The Economics of Government

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Introduction

Economics students at one time studied Comparative Economic Systems, which examined capitalism and communism. Following the collapse of the Soviet Union in 1991, colleges began to remove this course from their curricula. However, we argue that the political system is not essential. 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 its markets. The importance lies in 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 the 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 sparked a renewed interest in economics and the role of government during economic downturns among people and college students. The financial crisis has awakened the famous debates between Maynard Keynes and Friedrich Hayek. Friedrich Hayek believed in free markets with minimal government interference, while John Maynard Keynes thought that the government should utilize its power and resources to promote full employment in the economy. Thus, the debates rage forward.

This textbook does not resolve Keynes' and Hayek's debates and avoids political debates. Instead, we focus on the economic behavior of the government in this textbook and its impact on the economy. Although many examples throughout the book use the United States as an example, the principles discussed in this book can be applied to all governments. Furthermore, this book appeals to a broad audience of college students and educated individuals, especially those residing outside the United States. We removed and replaced the names of U.S. government agencies with their generic U.S. government label. We focus on economics and market behavior, rather than testing students' knowledge of U.S. institutions. After reading this book, students should understand why some countries prosper and grow, while others stagnate and wither.

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

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

Chapter 1 introduces the economics and concepts of capitalism and private property rights. We then study the arguments of Karl Marx and Vladimir Lenin to explain the shortcomings of capitalism. Finally, we describe the similarities and differences between government and markets.

Chapter 2 discusses the regulation of markets, as all governments establish bureaucracies to enforce rules and ensure the public complies with a country's laws. Consequently, we explain the

types of market control, total costs of regulations, and the shortcomings and problems associated with creating large bureaucracies.

We introduce supply and demand analysis in Chapter 3 and demonstrate how markets with minimal government interference are stable. Chapter 3 is essential 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 the market, and we study the short- and long-run economic consequences.

We review a firm's cost functions in Chapter 5. We then apply the cost functions to a competitive market, as illustrated in Chapter 6. Economists use the competitive market as a benchmark to measure the efficiency of other market structures, such as those where a monopolist controls 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. Chapter 8 examines 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 capitalist market.

Chapters 10, 11, and 12 form a group on international trade. Chapter 10 reviews the theories on global trade and uses supply and demand analysis to predict foreign-currency exchange rates. Subsequently, we explain in Chapter 11 why governments impose trade barriers, join trade blocs, and impose trade sanctions on other countries. Finally, we examine mercantilism in Chapter 12, exploring how a country utilizes trade to develop its economy. For example, Japan utilized mercantilism to rise from the ashes after World War II, becoming one of the wealthiest countries within one generation.

Chapters 13, 14, and 15 switch the economic analysis to macroeconomics. In Chapter 13, we explain the analysis of aggregate demand and aggregate supply. We then analyze in Chapter 14 how a national government can use its fiscal policies — i.e., government spending and taxation — to influence the entire economy. Subsequently, we examine in Chapter 15 how a central bank can use monetary policy to affect the whole economy by adjusting 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 U.S. banking institutions. Finally, we explain in this chapter why a government must regulate one of the most critical sectors of the economy.

Chapter 17 is another macroeconomics chapter that examines why a government, especially in developing countries, uses tourism for economic development. The government becomes the leading developer and driver of a tourist destination. This chapter provides a succinct analysis of the economics of tourism.

Chapters 18 and 19 present microeconomic analyses of the economics of environmental and natural resources. When a firm extracts a resource or pollutes the environment, that action impacts 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, we analyze games where the 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 an infinite number of wants and needs, society produces a limited range of products and services. Thus, humans must make choices. Consequently, economists have expanded the field of economics to encompass a wide range of areas, spanning diverse ideas, concepts, and disciplines. For example, ***macroeconomics*** studies 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 specific economic units, such as individuals, firms, or markets. Of course, macro means large, and micro means small.

We focus on microeconomics in this textbook because it examines how a government influences a firm, individual, or market. Thus, we introduce students to the basic concepts and definitions used later in this book in this chapter.

Economic Systems

An ***economic system*** arranges and organizes a society's institutions. Every society has a government that dominates it. A government specifies who owns property, who produces products, and who has access to consume the products.

Two broad economic systems are socialism and capitalism. Under ***socialism,*** the government owns and controls all society's property, land, buildings, and machines. Moreover, a central government committee determines production levels and prices, which it refers to as "collective decision-making." In practice, the state produces and distributes all goods and services to its citizens. ***Communism*** is the extreme form of socialism, as the government controls all aspects of its citizens' lives. The Soviet Union used Communism, while China, Cuba, and North Korea currently use it. Socialism can also encompass a system where the government maintains private property but extensively utilizes taxes, subsidies, price controls, and regulations to control the economy indirectly.

The other extreme is ***laissez-faire capitalism***. Laissez-faire is a French term that translates to "leave it alone." Laissez-faire, of course, refers to a government's propensity to interfere with its economy. Capitalism allows citizens to own property, including land, buildings, and machines, which are used to produce and distribute goods and services among citizens.

Capitalism is synonymous with free markets. Free means minimal interference from the government, and a ***market*** brings together many private sellers and buyers, exchanging products and services for money. However, capitalism still needs a government. The 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, and canals, that help commerce flourish.

Socialism and capitalism are opposites; 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.

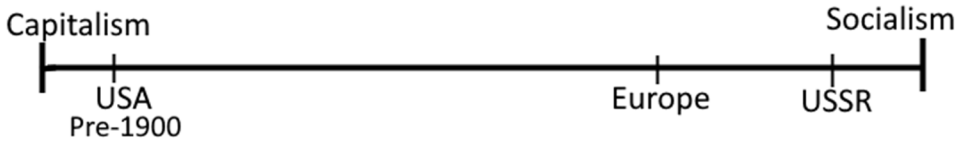


Figure 1. The continuum of economic systems

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.

Economic freedom does not constitute political freedom. For example, Singapore and Kazakhstan have market-oriented economies, but citizens may be cautious about publicly criticizing the government. Consequently, democracy and freedom went together hand in 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 government's level of control over its economy. They refer to one measure as the ***Index of Economic Freedom***. Researchers rank the freedom levels of people and businesses in terms of the degree of free trade, taxation levels, government expenditures, and the ease of obtaining business licenses. Then they compute an average of all characteristics. We present two Indices of economic freedom in Table 1. Researchers consistently ranked Hong Kong as the freest economically, while Venezuela was ranked as 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

Country	Heritage Foundation 2000	Heritage Foundation 2010	Heritage Foundation 2025	Fraser Institute 2009	Fraser Institute 2022
Hong Kong	1	1	NA	1	1
Ireland	10	5	3	21	6
The United States	8	8	26	10	5
Mexico	76	41	80	75	65
Russia	113	143	135	82	119
Venezuela	89	174	174	139	165

Sources: Fraser Institute and the Heritage Foundation

Although economic freedom measures are subjective, they can still be informative when examined over time. For example, let's discuss the United States. The Heritage Foundation ranked the United States 8th in 2000, but it fell to 26th by 2025. However, the Fraser Institute claims that the United States is freer in 2022 than it was in 2009.

Characteristics of Capitalism

Private ***property rights*** form the backbone of capitalism and are an individual's right to use, control, and obtain benefits from a good, service, or resource. Typically, we associate private property rights with tangible assets, such as equipment, land, and buildings. However, they also include intangible assets such as patents, trademarks, and copyrights. A ***patent*** gives an inventor the exclusive right to produce an 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 must have the right to exclusive use of the property, receive legal protection against invaders, and have the right to transfer the property to another. Countries with strong property rights require a sound and honest judicial system where judges and magistrates ensure that they protect property rights.

Private property rights create incentives for the owners. Owners can use private property for their benefit, and this self-interest can also benefit others. For example, an owner constructs and operates a restaurant to earn a profit. In the surrounding area, people benefit from having 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 incentive to care for their property, while theft became rampant. Stealing is becoming a significant problem in the United States as well. Some claim that 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. Owners cannot do anything they want with their property. For example, city governments impose zoning laws, which define 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 on private property include pollution, traffic congestion, noise, and the protection of endangered species.

People who own their land are incentivized to take good care of their property. Government ownership of land poses several problems. Governments in China and Australia own agricultural land and lease it to farmers. Hence, the farmers do not own the land. Farmers overuse the land, failing to let it fallow and replenish its nutrients. Fallow means farmers let a pasture lie unused to allow it to rebuild its nutrients. Furthermore, farmers often do not invest in capital to prevent soil erosion; instead, they overuse fertilizers and pesticides. After the agricultural land becomes unproductive, the farmers leave, leaving the government with infertile, useless land. Australia has another severe problem. Sheepherders raise too many sheep on a pasture. The sheep eat all the

grass and constantly trample on the fields, damaging future grass growth. Again, the government owns unproductive agricultural land (Diamond, 2005).

Capitalism is built upon ***self-interest*** because it directs the activities of individuals and businesses, encouraging them to pursue their interests. For instance, consumers want low prices and high-quality products and services. ***Entrepreneurs*** who take risks and introduce new products aim to earn profits; workers seek high wages, fringe benefits, and reduced workloads, while property owners desire the highest value for their land. Unfortunately, many people label self-interest as greed because individuals and businesses often pursue money as a form of 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 these cell phones. Thus, greed is not necessarily bad. Greed helps people channel their self-interests into activities that benefit society.

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

Capitalist countries have competitive markets, characterized by numerous buyers and sellers. With many buyers and sellers, neither a particular buyer nor a seller can manipulate the market. ***Competitive markets*** ensure that consumers pay the lowest prices and purchase the largest quantities of goods and services. Moreover, competitive firms have incentives to implement new technology or create new products. The keyword is competitive because the first government intervention in the United States occurred in non-competitive markets. For example, the U.S. government began regulating during the 20th century, breaking up monopolies and regulating 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***. The first form of specialization is the division of labor. ***Division of labor*** is a business that breaks down a product's manufacturing into specific tasks, each performed by a different worker. Workers become more skilled over time and choose occupations that suit their abilities. One worker is an excellent welder, while another quickly assembles the products. Division of labor forms the foundation of mass-production technology as workers boost their productivity and raise production. For example, workers on factory assembly lines can produce millions of consumer products at a low cost.

Specialization applies to countries as they focus on products and services in which they excel. The ***Law of Comparative Advantage*** states that countries specialize in producing goods at a lower cost relative to other countries and then engage in international trade. David Ricardo wrote this Law in the 19th century, which still applies today. For example, Asian countries produce a wide range of products, including computers and cars. The United States grows corn and soybeans, while Colombia grows premium coffee. Thus, these countries produce these products at a low cost and trade with each other. Therefore, consumers in these countries have access to a large variety of goods that are sold at low prices.

Even regions within a country can specialize in specific industries. This is not the Law of Comparative Advantage because it applies to countries, not regions within a country. For example,

the United States is a vast country, and its regions specialize in a wide range of products and services. Energy companies operate in Texas. Dairy companies produce milk and cheese in Wisconsin, while farmers grow oranges in Florida. Furthermore, the United States has developed an extensive and efficient transportation system that enables sellers to quickly and affordably transport products and services anywhere within the country. At last, companies can specialize in products and services. Microsoft specializes in computer software, while Honda builds motor vehicles. Thus, countries, regions, and companies specialize in what they do well and can produce large quantities at the lowest prices.

