corn surplus. A greater corn price may encourage farmers who grow other crops like soybeans to switch to corn, adding to the corn surplus.

4. Government believes it will get $1 billion in tax revenue from yacht owners. However, a tax causes a higher market price, so some people will sell their yachts. Furthermore, some yacht owners may evade the tax; thus, government will collect less than $1 billion.

5. A wine tax causes a higher market price, lower market quantity, and a deadweight loss of taxes. Furthermore, since the tax is per bottle, people may buy larger bottles, minimizing the impact of this tax.

6. Problem with Social Security taxes is government stops collecting the tax as income exceeds $113,700 per year. If you earned one million dollars in income, you would pay $7,049 in taxes on the first $113,700, or 6.2% of $113,700. However, you paid 0.7% of your income to Social Security. If you earned exactly $113,700, you paid 6.2% of your income for this tax. Thus, rich people pay a smaller proportion of their incomes to this tax.

7. Many professionals, such as attorneys, accountants, and tax software programmers depend on a complicated tax code. If the federal government significantly reduced the complexity of the tax code, these professionals would lose their jobs.

8. A head tax is an extremely regressive tax. Homeless people with no income would still pay the same tax as wealthy people. Wealthy may not notice the head tax.

9. Subsidy lowers the price for oranges and products like orange juice. Florida orange growers expand their production of oranges, and the government pays for the subsidy by expanding a tax on another market. Orange growers outside of Florida do not get the subsidy. They receive a lower price for their oranges, driving them out of business.

10. Problem is more people may smoke marijuana, and users may suffer from more medical problems. Moreover, society loses from the deadweight loss of taxation. However, a government benefits by eliminating the black market. Violence from the criminal groups could fall because they no longer fight over control of marijuana’s distribution. Furthermore, prices for marijuana may fall as producers may supply more. Quality can improve. Finally, the state government collects more tax revenue, lessening their financial crisis.
**Answers to Chapter 5 Questions**

1. DeBeers Corporation was horizontally integrated or multiplant.

2. Children should form a partnership.

3. It is an explicit cost because the business must pay money or transfer money through a bank.

4. Accounting profit always exceeds economic profits. Thus, accounting profit is positive and greater than the economic profit.

5. It is a sunk cost.

6. This is a fixed cost. Furthermore, Intel produces millions (or billions) of microprocessors to bring its average total costs down.

7. MC is increasing. Furthermore, MC > AVC and MC < ATC. Production level, Q, lies between the minimums of AVC and ATC.

8. This is a fixed cost, and it does not vary with the production level and, therefore, cannot be a variable cost.

9. GM may suffer from diseconomies of scale.

10. No, all costs are variable in the long run.

11. A firm’s cost functions decrease and shift downward.

12. In this case, technology becomes a cost, increasing a firm’s cost functions.

**Answers to Chapter 6 Questions**

1. Social welfare could be high because Intel and AMD compete, charging low prices and boosting market quantities.

2. Owners of a fruit stand can be in a contestable market. If the fruit stand owners earn economic profit, competitors can easily enter the market.

3. Yes, a new firm entering the market will finance this advertising cost and inform the customers about their product. Advertising creates another entry barrier.

4. It should expand production by one more unit. It profit rises by $20 - $15 = $5.

5. Firm earns profits if the market price exceeds $75. Firm breaks even at $75 and earns losses if the price falls below $75. Firm still operates if the market price lies between $50 and $75,
but shut downs if price falls below $50.

6. No, when the market price falls below the firm's AVC, the firm shuts down and supplies zero quantity. Marginal cost remains positive at this point.

7. Cell phone industry is a decreasing cost industry. As the industry expands, the long-run prices fall.

8. Demand for cars decreases. After the long-run adjustments, the market price for cars remains the same, and some car manufacturers leave the industry. Car manufacturers would produce the same quantity and earn zero economic profits. However, the car industry produces and sells fewer cars.

9. No, the monopoly is both allocative and productive inefficient.

Answers to Chapter 7 Questions

1. Microsoft uses unfair competition. If a company introduces a new program that Microsoft likes, Microsoft quickly buys the company and buys all rights to the software. Microsoft also erects an institutional barrier. All programs and software will run on one of the Windows operating systems. However, many programs do not work on Apple or Linux operating systems.