Specialization and the Law of Comparative Advantage lead to increased production efficiency. Consequently, people trade and exchange products and services with those who most desire them. Thus, businesses and people need the freedom to engage in voluntary exchange. ***Voluntary exchange*** is when one person sells goods to another who places a greater value on them. Thus, voluntary exchange forms the foundation of trade. For example, a person owns a 1968 Ford Mustang and assigns a value of $4,500 to the car. However, one buyer was willing to pay $5,000. Consequently, both parties benefit by trading, while the seller gains $500 in value. Both parties are entitled to a voluntary exchange benefit. However, trade and exchanges have transaction costs. ***Transaction costs*** arise as buyers must expend time, effort, and other resources to search for and negotiate an exchange with a seller. Transaction costs reduce gains from potential trades. For instance, a homebuyer spends time and effort finding the perfect house and then pays various fees to transfer the property title into their name. In the United States, transaction costs range from 3% to 9% of a property's value.

Specialists evolve into experts in their field. We call these experts middlemen. A ***middleman*** is a person who buys, sells, or arranges trades. Middlemen reduce transaction costs by leveraging their expertise to connect buyers and sellers. For example, car dealerships are the intermediaries between car manufacturers and customers. Grocery stores serve as intermediaries between farmers and customers. Stockbrokers act as intermediaries, helping investors buy and sell stocks. Finally, the Internet became the ultimate intermediary because Amazon, eBay, and Craig's List help buyers and sellers find each other worldwide. Consequently, a country with more middlemen becomes a wealthier nation.

Transactions require a medium to facilitate trade. Thus, societies use money to boost specialization and voluntary exchange. The first function of money is that people, businesses, and governments use it as a ***medium of exchange***. Thus, money enables individuals, businesses, and governments to purchase products and services. If a society did not have money, then people would use barter. ***Barter*** is a highly inefficient form of trade. For example, if a person makes shoes and wants to buy bread, they must find someone who wants to trade shoes for bread. Thus, a buyer must find a seller who wants the buyer's product, a phenomenon known as the ***double coincidence of wants***. Imagine a teacher, scientist, or musician who wants bread. They must find a seller who is willing to utilize the services of these professionals. Thus, money leads to specialization and simplifies trade.

Barter is returning. The Internet enables people to connect. Although barter is inefficient, a business may have cash-flow problems and use it to obtain products and services it needs to sell. Furthermore, barter helps people avoid taxes because the buyer and seller do not exchange money

and place no monetary value on the trade. Hence, they do not pay taxes. Of course, governments are quick to put taxes on these transactions.

Criticism of Capitalism

Karl Marx studied the poor working conditions in British factories during the 19th century. He believed all societies experience transitions of class struggles because every society has two classes: the privileged and the exploited. During Roman society, the two classes were the slaves and the slave owners. During the Middle Ages, the lords and serfs were the primary social classes. During the Industrial Revolution, they were the owners of capital and the workers who clashed and fought with the owners. Owners of the capital are few and wealthy, while the workers are numerous and poor.

Over time, tension builds between the two classes, leading to a revolution. Then society evolves to a higher level. Although Karl Marx criticized capitalism, he considered it a necessary stage in development. Consequently, capitalism builds upon a nation's wealth and increases the amount of capital, such as machines and equipment.

Marx criticized capitalism on three grounds:

The Law of the Falling Rate of Profit – the capitalists search for new technologies that reduce labor and boost productivity. However, businesses that implement modern technologies and install new machines and equipment often displace labor, thereby increasing the number of unemployed individuals. Thus, capitalists produce more output and employ fewer workers, while indirectly, fewer workers earn wages. Hence, companies have fewer consumers, which causes their profits to fall over time. This trend accelerated in 2025 as companies scrambled to replace workers with artificial intelligence.

The Law of Disproportionality – capitalist systems are plagued by boom-and-bust cycles. Businesses go through cycles when they cannot sell their products and services, while workers cannot afford to buy 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 affected the United States and Europe for years. The events of 2025 suggest that another economic downturn is imminent as the world teeters on the edge of recession.

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 in the hands of a few people. Then the monopolies and trusts dominate and control an industrial society. A society's wealth becomes increasingly concentrated in the hands of a few.

These three laws pave the way for a revolution, and then society would evolve to its highest form: communism. Communism is a utopian society characterized by the absence of class struggle. Of course, the government must control all society's resources and provide help during the transition. However, only a handful of countries became communist.

Vladimir Lenin explained this anomaly by adding the fourth law. Industrial countries are imperialistic and always conquer and add new colonies. Industrial countries export manufactured goods to the colonies, and in turn, the colonies ship raw materials and food to the industrial country. Capitalism leads to imperialism, enabling industrial countries to survive and extend the class struggle globally. Imperialism extends the life of capitalistic countries as these countries exploit the poorer countries. We can claim imperialism is still around. For example, many countries, including the United States, are trying to prevent China from developing a sustainable computer chip industry.

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. John Rockefeller, the founder of Standard Oil, controlled over 90% of the market for petroleum in the early 1900s. Lastly, 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 negotiate and dispute over workers' wages and benefits, including pension plans and health insurance. Workers can strike if the capitalists and labor unions cannot reach a mutually acceptable agreement. The factories shut down as the workers stopped working and walked off their jobs. Production disruption hurts the business's profits until the labor unions and management reach an agreement. In the 1980s, the U.S. government curbed union power and opened the U.S. economy to free trade. Now, Marx's predictions are becoming true again as all laws are being reflected in society.

The Similarities between Government and the Market

The government and competitive markets share similar characteristics. Both government and market participants can use ***cost-benefit analysis***. Before a firm, consumer, or government decides 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 the total costs. Economists consider a positive net benefit ***efficient*** because it allows society to obtain the greatest benefit from its resources. For example, the net benefits for firms are profits. If a firm continually incurs a loss, it should consider reallocating its 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 purchases a product, they weigh the level of satisfaction with the product's price relative to their income. Consequently, consumers only consume a product if it raises their utility. Unfortunately, the government often fails to use cost-benefit analysis, despite its potential benefits.

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 spending, while a business's profits limit a firm's growth. For instance, if a firm continually incurs losses, it will eventually become bankrupt unless a government subsidizes it or bails it out. Likewise, a government's tax collections limit its spending. The government can

increase borrowing, but again, future tax hikes limit the government's debt because it must repay the debt with interest. Economists refer to this as the "No free lunch" principle because every choice entails both benefits and costs, and efficiency seeks to maximize the benefits relative to their costs.

The Differences between the Government and Markets

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 as the government establishes and updates 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 and criminal courts protect private property owners. Moreover, a government uses force to modify human behavior. The 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 their ability to modify human behavior. For example, employers cannot penalize workers for arriving late to work daily. However, employers can fire their workers, 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 places the government in a unique situation because it can raise fees, fines, and taxes if it has financial trouble. If a firm or consumer experiences financial problems, it either resolves its financial issues or goes bankrupt. Unfortunately, the ability to raise taxes may cause a government to delay reforms or prevent much-needed restructuring.

Another difference is that a government can redistribute wealth, and redistribution can be an efficient means of achieving this. For instance, the government finances education, such as public schools and universities. Then the government subsidizes the students because students receive more funds from the government than they pay in taxes. However, society benefits in the long run because it has a more educated workforce, which raises their productivity and serves as a foundation for high-tech industries.

The government is political, as political parties fight for control of it. The United States has two major political parties: the Democratic Party and the Republican Party. 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 from the market. People who supply highly valued goods and services can earn high incomes in the market. For example, half of the United States' millionaires earned their fortunes from real estate, while politicians use campaigning, fundraising, and public relations to capture votes, thereby strengthening their power.

Key Terms

macroeconomics
microeconomics
economic system
socialism
communism
laissez faire capitalism
market
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 could we 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 Russia and Venezuela became less free. What is occurring?

3. Some countries, including 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 we have any problems with this arrangement?

4. We design a hot, new cell phone that everybody wants. We also hold a patent that prevents competitors from duplicating our phone. Which price would we charge?

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

6. Is Karl Marx correct in assuming that the government and the capitalists would conspire together?

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

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

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

10. Does the government force consumers to pay for specific products or services?

2. The Government Regulation of Markets

A capitalistic society still needs a government because the government establishes a society's legal system. The legal system informs citizens of the rules and regulations, as well as the consequences of breaking them. Furthermore, a legal system encourages citizens to interact peacefully and harmoniously and protects citizens' property. Moreover, a government issues money and helps establish a society's infrastructure, which connects cities, markets, and ports through roads, canals, and railroads. Consequently, an infrastructure enables regions within a country to specialize as producers and suppliers, facilitating the rapid transport of goods and services from one market to another.

The government can intervene in a market and correct a market failure. Thus, the government either supplies a product or service or fixes market failure by imposing a regulation or government control. Regulations can be complex, but this chapter provides a foundation for understanding government regulations, introducing common theories, total economic costs, and problems associated with them.

Why Does the Government Regulate or Control a Market?

A regulation is defined as a government-imposed limitation on the behavior of individuals or organizations. A regulatory agency is the institution that monitors and enforces the limitations. A country's President and legislature create the regulatory agencies and enact laws that the agencies must abide by. The legislature is the Congress of the United States and the Parliament for many European countries. In addition, all levels of government in the United States can impose regulations, including federal, state, county, and city governments.

Some examples of regulations include the following:

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

Example 2: The 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: The government mandates a quality standard. A ***mandate*** is when the government instructs market participants on what to do, but does not cover the associated costs. Furthermore, the government may impose penalties on violators for noncompliance and typically does not cover the costs of mandates. For example, the U.S. federal government imposes a standard on drinking water. Water companies must reduce contaminants, such as metals, toxic chemicals, and microorganisms, below the maximum allowable limit.

Example 4: A government restricts market entry. For instance, the United States government grants patents. When an inventor designs a new product, they file for a ***patent,*** and this person has exclusive control over the product for 17 years. A patent encourages people and businesses to design brand-new products. Consequently, patents grant the inventors monopoly power, which helps them recoup their research costs and reward their hard work and dedication.

Example 5: The government bans or prohibits an activity. Thus, if a government finds anyone supplying or using the product or service, it imposes severe penalties. For example, many governments ban the sale and use of drugs such as marijuana, cocaine, and heroin.

The 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 a single firm supplies the entire market, economists refer to this company as a monopoly. Consequently, a ***monopoly*** has market power because it can reduce its production level, raising both the market price and profits.

Natural monopolies, such as telephone, electricity, natural gas, railroad, and water companies, require massive investments in infrastructure. As these companies become larger, they can reduce their per-unit costs. A ***natural monopoly*** becomes large enough to supply goods or services to the entire market at a low cost. For instance, a railroad company lays a network of railroads connecting cities throughout the country. Thus, farmers and companies can produce in one area and transport their products to other places in America at a lower cost. Lastly, the company must maintain this system.

Sometimes, companies can become too large. Thus, the U.S. government can break up a monopoly or regulate its price. For example, the U.S. government broke 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. The government wanted to limit Standard Oil's market power because an unregulated monopoly could raise profits and market prices by reducing production.

For the second reason, the government intervenes to correct an externality. An ***externality*** is a situation where a firm or person affects a third party without the third party's consent. Unfortunately, a third-party often experiences either a cost or a benefit. For example, a firm pollutes the air freely. Polluted air harms people living in its vicinity, and the firm does not compensate for the damage it causes. Economists refer to this as a market failure because property rights are poorly defined.

We can define property rights as abstract. The polluting firm treats the air or water as a free resource, damaging it without anyone's consent. Consequently, a government has two strategies. The government can convert air or water into property rights, and the firm can buy the right to pollute the resource, or the government can impose taxes and regulations. Nevertheless, the 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 administers vaccines to paying customers. However, those who are not vaccinated can still spread diseases to other unvaccinated people. Hence, a government could prevent epidemics by inoculating everyone freely or subsidizing the inoculations. The government drives the market price down for inoculations as consumers increase their quantity demanded. Hence, doctors inoculate more people. Positive externalities include research and technology. After a firm has designed a new product using new technology, other firms can quickly duplicate the technology.

For the third reason, the government enters a market to provide a ***public good***. A public good requires two conditions. First, public goods are ***non-rival***. One person's consumption of the good does not prevent others from consuming it. 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 them without paying. Unfortunately, they have no incentive to pay for the goods. Moreover, companies cannot restrict the 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 rural areas migrate to cities, seeking work and escaping the poverty and hardship that often prevail in rural communities. Unfortunately, urbanization usually leads to a larger government and increased bureaucracy.

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

Millions of people, however, live near each other in cities, 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 metropolitan areas, stressing the environment. People generate large amounts of garbage, wastewater, and pollution. Then crime, noise, and traffic congestion become serious problems. Consequently, a government expands to address these problems and reduce conflict. Ultimately, urban dwellers must bear the cost of these government services, resulting in higher taxes compared to those living in the suburbs or countryside.

Public goods also 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 produce enough, and the government supplies them. Several examples include postal services, highways, libraries, and education. Private companies can deliver mail and packages. However, mail companies would often provide good service to urban customers while neglecting those in rural areas. Mail companies usually struggle to find enough customers in rural communities to sustain a profit. Furthermore, private schools cater to parents who can afford their tuition. Nevertheless, students from low-income families would be excluded from an education. Consequently, public schools allow 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 the 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*** refers to the situation where one party, typically the buyer or seller, possesses more information than the other party. For example, a person who buys fire insurance knows they have faulty wiring in their home. Thus, the homeowner has more information than the insurance company. For another example, many consumers are unaware of how to calculate loan payments. Finance companies and banks can exploit consumers' lack of knowledge and charge higher payments. Asymmetric information occurs in markets where consumers have difficulty inspecting the good or seldom purchase it from the same producer. Consequently, some producers make and sell low-quality, defective, or even harmful goods.

The government can regulate markets with asymmetric information to protect the buyers or sellers. Some forms of asymmetric information may be illegal, and the government prosecutes those who engage in them. For instance, a person sets his house on fire, hoping to collect the insurance money. The arsonist has more information than the insurance company. For another method, a government establishes a weights and measures agency. Thus, the government employs inspectors who check gas pumps and supermarket scales to ensure accuracy. Finally, the government imposes standards on occupational licenses. A ***license*** grants a professional the right to practice their specialty and ensures that professionals have a high level of competence. 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 quality. For example, McDonald's is a franchise; theoretically, a Big Mac tastes the same anywhere around the world. Additionally, consumers can utilize information sources like Consumer Reports to aid in purchasing products or services. Finally, credit bureaus such as Experian, Equifax, and TransUnion create databases containing information on customers' creditworthiness. People who know they will not repay a credit card and have 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 by identifying a societal problem and regulating it. ***Social regulation*** encompasses the previous four reasons for regulation, and the number of regulations has increased significantly in the United States over the last 50 years. For example, people can legally purchase cigarettes in the U.S. if they are 18 years of age or older. However, state governments heavily taxed cigarettes, won large lawsuits against tobacco companies in the 1990s, and passed laws restricting tobacco use. Many states and city governments ban cigarette smoking in restaurants, bars, near building entrances, schools, and other public places. Health insurance companies also raise the premiums for smokers since they are likely to suffer from more health problems. Nevertheless, the government could simplify things by making tobacco illegal rather than having hundreds of regulations and laws restricting tobacco use.

The Theories of Regulation

Different theories explain the relationship between regulatory agencies, their regulated industries, and the public. Implementing regulations can be complex because politicians, interest groups, industries, and regulatory agencies become involved, each with different interests. Then various groups strive to control or influence regulatory agencies and politicians. Consumer groups want lower prices. New companies want more liberalized markets. Larger, older companies seek high, stable profits, restrictions on international trade, and limitations on labor unions, while labor unions advocate for higher workers' wages that increase firms' 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 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 like complex rules because they are educated and demand higher salaries. They will move on to other work.

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

The First Theory: ***Public Interest Theory*** is the concept that the government corrects a problem in a society or a market. Consequently, the government established a regulatory agency to address the problem. For example, one firm, a monopolist, controls a market. A monopolist reduces production, increases the market price, and prevents market competition. The government regulates the market to curb the power of monopolists. As another example, firms are producing contaminated foods. The government establishes a health regulatory agency to reduce contaminated foods, as health inspectors inspect the food to ensure producers meet the minimum standards. Health agencies can fine, penalize, or sue a firm if it is found to be producing contaminated food. Consequently, regulations increase a society's welfare in these cases.

The Second Theory: ***Corporatism*** occurs when bureaucrats, political leaders, and businesses collaborate as if the country were one large corporation. The 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 the government allows people to own 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 the government determined the best path and plan for economic development and growth.

Corporatism comes in various forms. In some cases, the government dominates the relationship and regulates its industry. This management style employs a top-down approach, similar to how communist countries manage their industries. Other forms of corporatism allow businesses a certain degree of autonomy and independence. The government creates associations that become the intermediaries between the government and the industry. Sometimes, the association advocates for industries and persuades governments to reduce their regulatory control (Unger & Chan, 1995).

The Third Theory: *Capture Theory* is when an 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 have a strong influence on the President and the legislature. Thus, the government passes favorable rules for the industry and regulatory agencies. Furthermore, the industry can directly affect the President and the legislature. Specifically, political campaigns in the United States are expensive, and corporations and businesses contribute to them to influence politicians' votes. 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 encompass interest groups beyond industry (Becker, 1983). An ***interest group*** is a political organization that influences government and forms 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 the government in the United States. Politicians want to remain in office, but political campaigns cost millions. 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."

The Fourth Theory: *The Principal-Agent View* posits that government bureaucracies often fail to serve the purpose for which they were created. Bureaucrats in regulatory agencies become increasingly concerned with maximizing their power, influence, and prestige. Moreover, they can be corrupt or dysfunctional, serving their self-interest. Dysfunctional means a government agency is not performing its proper 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 incidents occurred in Dallas, Tulia, and along the Texas-Mexican border, where police officers arrested innocent people for drug possession and distribution.

The Fifth Theory: *Parkinson's Law* is C. Northcote Parkinson observed that regulatory agencies expand in size each year without any correlation to the amount of work they do. Northcote observed that as the British Empire shrank, the number of employees in the Colonial Office increased. The Colonial Office administered the British Empire, and a smaller empire implies less work. Thus, the number of employees should decrease over time, not increase.

Parkinson's Law is a universal principle that 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 typically ensures that all the allocated funds are spent. If the agency has saved money, the legislature would notice and lower future funding. Thus, government bureaucrats often request additional funding and find ways to allocate it.

Statement 2: "Work expands 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 will stretch the

task out over 8 hours. Therefore, the bureaucrats will create work. Whether designing 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 hired a rival, that rival would compete for the same promotions. However, a bureaucrat can elevate himself to a manager by hiring subordinates. To hire subordinates, bureaucrats must "create work for each other." Over time, regulatory agencies expand paperwork and broaden regulations.

The Sixth Theory: Technology leads to the growth of government bureaucracies. As technology improves for communication, transportation, and record keeping, bureaucracies become larger. Bureaucrats utilize technology to enhance monitoring and ensure compliance with rules and regulations (Kiser & Kane, 2001). For example, smugglers secretly import products, thereby avoiding payment of duties and taxes to the government. The 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 the government does not catch the smugglers, and the smugglers sell their products to stores and merchants, then government agents can track and trace the products back to the smugglers through record-keeping. Stores and merchants record their transactions so that government agents can scrutinize them. Records allow government agents to match what a merchant buys and sells. If a merchant claims he bought all his merchandise from one distributor, the agents can check the distributor's records for discrepancies. Finally, tax agents will investigate anyone who has an excessive amount of cash and cannot explain how or where they obtained it.

Technology has a harmful side effect. The national government can use technology to dominate its economy. The national government utilizes bureaucracies to regulate cities, villages, and communities located far away (Kiser & Kane, 2001). For example, the government maintains large computer databases of people and businesses. If a government agent suspects someone has violated a rule or regulation, they can dispatch a team of agents by plane, helicopter, or car within hours. It is no coincidence. The U.S. government is usurping power away from the states and has bombarded county and city governments with numerous rules and regulations. Without technology, bureaucracies would not have the power to enforce compliance with their rules and regulations.

Parkinson's Law and technology suggest that a larger bureaucracy may harm the economy more. This is not entirely true. The size of the bureaucracy is not the problem; rather, it is how efficiently the bureaucracy supplies public goods or how well it manages the legal system. A more developed country requires more bureaucrats; thus, the bureaucracies become larger. Good bureaucracies require the bureaucrats to be 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 laid off government workers and forced some workers into early retirement. Governments stopped maintaining buildings and reduced wages for 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 perform their jobs efficiently, so they closed their offices and began to disobey 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 views 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 interesting because the U.S. federal and state governments are similarly decimating their bureaucracies. The U.S. government is operating a $2 trillion budget deficit in 2025, with a total debt of $37 trillion. The government eliminated many positions and cut funding in 2025. Consequently, the quality of U.S. government services may decline.

Costs of Government Regulations

Government regulations impose numerous economic costs on a society. We are aware of some costs that can be quantified, such as taxes, fines, and fees, while a society incurs other costs indirectly through regulations. Total costs of regulations include the following:

Cost 1: The government diverts resources from the private sector to pay for a regulatory agency's budget. The largest budget cost is salaries. If a government did not employ staff, they would work in the private markets. Furthermore, regulators become adept at justifying their programs and their importance to legislators, as legislatures fund them.

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

Cost 3: Taxes and regulations destroy the market by increasing prices and decreasing market quantities. Therefore, taxes and regulations lower economic activity. If a government imposes mandates, businesses and producers incur greater costs to comply with these mandates. These companies then hire compliance specialists or invest in new machines and equipment.

Cost 4: When the government makes regulations or imposes taxes, some market participants will violate these regulations or evade taxes. Consequently, the government consumes resources to enforce and punish those who violate the law. The government also expands its agencies, such as courts and prison systems. Courts determine whether the people have violated the law. Then a court sentences the guilty to prison. Judges can impose fines to offset the government's costs. Nevertheless, some criminals will never pay.

Problems of Regulations

Government regulations can create many problems for society. For instance, the government and its bureaucrats can make poor investment decisions. For example, the U.S. government passed the Nuclear Waste Policy Act to locate a disposal area for the nation's nuclear waste. The 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, which 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 vacant trailers and parked them 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 trailers available to Hurricane Katrina's victims because federal law prohibits people from residing in trailers on a floodplain. Instead, some victims lived in tents. The government has paid $431 million for the vacant trailers (Neuman, 2006). Consequently, the 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 the following:

Problem 1: Bureaucracies can be political.

Problem 2: Bureaucrats have self-interest. Bureaucrats are primarily concerned with maintaining their jobs and perceived importance, rather than genuinely 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. An extreme form of "too friendly" is corruption, where the regulated companies pay bribes to regulators. Furthermore, regulators often retire from their bureaucratic roles and join the companies they regulate, earning higher salaries as a result. Regulators use and maintain their political connections to the government.

Problem 4: Different regulatory agencies may encounter conflicts due to differing regulations 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. As 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 particular 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 have unintended consequences. For example, the U.S. government passed laws to preserve historic buildings. However, the law had the opposite impact because historic homes are more expensive to renovate, and the government imposes many restrictions on them. For example, a homeowner who wants to paint their historic home another color must obtain approval from a bureaucracy known as the Historic Preservation Office. Some people are hesitant to buy or restore historic homes because they must contend with government regulations and high repair costs.

Problem 8: Regulators process documents at a slow pace. For example, in 1999, the State of Indiana needed six months to determine whether a home in Indiana was historic or not. The author worked for an economic development agency in Indiana.