2. Intel and AMD have economies of scale. For a company to build a factory that makes computer chips, this company must invest over a $1 billion.

3. Monopolist should increase production. If production increases by 1-unit, the monopolist's revenue rises by $5 while its cost increases by $1. Thus, profits rise by $4.

4. No, it is too late. Investors have already incorporated the success of Apple's Iphone into the stock price. Moreover, many companies sell cellular phones that are similar to the Iphone. For investors to reap profits from a new invention, they must be one of the first investors.

5. Housing agency suffers from lack of competition, x-inefficiency, and rent-seeking behavior. X-inefficiency is the agency employs too many workers, and rent-seeking behavior is the political connections. However, we do not know if it is allocative inefficient because the government agency provides free assistance. Disadvantaged or poor cannot pay for this service. This becomes a form of a public good.

6. Concentration Ratio equals 93, while the Herfindahl Index equals 4,038.

7. This is definitely Ramsey Pricing because the water company charges a fixed price and rate charge.
8. Breaking up a large company into two smaller companies should foster competition. In this case, these two companies would not compete with each other. Operating system and Office software are complements. You need one to run the other. Breakup would be ineffective, and the policy takes one monopoly and splits it into two smaller monopolies.

9. A fair return is the company earns zero economic profit. Remember, if a company earns zero economic profit, that company still earns an accounting profit. Accounting profit is the fair return to the company, and its investment in capital and infrastructure. Thus, the city government should use Average Cost Pricing.

**Answers to Chapter 8 Questions**

1. Yes, the two companies can form a gentlemen’s agreement. As they are playing golf at the country club, they can talk about prices and then shake hands.

2. Yes, this country can cheat and secretly sell its petroleum on the markets.

3. Theme parks use two strategies. First, they offer a variety of discounts. For example, the theme park owners print and distribute a variety of discount coupons, offer family discounts, and charge different age groups different prices. Second, a theme park has several prices. Customers pay for parking, park admissions, and food. A theme park could lower park admission price, but increase the prices for food and parking. (Theme parks do not allow customers to bring in food or drinks with them).

4. Price discrimination could be effective. Potential problem is the software company prevents the student from reselling the software for a higher price. For example, a student could buy discounted software and then sell it on Ebay. Software company would need a strong licensing system to prevent this, like matching the name to the serial number, etc.

5. Yes, this is a problem. Higher taxes, higher rates for deposit insurance, and more regulations force banks to pay greater costs and to earn lower profits, assuming the bank revenue did not change. Consequently, government both helps and hurts the banks at the same time with the bailout.

6. That country loses the international investors because they shy away from investment if they believe the government will seize their property and not compensate them for it.

7. Government should organize the Florida orange growers as a cooperative.

8. Strategy is quite simple. Government reduces the concentration of power. Government regulates or breaks up monopolies or exposes the monopolies to competition through international trade. Government also reduces the size of government, reduces taxes, eliminates subsidies, and simplifies bureaucratic red tape. Of course, this reduces the politician’s power, and they rarely use these methods. Instead, they increase regulations,
taxes, and subsidies.

**Answers to Chapter 9 Questions**

1. Yes, deregulation was a success. Deregulation forced the airline companies to compete and lower their airfares.

2. No, deregulation was a failure. State colleges and universities are quasi-government institutions. If students leave the college to avoid paying high tuition, and the colleges receive less tuition revenue, then the colleges would run to the state government and ask for more state funding. Furthermore, deregulation did not expose the universities to more competition.

3. TSA has a long list of complaints. However, let us stick to economics. Government raised wage levels and hired more TSA agents, which government finances through higher taxes. Moreover, the TSA may offer poor customer service, but the TSA agents are following the President’s and Congress’s regulations.

4. Kazakh government should set up joint ventures between the Kazakh government, a Kazakh company, and a Western company. Kazakh government would be the majority shareholder, and Kazakhstan actually does this.

5. Kazakh government should give its citizens vouchers. Then auction the state property to the public. Of course, Kazakhstan actually used this method to privatize apartments, stores, and small factories.