Problem 9: Individuals with hidden agendas and motives can infiltrate and rise to leadership positions within 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 any man standing in front of her.

Key Terms

mandate
patent
monopoly
natural monopoly
externality
public good
non-rival
non-excludable
free riders
quasi-public goods
asymmetric information
license
social regulation
Public Interest Theory
corporatism
Capture Theory
interest group
Principal Agent View
Parkinson's Law

Chapter Questions

1. The 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?

3. The State of California experienced a severe financial crisis in 2009. Critics stated that the government increased its budget quicker than it collected in taxes since 2001. Could a theory of regulation help explain this?

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

5. The 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 studying how the government regulates the market, students must learn what a market is and which factors influence market prices and quantities. A market is driven by 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 purchase these products and services, but they want to pay the lowest price. Consequently, a market balances these two opposing forces. Lastly, markets are inherently stable because they always gravitate toward a price that balances these two forces.

The Consumers and the Demand Function

A ***demand function*** represents the consumers in a market. A demand function shows the quantity and price of a good that consumers are willing to buy, ceteris paribus. ***Ceteris paribus*** is a Latin term that allows one factor to change but keeps all other factors constant. In this case, we examine consumers' annual demand for tea and allow the market price to change. Therefore, we can determine the impact of price changes on the 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 different goods, tastes, and preferences, etc. We show a consumer's demand for tea in Table 1 and Figure 1.

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

Price ($ per kilogram)	Quantity Demanded (kilograms)
$2.50	5
$2.00	10
$1.50	15
$1.00	20
$0.50	25

Let us look at the slope of the demand function. It has a negative slope, which represents the ***Law of Demand***. The Law of Demand is that consumers increase the quantity demanded 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: ***The Law of Diminishing Marginal Utility.*** When consumers purchase a product, they derive satisfaction, which economists refer to as ***utility***. As a consumer continues to consume additional units of the same good, they gain less and less additional utility from each unit. 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 Pepsi at $0.75. Every time a consumer drinks a Pepsi, the utility they derive from it decreases, so they place less value on the product until they stop drinking Pepsi

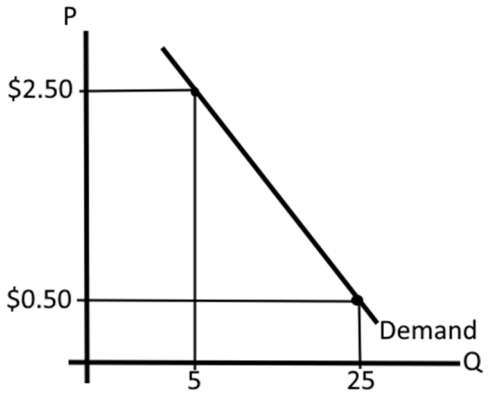


Figure 1. The consumer's demand function

Reason 3: The Law of Demand consists of income and substitution effects. The ***Income Effect*** occurs from a product's price change. If a product's price falls, a consumer with a fixed income can afford to 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. 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. The ***Substitution Effect*** occurs due to a change in consumer behavior. As the market price of a product decreases, people start buying it and substituting away from the more expensive, similar product. For example, if the market price for beef falls, and the price for chicken remains the same, then the consumers substitute beef for chicken. We can see how the problem of inflation in the United States in 2025 is imposing hardship on people as food prices rise while incomes fall.

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 the market, which is depicted in Figure 2. For example, two consumers are in the market, and each has a demand function. We denote a person's demand function by d, while capital D represents market demand. Likewise, we denote the quantity q as the amount for a person, while Q represents the total market quantity. All consumers see the same market price. Thus, a market demand is the horizontal summation of the 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 number of consumers until we find enough points that define the shape of the market demand function.

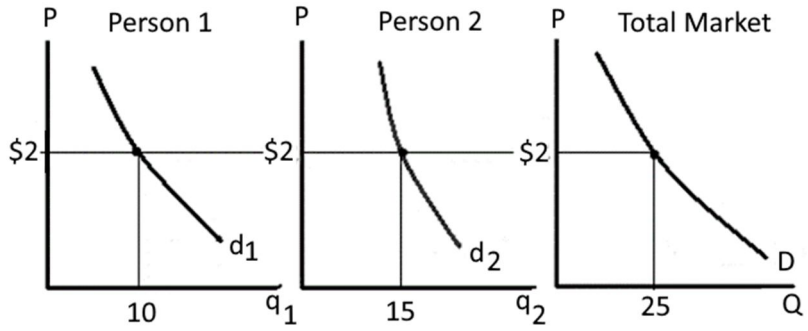


Figure 2. Deriving a market demand function

Economists can measure the aggregate benefit to all consumers in a market, which is known as the consumers' surplus. ***Consumers' surplus*** consists of the area below the demand curve and above the market price. Using the tea market as an example, if the market price equals $1.50 per kilogram, the consumers' surplus becomes the shaded triangle in Figure 3. We rank consumers by their willingness to pay for the tea. The first consumer would gladly pay $2.75 but only pay $1.50. The second consumer would pay $2.70, while the fifth consumer would pay $2.50; however, they both pay the market price of $1.50. Thus, these consumers benefit from the lower market price. If the market price falls to $0.50, consumers' surplus increases, as shown in Figure 4. Consequently, 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, as consumers pay lower prices and buy larger quantities.

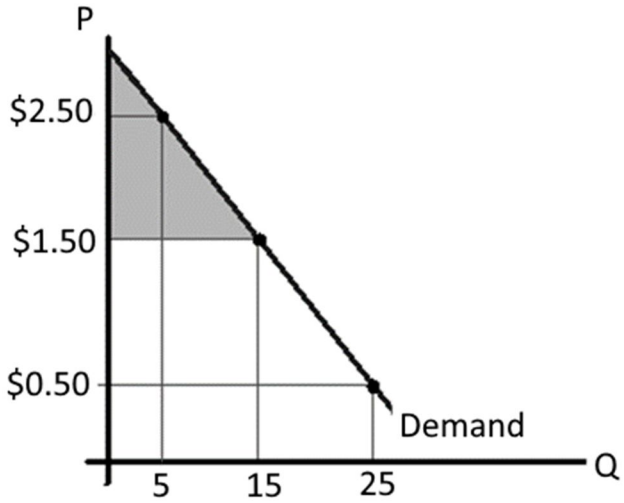


Figure 3. The consumers' surplus for the tea market

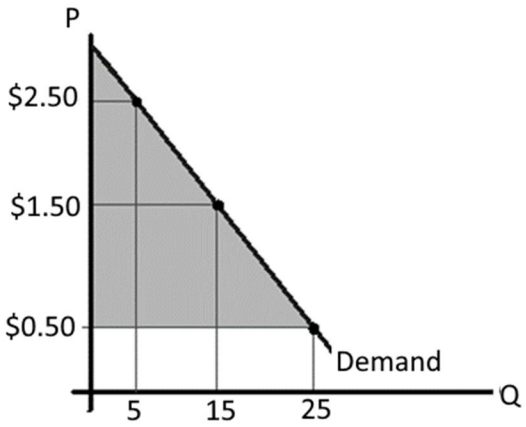


Figure 4. Consumers' surplus for the tea market for a lower market price

Demand functions have another characteristic – ***elasticity***, which measures the sensitivity of consumers' quantity demanded to changes in a market price. If consumers are sensitive to changes in market prices, then the demand function is ***elastic***, and the demand curve is relatively flat, as depicted in Figure 5. Furthermore, we compare the change in the quantity demanded to the change in the price. A small price change can lead to a significant change in the 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 luxury goods such as expensive clothes.

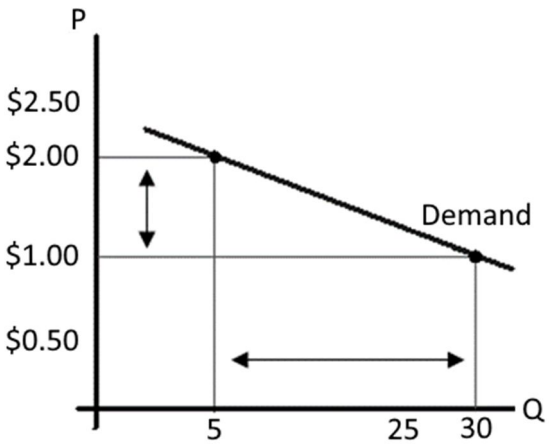


Figure 5. An elastic demand function

If consumers are not sensitive to price changes, 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 we notice the change

in quantity compared to the change in price? The change in quantity is small. Examples of inelastic demand functions include alcohol, cigarettes, and gasoline.

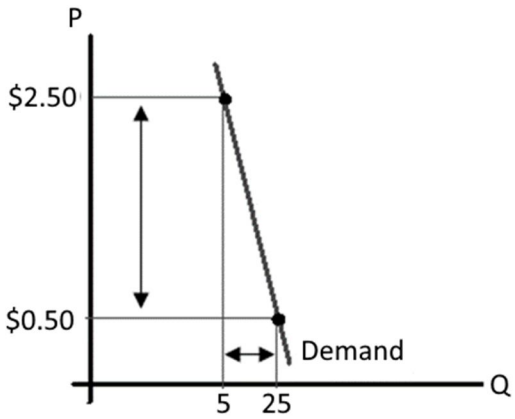


Figure 6. An inelastic demand function

Economists distinguish between "***quantity demanded***" and "***change in demand***." Changes in the quantity demanded follow a movement along the same demand function because the product's market price changes. We depict a movement along the demand function in Figure 7. After introducing the supply function, a changing supply function can cause consumers to move along a demand function.

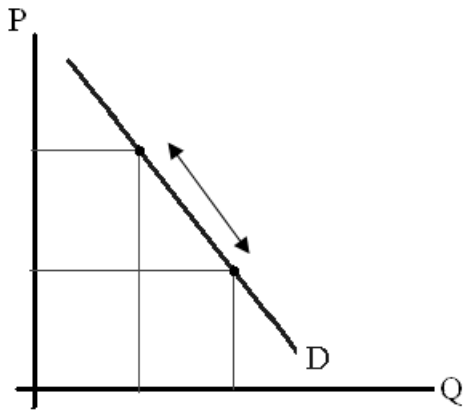


Figure 7. A movement along a demand function

Other factors influence consumers' demand for products, aside from the market price. When other factors change, the demand function shifts. We show an increase in demand in Figure 8, where the demand function shifts to the right. Nevertheless, factors can decrease the demand function, shifting the function leftward. We show a decrease in demand in Figure 9. We do not

violate the ceteris paribus principle because we allow one factor to change to determine its impact on the market.

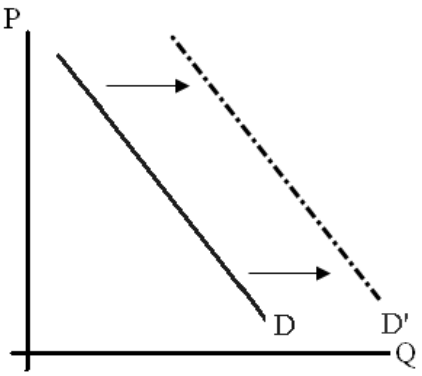


Figure 8. The demand function increases

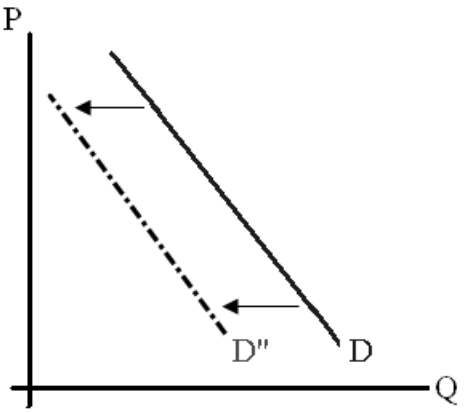


Figure 9. The demand function decreases

We list seven factors that shift the demand function to the right. A leftward shift would be the opposite.

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 earning higher incomes will buy more products. On the other hand, some products are ***inferior***, and consumers tend to buy fewer of these 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: The price of other products shifts demand functions. If a product is a ***substitute*** and the substitute's price increases, then consumers buy more of the other product, 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 price of the complement decreases, consumers increase their demand for the good. For instance, if the price of DVD players falls, consumers increase their demand for DVDs, all else being equal. A consumer cannot watch DVDs without a DVD player, so a cheaper player encourages consumers to buy more DVDs. For instance, Sony sells the PlayStation 5 console at a loss but earns profits from the games it sells.

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

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

Factor 6: Consumer tastes and preferences change. For instance, scientists have discovered that coffee reduces the risk of colon cancer and improves overall health; thus, consumers increase their demand for coffee, all else being equal. They want the health benefits of coffee.

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

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

The Producers, Sellers, and the Supply Function

The ***supply function*** shows the prices and quantities producers and sellers are willing to supply, ceteris paribus. For example, tomato producers have a supply schedule in Table 2 and a corresponding graph in Figure 10. Did we notice how the supply function has a positive slope? The positive slope reflects the ***Law of Supply***, where producers and sellers supply more products 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.

A characteristic of supply functions is producers' surplus. ***Producers' surplus*** represents the area above the supply curve but below the 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, which we represent as the shaded area in Figure 11. Some producers can supply tomatoes to the market for $1.00 per pound. However, these producers benefit because the market price exceeds their costs. Thus, they earn profits. Market prices can change for the producers. For example, if the price of tomatoes increases to $5, the producers will benefit and earn more profits, as depicted in Figure 12.

Table 2. Producers' Supply of Tomatoes per Year

Price ($ per kilogram)	Quantity Supplied (1,000 kilograms)
$5	100
$4	80
$3	60
$2	40
$1	20

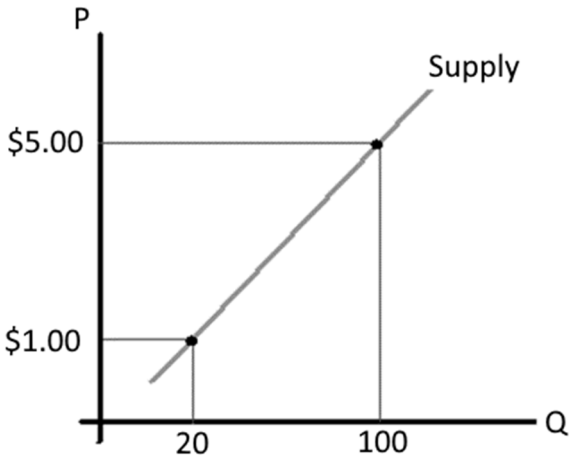


Figure 10. The supply function for tomatoes

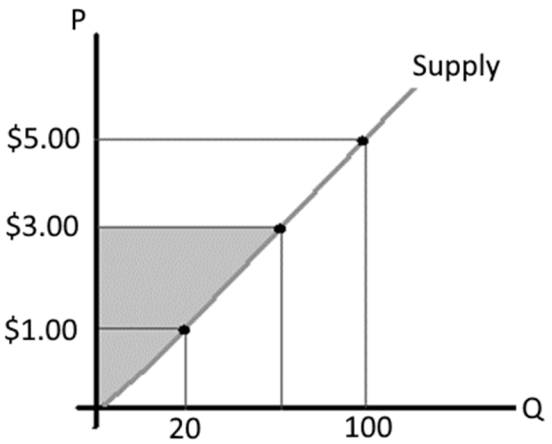


Figure 11. The producers' surplus in the tomato market

Another characteristic of supply functions is ***elasticity***. Elasticity for supply functions is caused by time. Producers and sellers cannot expand production quickly in the short run when the

market price changes. Consequently, producers and sellers are not sensitive to price changes in the short run. Supply functions are relatively steep and ***inelastic***, as shown in Figure 13. In the long run, producers and sellers have the time to adjust plant size and invest in new machines and equipment. Thus, long-run supply functions are relatively ***elastic***. We depict another example in Figure 14.

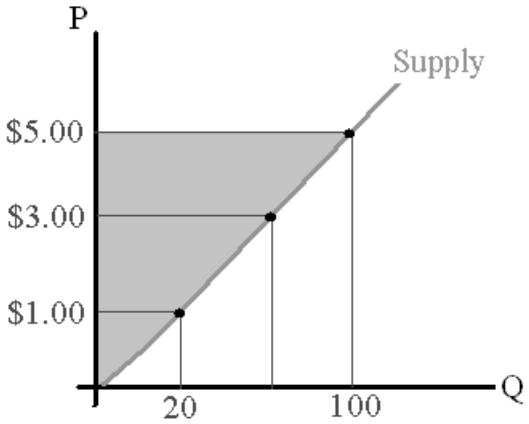


Figure 12. Producers' surplus increases for a greater market price

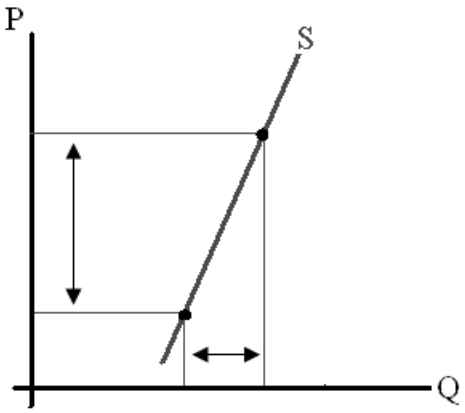


Figure 13. An inelastic supply function

For example, Intel has both short-term and long-term 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 were operating below its 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. Thus, the supply curve in the long run is more elastic, as shown in Figure 14.

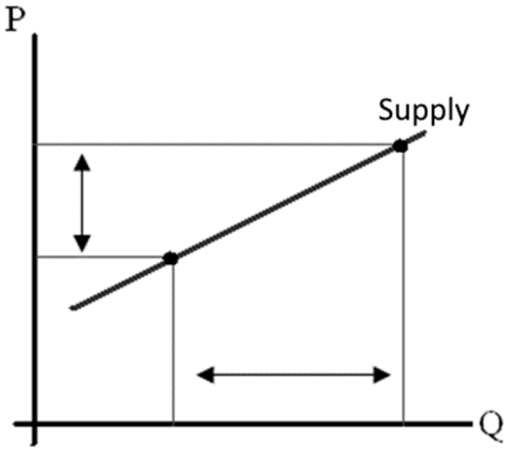


Figure 14. An elastic supply function

Similar to demand functions, economists distinguish between a change in "***quantity supplied***" and a "***change in supply***." A change in the quantity supplied is a movement along a supply function that results from changes in market demand. We show a movement along a supply function in Figure 15. A change in supply is a decrease or an increase in the supply function that shifts the whole function to the left or the right.

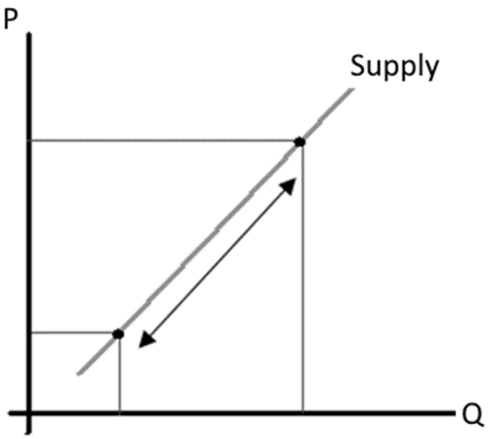


Figure 15. Moving along a supply function

Other factors in the market can change, other than the market price. These factors influence the behavior of producers and sellers. Some factors increase supply, shifting the entire supply function to the right. We show a supply increase in Figure 16. Other factors decrease supply, shifting the entire supply function to the left. We depict a decrease in supply in Figure 17. Do not

think of shifting supply functions "up" or "down." A supply function shifting upward does not represent an increase in supply. This becomes a decrease in supply!

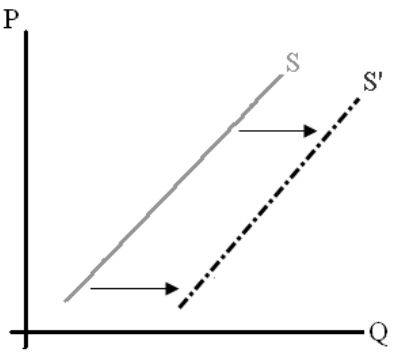


Figure 16. The supply function increases

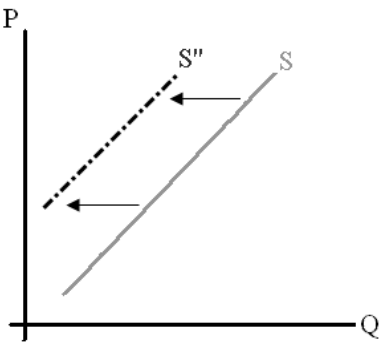


Figure 17. The supply function decreases

The following factors shift the supply function rightward:

Factor 1: Falling resource prices increase supply functions. If firms and producers pay lower labor wages or prices 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: Weather, natural disasters, and political disruptions can greatly impact supply functions. For example, favorable weather increases agricultural production. Thus, producers and sellers supply more agricultural products to the markets, ceteris paribus. If politicians end a war, producers and sellers supply more to the market, ceteris paribus. Typically, producers and sellers conceal or hide their resources to safeguard themselves and their property during wars and political upheavals.

Factor 4: The 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: The government reduces regulations because firms pay greater costs 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 in machines and equipment to comply with regulations. For instance, U.S. electric power companies must reduce air pollution by investing in machines that lower pollution emissions 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, some firms will likely sell their sugar this year, thereby boosting the sugar supply.

Factor 8: The number of sellers or producers in the market increases because more sellers 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. Market examples include foreign currency, commodities, and the New York Stock Exchange. The New York Stock Exchange brings together buyers and sellers of stock for well-known corporations.

We assume a market has perfect competition. The 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 one's favor. We depict a competitive market for cookies in Figure 18. For instance, a market price of $2 for cookies causes consumers to buy 10 units, while producers also sell 10 units. Thus, the quantity supplied equals the quantity demanded. We refer to this market price and quantity as the equilibrium. ***Equilibrium*** is a state of rest because the market price and quantity do not change as long as another factor does not change.

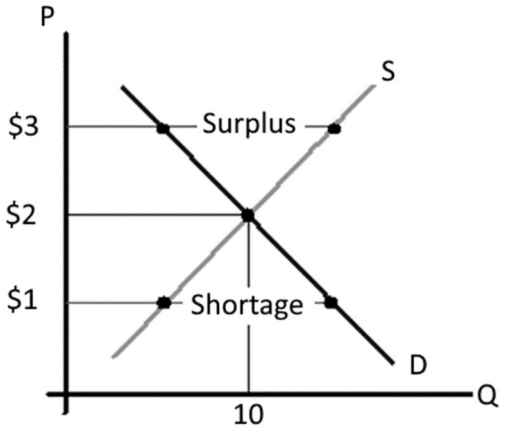


Figure 18. The cookie market

Unregulated markets are stable, and prices tend to gravitate toward equilibrium prices and quantities. For example, a price shock caused the price of cookies to soar to $3. At this price, the quantity supplied exceeds the quantity demanded. The market has a ***surplus*** of cookies because the producers want to provide more than consumers want. Thus, the store shelves are brimming and overflowing with cookies, so the producers and sellers must lower the price until the market clears at $2. On the other hand, another shock occurred, and the market price fell to $1. At this price, the quantity supplied is less than the quantity demanded. Hence, there is a ***shortage*** of cookies in the market 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, Figure 19 illustrates the beef market. Consumers eat beef while cattle producers supply it. If the market price of chicken increases and chicken substitutes for meat, consumers increase their demand for beef, shifting the demand function to the right. Consequently, consumers substitute the cheaper beef for chicken, and both the market price and quantity of beef rise.