6. In theory, capitalism and communism are opposites. However, China has managed both at the same time. Refer to Section - China’s Successful Blend of Communism and Markets.

7. Yes, Eastern Europeans have an idea what markets are, and they embrace them quickly.

8. No, a small country could not rely on its internal markets for growth. Monopolies would dominate the heavy industry, which is almost as bad as a government controlling everything.

9. This could hurt investment. Why would a person or business invest in a company if the government takes over it again? A government oscillating with its policy creates uncertainty. Citizens and businesses will ask how long markets will last this time, and investment suffers.

**Answers to Chapter 10 Questions**

1. Answers vary because it depends where you live. For example, the United States exports corn and soybeans. Thus, exports benefit these states. However, some states like Michigan are harmed when the United States imports manufactured goods from Asia.
2. Answers vary.

3. A straight-line PPC indicates producers can move resources from one industry to another with no losses. A curved PPC is more realistic. It indicates resources are not identical, and producers moving resources from one industry to another creates losses.

4. A higher birth rate produces more future workers. Thus, the PPC for the United States should shift outward as these workers enter the workforce.

5. It depends how strong the economic growth is in the United States. PPC for the U.S. could expand and shift outward, but the economic growth would be lower. PPC could even shift inward as the U.S. economy stagnates.

6. You must calculate the opportunity cost. As China produces one more bushel of soybeans, it must give up two computer chips. As the United States produces one more bushel of soybeans, the U.S. must give up 0.25 computer chips. Thus, the United States produces all soybeans while China produces all computer chips.

7. With no free trade, China produces 50 computer chips and 25 bushels of soybeans while the United States produces 12.5 computer chips and 50 bushels. Thus, both countries produce 62.5 computer chips and 75 bushels of soybeans. Under free trade, the United States 100 bushels of soybeans while China produces 100 computer chips. Both countries gain 37.5 computer chips and 25 bushels of soybeans.

8. Remember a market has both buyers and sellers. Consumers pay lower prices for imported goods and buy more quantity while producers receive low prices and reduce their production. Thus, domestic consumers benefit while domestic producers are harmed.

9. Consumers pay greater prices for exported goods and buy less quantity while producers receive high prices and increase their production. Thus, domestic consumers are harmed while domestic producers benefit.


11. Supply for U.S. dollars comes from people holding U.S. dollars, and they trade those dollars for another currency. Consumers demanding currency in one market automatically creates a supply of currency in another market as people exchange currencies. Note, the central bank also could expand the supply of U.S. dollars.

12. Americans buy less Mexican made goods. Thus, consumers demand for pesos falls and shifts leftward. Peso depreciates while the U.S. dollar appreciates. Consequently, Mexican imports fall while exports rise.

causing the U.S. dollar to appreciate and the euro to depreciate. However, the European central bank can nullify this. It could reduce the supply of euros by exchanging U.S. dollars for Euros.

14. Foreign investors reduce their demand for U.S. currency, shifting the demand function leftward. Furthermore, U.S. investors invest in other countries to earn a higher interest rate. As they convert their U.S. dollars into another currency, the supply function for U.S. dollars increases. Thus, the U.S. dollar depreciates. However, the market quantity of U.S. dollars is ambiguous.

15. At best, the U.S. policies may cause economic growth in the short run. However, the government is following the exact opposite policies of the Asian Tigers. Furthermore, a stronger U.S. dollar boosts imports and reduces exports. Thus, the U.S. economy may grow little over the next decade.

**Answers to Chapter 11 Questions**

1. Reason 1-Government protects an eroding comparative advantage.

2. Reason 6-Government intervenes in its foreign exchange rate.

3. Voluntary export quota leads to higher prices for cars, and the U.S. imports less. Furthermore, the Japanese car companies collect economic rent from the greater car prices, and they exported their best, luxury cars. Finally, the Japanese car manufacturers could bypass the trade restrictions by manufacturing their cars within the United States.

4. Yes, the retaliating government also imposes more “red tape” and regulations against its trading partner.

5. Answers vary; it depends where you live. States like Texas could benefit from NAFTA because Mexico’s factories manufacture products in Monterrey, Mexico. Mexican manufactured goods would pass through Texas into the United States. Other states, like Michigan, would have fewer manufacturing jobs.