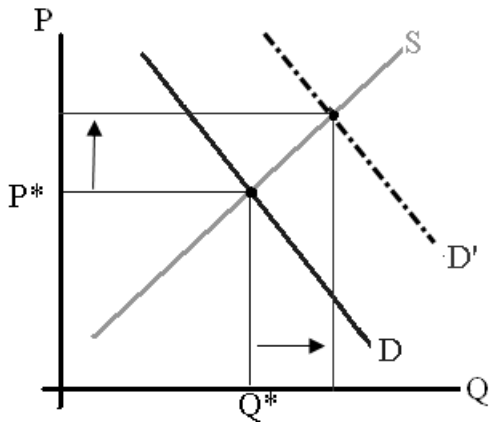


Figure 19. The beef market

As another example, consumers experience an icy-cold summer. Consumers drink soft drinks while producers supply them. We depict a market for soft drinks in Figure 20. Consumers are drinking fewer cold soft drinks, leading to a decline in demand. Demand shifts to the left, and both the market price and quantity of soft drinks fall.

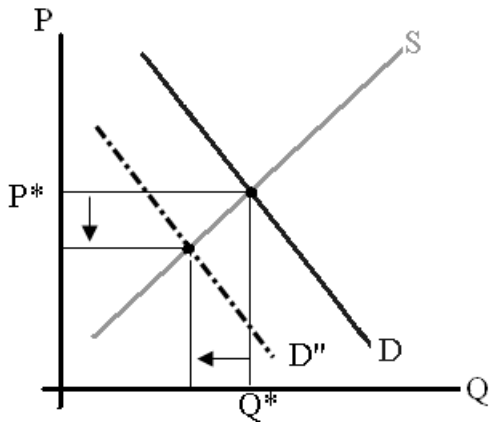


Figure 20. The soft drink market

The 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, producing cheaper computers from more affordable computer chips. Thus, the supply function increases and shifts to the right. The market price falls while the market quantity rises for computers.

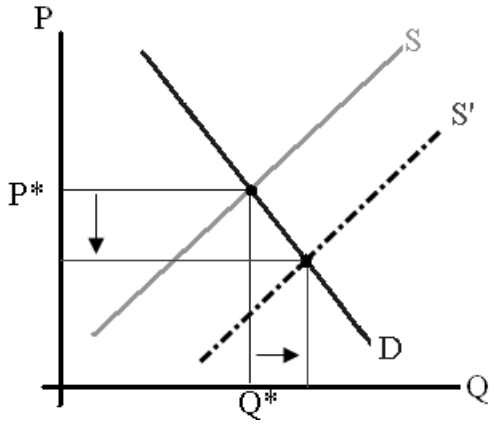


Figure 21. The computer market

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 wages to their workers, their production costs rise. Hence, the supply function decreases and shifts to the left. The market price for automobiles increases while the market quantity decreases.

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

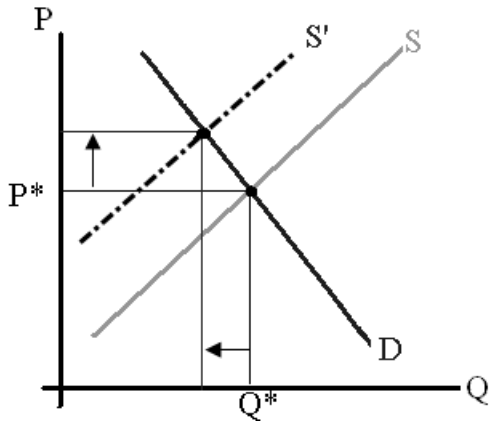


Figure 22. The automobile market

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 prices until they sell their surplus. Consequently, sellers' profits decline due to the lower market price. On the other hand, what would happen if the apple market had a shortage of apples? Sellers will raise the price until the shortage is alleviated, thereby increasing their profits. When the government sets a market price, government bureaucrats are unlikely to set prices accurately. Even if they set prices correctly, things constantly change, causing the quantity supplied to become out of balance with the quantity demanded. Thus, persistent shortages tend to plague Socialist countries.

A free market hinges on the free movement of market prices. Market prices communicate information and affect millions of consumers and producers worldwide. 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, doctors treat illnesses so that people can remain productive and healthy. Thus, society benefits.

The firm has a self-interest in earning profits. Firms earn profits when total revenue exceeds total costs. A firm earns revenue by selling products to customers and pays costs to use resources in the production process. If a firm earns a profit, consumers value the product more than the resources used to manufacture it. Therefore, profits lead to the industry's expansion 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 government interference. Therefore, a society obtains the greatest social welfare. Producers sell their products at the highest price possible, while consumers pay the lowest price, thereby maximizing trade between the two parties. Thus, a competitive market maximizes social welfare, as depicted in Figure 23.

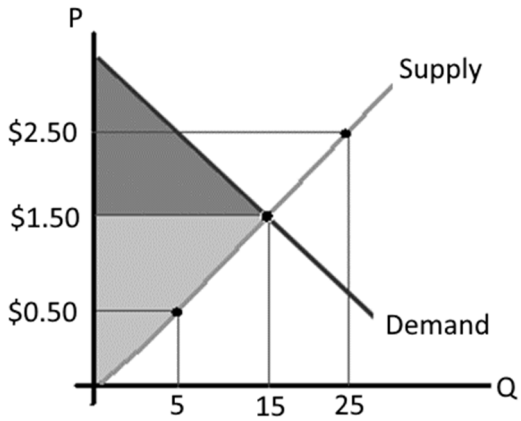


Figure 23. The unregulated market maximizes social welfare

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 driving up the global coffee 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 2008 Great Recession has reduced consumers' incomes. Evaluate the demand for consumer products.

4. The government expands a small road into a highway. Evaluate the change to the stores and restaurants along this road.

5. A scientific study concludes that the artificial sweetener aspartame causes cancer. Evaluate the change in consumers' demand for aspartame.

6. The price of Sony PlayStation 5 consoles has decreased. 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 beverages.

8. When gasoline prices were high in the summer of 2007, consumers sought fuel-efficient cars and were willing to pay premium prices for hybrid vehicles. Appraise the supply elasticity of hybrid cars.

9. The government mandates that suppliers add ethanol to gasoline and that producers make ethanol from corn. What would we expect to happen to the supply function for soybeans if the mandate leads to higher corn prices?

10. The 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 enables farmers to double their corn harvest rate, even when using the same fertilizers, water, and other resources. What happens to the supply function for corn?

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

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

14. The 2008 Great Recession has lowered consumers' incomes. If cars are a normal good, appraise the changes in the new car market.

15. The labor market for automobile workers experienced trouble during the 2008 Great Recession. Businesses and producers demand labor while workers supply labor. The 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 LCD and plasma flat-screen TVs, but they tend to shun traditional tube TVs. What do we predict is occurring in the TV industry?

4. The Government Interferes with the Market

The government can enter a market and impose regulations because it identifies a problem and seeks to correct it. The government can enter a market and impose a new price, a quantity limit, or a quality standard. However, these regulations can cause long-term economic consequences that the government did not foresee or completely ignored. We study the economic impacts of these regulations and government controls. Furthermore, the government must finance a bureaucracy to enforce its regulations and controls. Thus, the government must impose taxes on the market to fund its bureaucracies. Unfortunately, taxes can harm the markets by reducing economic activity, while the government may grant a subsidy to expand the market. We examine the economic impact of taxes and subsidies on the market. Finally, black markets thrive and expand if a government imposes excessive regulations, taxes, and subsidies. Consequently, we study the characteristics of black markets.

Government Price Controls

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

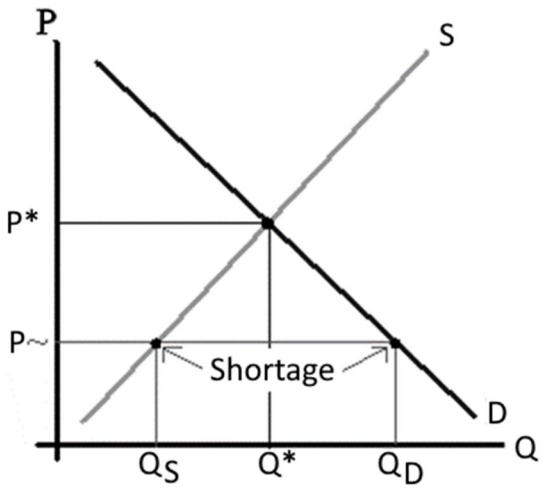


Figure 1. The shortage in the rental market

The government believes the apartment rent is too expensive and sets a price ceiling at P~. A price ceiling is lower than the market price. The direct effect is that the quantity demanded exceeds the 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 ceilings occur over time, exacerbating the rental shortage. First, renters often have to wait for a long time for available apartments. Second, renters may pay "under the table" to property owners. Third, property owners do not invest in new rental housing because they receive low market rents and earn lower profits. Fourth, property owners may lower costs by reducing maintenance and repairs, which can lead to a deterioration in housing quality 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 does not affect the market. This is an excellent trick question on exams. A government could intentionally set 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. The black triangular region represents the ***deadweight loss*** to society, and nobody gets this. This becomes a loss to society because the government has interfered in the market.

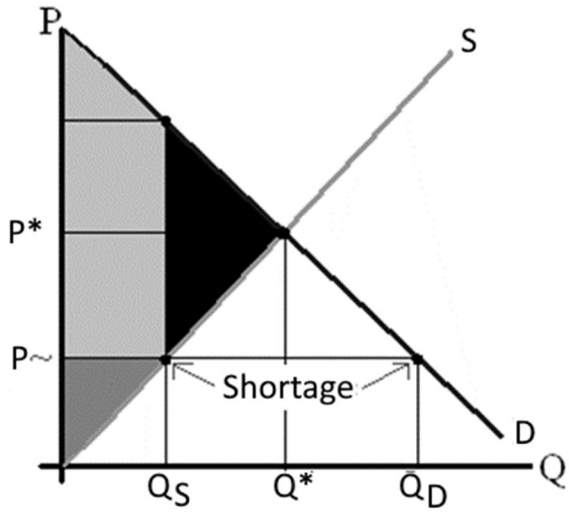


Figure 2. Social welfare for a market with a price ceiling

A price control can be a price floor. A ***price floor*** is a government setting 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. The market price is P*, and the market quantity is Q*. The market price is the wage rate, while the quantity is the number of labor hours. People supply labor while businesses demand labor.

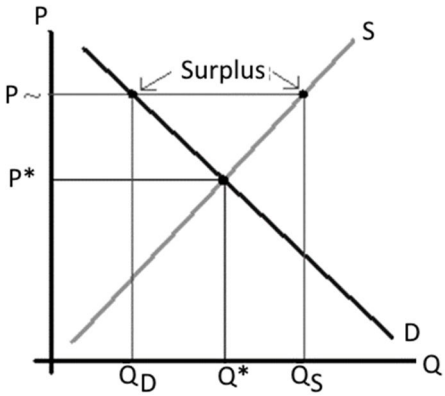


Figure 3. The surplus in the labor market

The government believes workers' wages are too low and passes a law requiring employers to pay a minimum wage. The government sets the price control higher than the market price. The price control creates a direct effect when the quantity supplied exceeds the 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, thereby eliminating the surplus. However, the government "locks" the price at its minimum. Consequently, the surplus never disappears.

Secondary effects occur over time. Employers are hit with higher costs. Thus, they reduce costs by 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, as they often have more difficulty finding jobs. Usually, employers pay higher wages to skilled labor that exceeds the minimum wage and lower wages to unskilled workers.

If the price control is lower than the market price, then the price control does not affect the market. For instance, professional jobs typically pay more than the 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, consumers are affected more severely by price floors. The black triangular region represents the deadweight loss to society, and nobody gets this. Society lost this because the government intervened in the market.

Quantity Restrictions

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

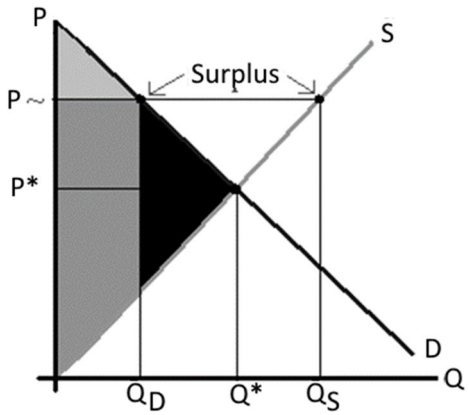


Figure 4. Social welfare for a market with a price floor

For this chapter, we can illustrate a simple quantity restriction. For instance, the 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 price by P*. The government believes the city has too many taxis driving along the streets, and it limits the number of taxis to a certain number $\bar{Q}$. Consequently, consumers pay a higher price to ride in taxis, and they lose the consumers' surplus of the medium-shaded rectangle above the market price, P*. The government's quantity restriction creates a deadweight loss equal to the area of 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 at the bottom, in the black triangle below P*.

An excellent exam trick question is whether the quantity restriction impacts the market. Thus, the government must set the quantity restriction below the market quantity. If the government imposes a quantity restriction that exceeds the market quantity, the restriction does not affect the market.

Quantity restrictions can have unintended effects. For example, New York City created the medallions in 1937. A medallion is a license allowing a taxi driver to operate a taxi in the city. Every taxi driver is required to possess a medallion. The problem is that 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 exceeded a million dollars in 2013. If a new taxi driver wanted to enter the market, they would need to collect many taxi fares to cover the cost of a medallion.

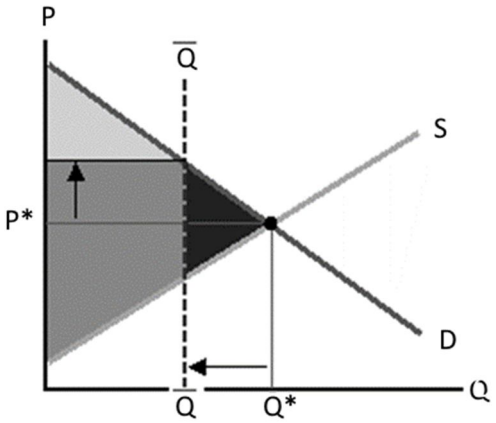


Figure 5. The government imposes a quantity restriction on the market

Quality Mandates

The government imposes quality standards on food, children's toys, cars and trucks, and many other products and services. It aims to enhance product safety and minimize health hazards. For example, the government imposes quality standards on drinking water. Producers and suppliers remove metals and salts from drinking water that meet government standards. In some communities, water companies are required to add fluoride because it strengthens the enamel on teeth.

We begin with the water drinking market, as depicted in Figure 6, where Q* represents the equilibrium quantity and P* denotes the market price. The government passes a law requiring the water suppliers to remove more salts and metals from the water. Suppliers must process more water and invest in machines and equipment. Thus, the water suppliers must pay additional costs, shifting the supply curve to the left and reducing the supply. Consequently, consumers pay a greater market price and buy less. Producers gain some consumers' surplus, which is the medium-shaded rectangle above the original market price. However, society loses the black triangle, which represents the deadweight loss from 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 higher-quality drinking water, it would already be producing the drinking water. However, a firm's cost could fall if the quality standard leads to innovation. The firm discovers new technology that enables it to meet the government's quality standards at a lower cost. In this case, the quality standard would improve social welfare because the supply

increases and shifts to the right, reducing the market price as suppliers produce more units. We study this possibility under Porter's Hypotheses in Chapter 19.

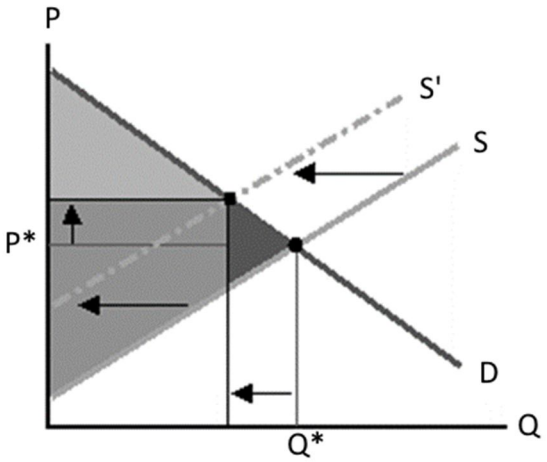


Figure 6. The government imposes a quality standard on a market

The Impact of Taxes

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 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. The original equilibrium market price is P*. The market quantity is Q*, and the market has no taxes. The government imposes a $1 tax on each pizza and places the statutory incidence on the pizza producers. Thus, the producers collect and remit the taxes to the government. We define the tax rate as dollars ($) per unit tax. We could expand this analysis to include a percentage sales tax; however, a percentage tax would alter the slope of the supply function. A $1 per unit tax only shifts the supply function to the left.

The pizza tax shifts the supply function to the left by exactly $1. If the original market price were $10 per pizza (P*), the new price would not be $11. The new price lies between $10 and $11 because the tax changed consumers' behavior. The tax raised the market price, so fewer consumers buy pizza. (Do not forget the Law of Demand). The new quantity of pizzas is Q_T, which we refer to as the tax base. The ***tax base*** is the total amount of goods the government taxes in a market. As the government increases the tax rate, the tax base always falls. In addition, the 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. The size of the price wedge is the tax.

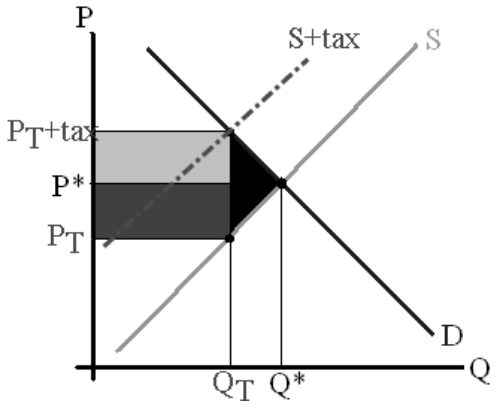


Figure 7. The government taxes the pizza market, while the producers remit taxes to government

The government collects tax revenue from pizza, which is calculated by multiplying the tax rate by the tax base, or the area of the rectangle. Tax revenue equals the lightly shaded and darkly shaded rectangles in Figure 7. The light-shaded rectangle is the economic tax burden on consumers, while the darkly shaded rectangle is the producer tax burden. Furthermore, the black triangle is the deadweight loss of taxation, and nobody receives this revenue. This becomes a loss to society because the government interferes with the market. Remember, the government decreased the market size by raising the market price. Deadweight loss of taxation reduces social welfare.

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

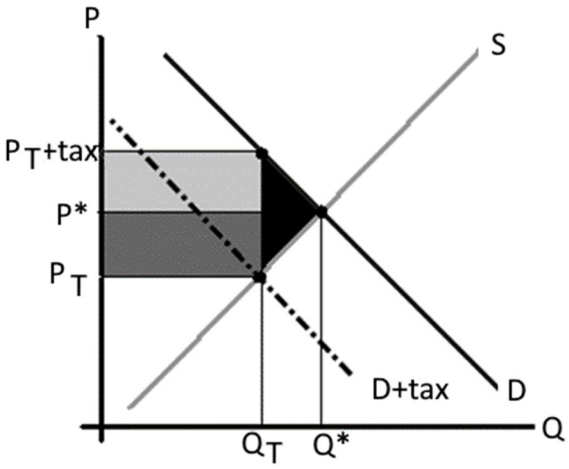


Figure 8. The government taxes the pizza market, while the consumers remit taxes to government

Consumers pay pizza producers the price, P_T, and then remit the one-dollar tax to the government. Thus, consumers pay P_T + tax while firms receive P_T. The tax burdens the consumers by the lightly shaded rectangle, while the tax burdens the producers by the darkly shaded rectangle. The black triangle is the deadweight loss to society. Consumers and producers do not share the tax burden equally, despite the rectangles appearing equal.

Theoretically, it makes no difference who sends the tax to the government. We have shown that the economic tax incidence is the same whether the consumers send the taxes to the government or the producers. However, consumers usually outnumber the pizza producers. Consequently, the government must monitor the producers and ensure they pay taxes to the government. A government would not depend on the consumers' honesty when sending taxes to the government. Tax evasion would be greater if the 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, consumers are not sensitive to price changes; therefore, a rising price causes a slight decrease in the 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 the government taxes a product with an elastic demand function, the higher price resulting from the tax causes the market to shrink or go 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 while earning $20,000 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.

$$Average\ tax\ rate = \frac{tax\ liability}{taxable\ income} \cdot 100\% = \frac{,000}{,000} \cdot 100\% = 25\% \qquad (1)$$

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

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 ones. U.S. federal and state governments impose progressive tax rates on family and business income.

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

Type 3: A ***regressive tax rate*** is the average tax rate that falls with income. As one's income increases, the average tax rate declines. Regressive taxes economically harm people experiencing poverty and people living on fixed incomes. Property, sales, and excise taxes are regressive because income does not determine the rate. An excise tax is a tax imposed on a particular good,

such as excise taxes on cigarettes, alcohol, and gasoline. In contrast, a government applies a sales tax to consumer goods in stores.

Social Security and Medicare taxes are regressive because once income exceeds a threshold, the government stops collecting the taxes. For example, a wealthy person earned $1 million in salary. The U.S. federal government would collect Social Security taxes on the first $176,100 in income in 2025, and the government does not collect taxes on the remaining $823,900 in income. Thus, the government imposes a 12.4% tax on Social Security, so this wealthy person would pay $21,836.40 in taxes, which is 2.2% of the person's income. A person earning $176,100 pays 12.4% of their income taxes. (Note – employees pay half the 12.4% while employers must match the other half).

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 the government collects $700 from each family per year. If the first family has an income of $50,000, their average tax rate on food is 1.4%. In contrast, a second family with an income of $20,000 pays 3.5% of their income for the food tax. Thus, low-income households are disproportionately affected by regressive taxes.

The ***Laffer Curve*** shows the relationship between tax rates and tax revenues. We illustrate a Laffer Curve in Figure 9 and identify two key points. If a government sets the tax rate to 0%, it collects no tax revenues. If a government imposes a tax rate of 100%, it collects no tax revenue at all. Nobody would work if a government took all of a person's income.