6. Customs Union among Russia, Belarus, and Kazakhstan may be a form of trade protection. Many products like computers and electronics are made outside of the union. Thus, these countries must import the products.

7. Candidate country is using a pegged exchange rate regime. This is important because it creates a smooth transition to the euro.

8. China uses a managed float or dirty float.

9. Believe it or not, a central bank or government can weaken a currency easily. If the currency
is always appreciating, the central bank keeps increasing its money supply. Then the central bank dumps its currency on the international market by buying foreign currencies, causing its currency to depreciate.

10. No, in general. If a country’s currency is always depreciating, then the central bank must use its cache of currencies to intervene in the market. Thus, the central bank would buy its own currency with hard currencies, reducing the supply of its currency on the foreign exchange markets.

**Answers to Chapter 12 Questions**

1. Yes, a country uses mercantilism to create a trade surplus. Export growth strategy focuses on exports, whereas traditional mercantilism focused on import restrictions. Result remains the same.

2. Yes, the buy only American campaign encourages Americans to reduce their demand for imports and buy more American-made products. Again, this campaign is a variant of mercantilism.

3. United States will lose its hegemony. Countries would stop accepting the U.S. dollars, and world trade would halt, unless countries found another currency to replace the U.S. dollar.

4. In theory, China could collapse the U.S. dollar by dumping its U.S. investments onto the markets. However, China would lose approximately $2 trillion in investment. Thus, China has a strong financial incentive to maintain the system as long as possible.

5. Many times government does not use economic reasoning in making decisions. When government imposes a trade sanction, the press reports the government’s decision the government is forcing a country to do something.

6. We could view this as a market failure. Knowledge and technology are both a positive externality and public good. After an inventor or scientist had developed new technology, the free riders benefit from the technology without paying (i.e. public good). Since the country developing the new technology is not being paid, countries have an incentive to undersupply knowledge and technology (i.e. positive externality), which could be good because a military uses technology to kill the enemies.

7. Yes, the U.S. has the same problems. Some politicians found themselves in hot water for trying to reform an old institution like Social Security.

8. This is hard to say. Large conglomerates can monopolize a market, increasing market prices and earn substantial profits. However, the bank does help if the conglomerate is modernizing its production and investing in new machines and equipment. Russia also experienced large GDP growth rates, and Russian banks control some of Russia’s industries.
Answers to Chapter 13 Questions

1. A strong U.S. dollar boosts imports and reduces exports. Thus, the foreign producers gain an advantage at the expense of the American companies. Consequently, the aggregate demand decreases and shifts leftward.

2. This pessimistic view decreases business investment. Thus, the aggregate demand function decreases and shifts leftward.

3. If households have more money, then they save and spend more. Hence, the increased spending causes the aggregate demand function to increase and to shift rightward.

4. Government taxes production, increasing business costs. Thus, the aggregate supply function shifts leftward and decreases.

5. If the immigrants are working, then their wages usually are lower than the legal labor. Hence, firms’ labor cost rise as a government deports illegal immigrants. Therefore, the aggregate supply function decreases and shifts leftward.

6. Energy prices become cheaper, and producers use energy as a production input. Thus, firms’ cost falls. Consequently, the aggregate supply function increases and shifts rightward.

7. Complicated rules and regulations impose a cost on businesses. Thus, they hire costly, compliance specialists. Furthermore, taxes impose another cost. Consequently, the aggregate supply function decreases and shifts leftward. GDP would fall, and the economy experiences inflation as the price level increases.

8. Increases in productivity mean workers can produce more given the same level of resources. Thus, the aggregate supply function increases and shifts rightward. Although GDP increases, the inflation rate becomes ambiguous. If prices are flexible, then the economy has deflation as the price level falls. If prices remain rigid, subsequently the economy has no inflation or deflation. However, GDP grows quickly.

9. Consumers boosting their spending increases the aggregate demand function, shifting it rightward. Thus, the GDP rises, and the economy experiences inflation.

Answers to Chapter 14 Questions

1. It may not be a good measure, but it is the best one we have. For example, GDP per capita is growing and a dictator rules this country. Well-being of society is not increasing if the dictator consumes all the goods and services for himself. For another example, a country has a high GDP growth rate but is consuming its resources quickly or creating massive amounts of pollution. GDP does not include resource depletion or environmental damage.
2. Company’s investment contributes $30 million to the located community. If the company does not invest there, the local government does not collect any new tax revenue. If the company does locate there, the local government’s tax revenue increases from the multiplier effect, even though the new company does not pay taxes. Thus, local government should approve the tax break.

3. Multiplier equals the change in GDP divided by change in investment, which equals 4 in our case.

4. Solve for $\Delta G$, which equals $\Delta G = \frac{\Delta GDP}{multiplier} = \frac{+$2 trillion}{3} = +$666.7 billion

5. We do not know the multiplier, but we can calculate it from MPC. Furthermore, remember households pay for part of the increased taxes from savings, which is why the MPC appears in the numerator. Change in GDP equals:

$$\Delta GDP = \frac{\Delta T \cdot MPC}{1 - MPC} = \frac{-500 billion \cdot 0.95}{1 - 0.95} = -$9.500 trillion$$

6. A flat tax is a proportional tax system. Government takes the same percentage from income, whether incomes are high or low. Thus, a flat tax does not slow down spending when incomes grow. Furthermore, an economy could experience wider swings in its GDP with a flat tax.

7. Politicians have self-interest. They show their constituents that they are bringing money to their home district. They do not look at the long-run impacts of their policies. Thus, politicians like Keynesian economics.

8. Again, this is Parkinson’s Law from Chapter 2. Leaders in government continually expand government from 5 to 7% per year, regardless of tax revenue or purpose. That is their self-interest. Before the 2008 Financial Crisis, the U.S. debt grew roughly 7% per year. After the crisis, the debt is growing at a quicker pace.

Answers to Chapter 15 Questions

1. People need and demand less money. Of course, the demand for money would decrease and shift leftward. Although the quantity of money does not fall in society, the real interest rate drops.

2. Market bond prices fall. As you probably guessed, if an investor can predict a central bank’s actions, then he or she could earn a large profit.

3. Federal Reserve should use expansionary monetary policy. This policy causes falling
interest rates and a growing GDP.

4. In theory, a central bank should use contractionary monetary policy to slow down the economy. However, this monetary policy could trigger a recession as GDP slows down.

5. A central bank should use expansionary monetary policy because the lower interest rate encourages more banks to grant more loans. Fed loans inject more money into the economy via the banking system.

6. A central bank should use contractionary monetary policy because a central bank selling securities removes money from the economy.

7. Low interest rates had little impact on the United States between 2008 and 2009 because Americans have too much debt. Americans are repaying their debt and are not interested in new loans, even loans with low interest rates. Furthermore, asset prices are declining in the United States, and banks are reluctant to lend on assets that are losing value.

8. Many governments perpetually maintain budget deficits. Thus, government spends more than what it collects in taxes. Some countries force their central banks to cover this deficit by printing money if a government cannot find investors to buy its securities.

Answers to Chapter 16 Questions

1. No, regulations can raise a business’s costs. A state bank can avoid federal regulations by remaining a state bank.

2. Several answers may be correct. One answer is the federal and state government looked the other way. For example, 30 years ago, banks imposed stringent loan requirements. Borrowers needed stable work history, paid a down payment on his house, etc. At the height of the housing bubble, banks approved anyone for a mortgage loan. Financial industry needed mortgages to create their new exotic securities. These exotic securities are collateralized debt obligations (CDOs) and credit default swaps (CDSs).

3. Government created deposit insurance to prevent bank runs. Increasing the deposit insurance to $250,000 would cover most depositors. If the deposit insurance remained at $100,000, then banks could experience bank runs as depositors with balances over $100,000 withdrew or transferred their money out of the bank.

4. Yes, the commercial bank could encourage its customers to invest in these new stocks and bonds. Furthermore, FDIC insures bank deposits, but does not insure stocks and bonds. Banks can trick their customers into bad investments that the government does not insure.

5. Commercial and investment banks created new financial instruments. These financial instruments are similar to mutual funds. Banks combined mortgages into a fund and sold...
shares to investors. Many investors were foreigners.

6. Internet allows customers and businesses to access their bank and financial accounts. Furthermore, people can pay bills through the internet. Thus, money easily crosses state lines and borders. Consequently, people and businesses could structure their payments to minimize taxes and regulations.

7. This question has no wrong or correct answer. Fed could raise interest rates by using contractionary monetary policy. This would slow down the rapidly increasing housing prices. However, the economy would enter a recession sooner. Would the earlier recession be milder? No one knows. Nevertheless, the Fed kept low interest rates to keep the U.S. economy growing. Ironically, Alan Greenspan, the former chairman of the Fed, resigned before the housing bubble had popped.

8. Federal Reserve should use contractionary monetary policy. However, this policy would slow down the U.S. economy, increase interest rates, and increase unemployment. This also hurts the U.S. export industry.

9. Federal Reserve uses expansionary monetary policy. This policy weakens the U.S. dollars. Thus, U.S. consumers buy fewer imports, and foreigners buy more U.S. exports. A weak dollar boosts the export industries.

Answers to Chapter 17 Questions

1. Tourism is a luxury product. If incomes stagnate or drop in the rich developed countries, then tourists experience tough economic times and take fewer vacations.

2. An informal sector comprises from 40 to 50% of a developing country’s economy. If government becomes harsh with its citizens, its citizens can retaliate against the government. As a country develops, the informal sector will shrink relative to the economy.

3. A tourist’s biggest expenses are airline tickets and hotel. Tourists usually fly on airlines and stay at hotel chains from developed countries. Thus, the tourists’ spending leaks to the airlines and hotel’s home country. Furthermore, the tourist may consume food and drinks that a tourist destination imports.

4. A small economy does not have the backwards linkages. Thus, a small economy lacks the industries to produce products and services for the tourists. Consequently, businesses must import goods and services, causing a high leakage.

5. International tourists bring foreign currencies to the tourist destination, so they can buy goods and services.

6. We can measure a tourist destination’s popularity by how expensive it is. For example,
everyone pays more for food, drinks, living accommodations, and entertainment at a tourist destination than a neighboring community with few tourists.

7. Dependency ratio equals 66.8%, which is quite high. Some U.S. tourists are scared to visit Mexico because the massacres, shootings, and drug wars occurring along the U.S.-Mexican border.

8. Tourist multiplier equals 3.33. If a tourist spends one more dollar at the tourist destination, then that one dollar creates $3.33 in incomes.

9. Tourists’ spending creates $45 million in incomes at the tourist destination.

10. Using algebra, the multiplier equals $\frac{1}{(1 - (1 - t) \cdot MPC + MPM)}$. If one substituted the equation, $MPC + MPS = 1$, into the multiplier, then the multiplier becomes $\frac{1}{(t + (1 - t) \cdot MPS + MPM)}$, which contains the three leakages: taxes, savings, and imports.

**Answers to Chapter 18 Questions**

1. Gold is still an exhaustible resource because only a finite amount exists in nature. However, gold can be recycled, so the amount of gold in society keeps increasing as miners discover more deposits.

2. People in our society cling to negative ideas. Thus, reporters always announce Malthusian ideas in the news, while they discount positive news.

3. It depends. Electric cars would use more electricity. In the United States, electric power plants generate the most electricity from coal, and coal is another exhaustible resource.

4. It depends. If a government extracts and sells petroleum in the international markets, then government may earn substantial revenues. If a government keeps taxes low and maintains a pro-capitalistic system, then its society becomes very rich. If a country like Venezuela uses petroleum revenues to finance a socialistic country, then the country may be doomed. Furthermore, government-owned industries are not efficient.

5. This mistake may cause a species to go extinct. Each year, the fish population falls until no fish are left.

6. Government has several costs. First, government hires inspectors to monitor the species. Second, government pays agencies to arrest, prosecute, and/or incarcerate violators. Of course, these costs could be high, and government collects fines and fees to pay these high costs.
7. Developed countries are wealthier. Thus, rich countries have more options. First, government creates a bureaucracy to monitor the resource. Second, wealthier households can use alternatives, such as natural gas to heat and cook, and construct new homes using metal beams. Finally, government can provide tax credits for people who plant and maintain trees.

8. As a logger cuts down a tree, the tree no longer converts carbon dioxide into oxygen. A carbon permit system would impose higher costs for people cutting down trees. Furthermore, if people help trees thrive and grow, then a permit becomes a subsidy. Thus, a growing tree removes carbon dioxide from the atmosphere, creating a revenue source.

9. People have no incentive to conserve water. Some households may waste water because they do not pay for the amount they use.

10. It depends. Water usage rate should reflect water’s scarcity. If the locality has plenty of water, then water prices would be low. If the locality is located in a dry region with little fresh water, then water prices would be high. High market price forces households to conserve that resource.

11. No! Used car oil is a waste product from using cars. As long as society uses gasoline engines, then a society always creates used oil as a waste product. Government can open a recycling center and take all oil for free. Furthermore, government could pay a $1 per gallon of oil. Thus, used oil has a price and some people would happily sell their oil to a government recycling facility.

12. Government could ban all cars and trucks, even electric cars. Electric cars use electricity that electric power companies produce from coal. Burning coal emits large amounts of carbon dioxide. Thus, these policies may be unrealistic.

**Answers to Chapter 19 Questions**

1. A government should use a tradable permit system because command and control regulations freeze technology. Companies have no incentives to develop new technology to combat pollution. A Pigouvian Tax could also be effective. However, government could rely on the tax revenue. If companies discovered new technology to lower pollution that reduces their taxes, then government could increase the tax rate. Finally, pollution involves a large number of people and businesses. Thus, the Coase Theorem would not work.

2. Remember, the only way completely to stop pollution is government shuts down all pollution sources. Since a government would never do that, then the best method is a government encourages businesses to minimize their pollution for the lowest costs. Thus, a government creates a well-defined permit system.

3. No, because the definition of nonpoint source pollution. It has so many pollution sources
that it would be impossible to bring all participants to court. Moreover, the lawyers would sue the wealthy firms emitting the nonpoint sources.

4. Air comprises 78.08% nitrogen, 20.95% oxygen, 0.93% argon, and 0.038% carbon dioxide.

5. Government could impose command and control regulations. Government must ensure all farmers build riparian buffers around their fields and collect animal wastes into lagoons. This policy may not be popular with the farmers because it increases their costs, especially if they must use productive land for the buffer or create a pasture for the animal slurry.

6. No. For a community to adopt this technology, the benefits must exceed its costs. For communities with plentiful water, companies can discharge minimally treated wastewater into the environment may be efficient. San Diego is located in a dry region with scarce water. Thus, water becomes valuable. Of course, the treated wastewater sits in pools for a while before the companies use the water again. Public does not like the image. “From the toilet to the drinking fountain.”

7. Unfortunately, no. Humans are creatures of habit. Sometimes people become confused and slow at learning new technology. (Just stick around an office where the computer specialists upgraded all the software on the computers). Thus, the Porter Hypothesis does have some validity. An environmental regulation may force an institution or business to implement change.

8. Yes, developing countries seek investment from developed countries and international corporations. These organizations bring their technology and know-how with them, adopting technology rapidly.

**Answers to Chapter 20 Questions**

1. Both criminals have a dominant strategy to confess. Nash Equilibriums are Confess-Confess and Don't Confess-Don't Confess. Criminals would prefer Don't Confess-Don't Confess because they would spend one year in prison.

2. Both players do not have a dominant strategy. Nash Equilibriums are Dinner-Dinner and Movie-Movie. Couple would prefer the Movie-Movie because they both receive a greater utility.

3. Both players do not have a dominant strategy. Nash Equilibrium is C4-R4. Players do not prefer an equilibrium because the game has only one.

4. Players do not have a dominant strategy, and this game has no Nash Equilibrium. This is a Zero-Sum Game. Are you surprised this game has the Mixed Strategy, where each player chooses one strategy 1/3 of the time?
5. Both companies use their dominant strategy to imitate. Game has one Nash Equilibrium, Imitate-Imitate. Companies do not prefer a Nash Equilibrium because the game has only one. If the government’s patent system raised the firm’s cost to imitate, then the Nash Equilibrium could change to Innovate-Innovate.

6. Game has a Nash Equilibrium - China captures the islands while Japan does nothing.
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