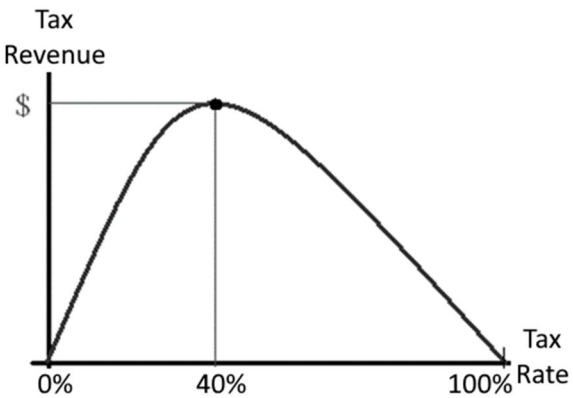


Figure 9. The Laffer Curve

The Laffer Curve embeds the behavior of consumers and producers. As a government raises the tax rate, the tax base decreases. The tax base is the government taxing an activity. However, if tax rates are low and the government increases the tax rate, it 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 the government raises tax rates, the tax base plummets more than the amount the government collects, resulting in a larger tax on each item. Thus, we show that a particular tax rate maximizes government revenue in Figure 9. A government imposing a 40% tax rate

maximizes its tax collections. If the 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 employed the Laffer Curve as the basis of his economic plan, which he referred to as 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. Typically, wealthy individuals hire consultants or pay bribes to reduce their tax payments in high-tax countries. Consequently, governments in high-tax countries collect relatively little tax revenue, making high tax rates ineffective (Laffer, 2004).

Government Subsidies

A ***subsidy*** is a government payment to suppliers and producers to encourage them 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. The equilibrium market price is P*. The market quantity is Q*, and the government pays no subsidies.

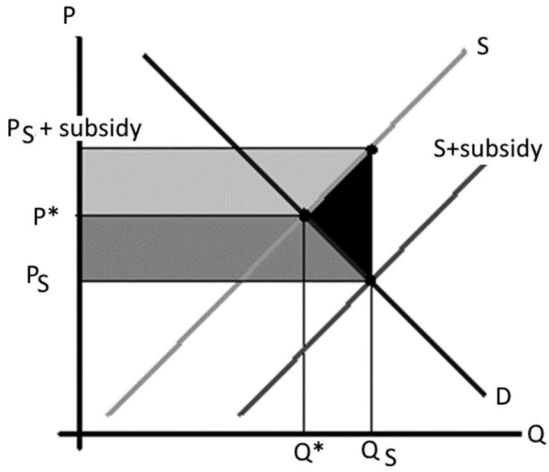


Figure 10. The government subsidizes the milk market

The government believes that low dairy prices economically harm dairy farmers and pays them a subsidy. Consumers pay the price, while dairy farmers receive the price plus the subsidy, which equals the total price. Consequently, the subsidy creates a price wedge, with the difference being dollars ($) per unit subsidy. Like a tax, this subsidy shifts the supply function to the right, without altering its slope. Consequently, the subsidy expands milk production to Q_S while the government pays a total subsidy to the rectangular region. We compute the government's subsidy by multiplying the subsidy by the Q_S units, which are represented by the lightly shaded, darkly

shaded, and black areas. The black rectangle represents the deadweight loss to society resulting from government interference in the market. Lightly shaded areas benefit consumers, while darkly shaded areas benefit dairy farmers.

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

Black Markets

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

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 a form of exchange where two people trade goods or services with each other without exchanging money. Thus, they place no value on the trade and pay no taxes. Other ways to avoid high taxes include underreporting income and assets or overreporting debt and liabilities. As another example, U.S. taxpayers can claim their children as dependents on their U.S. federal tax returns. More children mean lower taxes. Some people claim their animals are children to reduce their taxes. People no longer get away with this practice because the government verifies children's identities and Social Security Numbers.

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 regulate labor markets heavily in many countries. For instance, many U.S. employers hire foreigners from Mexico who do not have the proper documentation to work in the U.S. Employers often pay these foreigners lower wages. Moreover, undocumented workers may be reluctant to report their employers for violating labor laws and regulations.

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

Supply and demand analysis work the same for black markets. However, producers in black markets can supply more defective products, earn higher profits, and accept greater risk. Producers face risks because the government may arrest them, assess fines and fees, and/or sentence them to jail or prison. Moreover, black market participants face greater violence as criminal leaders enforce contracts, renegotiate, or break contracts.

The 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*. The 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 the government continuously builds new prisons to house drug dealers and new criminals. However, the high market prices will always attract new participants to the illegal markets.

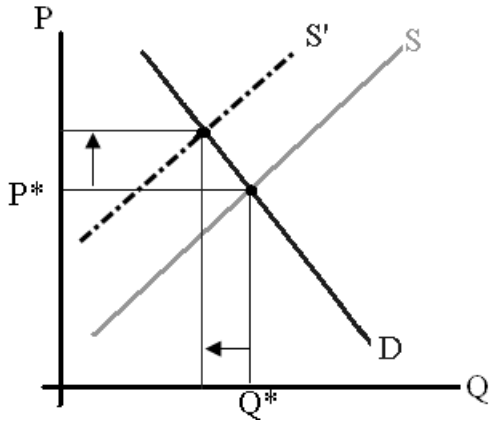


Figure 11. The black market for marijuana

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 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, the government must expand its police, courts, and prisons to tackle and imprison 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 the 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 its 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 their drug problem.

Government intervention in society can encourage the formation of black markets. Societies plagued by sizable black markets have two problems. First, black markets reduce the tax base, which could lead a government to increase taxes to compensate 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, the government reports a higher unemployment rate than the actual rate. Black market participants are unlikely to report their employment, which raises suspicion about their illicit activities. Table

1 shows the estimated size of black markets in several countries as a percentage of a country's GDP.

Table 1. The Size of Hidden Economy for Several Countries

Size of Hidden Economy	% of Real GDP 1999	% of Real GDP 2007
China	13.2%	11.9%
Hong Kong	17.0%	16.0%
Japan	11.4%	11.0%
Nigeria	58%	53%
Malaysia	32.2%	29.6%
Mexico	30.8%	28.8
Russia	47.0%	40.6%
United States	8.8%	8.4%

Source: Schneider and Williams. 2013

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

2. The government plans to boost the low salaries for computer programmers. On average, computer programmers earn $3,000 per month; however, the government imposes a minimum wage of $2,000. Examine the impact of the price floor on the market for computer programmers.

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

price floor on the market.

4. The government imposed a tax on people who owned luxury boats and yachts. The government estimates that 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. The government imposed a $1 tax per bottle on wine. Evaluate the economic impact on the wine market.

6. The U.S. government assesses roughly a 6.2% tax rate on a worker's income for Social Security. The worker's employer must match the dollar amount the worker pays. The government stops collecting the Social Security tax after a taxpayer's income exceeds $176,100 annually. Appraise whether the Social Security tax is regressive.

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

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

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

10. California suffered a severe financial crisis in 2009. State officials debated whether to legalize marijuana and tax it. Identify the economic consequences if California legalizes marijuana.

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 while paying for land, labor, and capital resources. All countries have business firms, but a country's government limits the firms' freedom to make decisions. Specifically, socialist countries give their firms little freedom. They can impose many constraints on their businesses, whereas countries with free markets allow companies to plan their business activities with minimal government interference.

This chapter reviews and derives the cost functions for a company. We add a business's revenue function in Chapters 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 impact a market's price and quantity differently.

Business Firms

The purpose of firms is to earn profits. If a business does well, the owners earn profits. If the company performs poorly, the owners incur a loss. Thus, a firm is strongly incentivized to produce at low cost, offer good service, or provide a quality product.

Businesspeople organize a firm into a proprietorship, partnership, or corporation.

A ***proprietorship*** is a business owned by a single individual. The business owner is liable for the business's debts, which are dissolved upon the owner's death. 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 a business entity formed by two or more people acting as co-owners. A partnership has a greater risk because all partners are jointly and severally liable for debts incurred by any one of them. The extreme case is when 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 corporation's business activities and act on its behalf. Theoretically, a corporation could live forever. Stockholders own a corporation by purchasing the corporation's stock. Hence, a ***stock*** share represents a piece of ownership. Stockholders can easily buy and sell stock, thereby transferring corporate ownership smoothly. Each stock share entitles a shareholder to one vote at a shareholders' meeting. During the shareholders' meeting, the stockholders elect the board of 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 goes bankrupt, 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 through ***bonds***, which investors can easily buy and sell in the financial markets. Stock and bond issuance allow 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. Lastly, 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 controls its supply and can adjust the quality of its products and services. For example, oil companies extract petroleum from the ground, transport it to refineries, refine it into various fuels and chemicals, and sell petroleum products directly to consumers through gas stations.

2. ***Horizontally integrated:*** A firm controls production and sells across a market. The 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 growing market share can lead a firm to evolve into a monopoly. For example, the Microsoft Corporation controls over 95% of the operating systems market, and it eliminates competition by buying and merging with new companies that have innovative products or implement new technologies.

3. ***Conglomerates:*** A firm acquires other firms in different, unrelated markets, thereby expanding the corporation's scope of operations. Consequently, a firm can diversify its products and services, thereby reducing the risk associated with 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, as well as in various other companies, including 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***, which involves contracts with individual workers who work independently. Contracting takes time and planning, which 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 the supervision of a manager. Team production reduces transaction costs. However, the firm must monitor its employees to prevent shirking. ***Shirking*** occurs when employees work at a rate below their normal productivity. For example, 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. An ***explicit cost*** is when 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, and utilities such as electricity, water, natural gas, and other essential resources. In addition, ***implicit costs*** remain a cost of doing business, but the business does not exchange cash for a service or resource. For example, accountants depreciate machines and equipment. Businesses purchase machines and equipment, which they use until they wear out and become obsolete. Accountants use depreciation to account for the decreasing value of machines and equipment over their useful life. Depreciation does not involve a cash transfer; however, it does affect a business's finances and financial statements.

Economists use another implicit cost, known as opportunity cost. ***Opportunity cost*** is the value or cost of the second-best alternative that an individual forgoes after making a decision. Opportunity costs look into the future and inform a company where to concentrate its resources. Accountants often overlook opportunity costs, which are crucial for making informed decisions. For example, what would our opportunity costs be if we had enrolled in college? As college students, our next best alternative is often working. Thus, the foregone salary becomes the opportunity cost of college. Furthermore, if we withdrew our savings to pay for tuition and books, we would have given up the interest we could have earned, which is also 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. The 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, as calculated in Equation 1. Consequently, accountants exclude opportunity costs.

$$\text{Accounting Profit} = \text{Total Revenue} - \text{Explicit Costs} - \text{Implicit Costs (excluding opp. costs)} \quad (1)$$

Accounting profit excludes the proprietor's opportunity cost. He quit his job, earning \$20,000 annually, and used his \$5,000 savings to start a business. He could earn 10% per year, or \$500 in interest, given that \$5,000 × 0.1 = \$500. We calculate ***economic profit*** 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, it is not using its 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 on being his boss.

$$\text{Economic profit} = \text{total revenue} - \text{explicit costs} - \text{implicit costs (including opportunity costs)} \quad (2)$$

Accounting profit always exceeds economic profit because economists subtract more costs to calculate economic profit. If firms earn zero economic profit, 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.

Table 1. Income Statement for a Proprietor

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

We exclude sunk costs from our profit equations, but they do provide valuable information. A sunk cost is when a company has paid a historical cost and cannot change or undo the cost. ***Sunk cost*** is when firms invest in machines, equipment, and buildings and cannot sell their assets without incurring large losses. For example, a university buys a printing machine to publish a magazine. The machine costs $20,000, and we depreciate it over 10 years, yielding a depreciation expense of $2,000 per year, $20,000 ÷ 10. In Year 3, the magazine receives subscription revenue of $3,000. If the magazine incurs a depreciation expense of $2,000 and paper and ink costs $2,000, then the magazine earns a $1,000 loss, or $3,000 – $2,000 – $2,000 = -$1,000.

What should the university do? If we 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 our third year. The machine became a sunk cost, and we excluded this cost from the analysis. Although the revenue is $3,000, and the paper and ink costs are $2,000, the university should keep the machine operating because the activity contributes $1,000. If the university shut down the magazine, it would incur a loss of $2,000 from the depreciation costs. Consequently, the university is minimizing a loss by continuing to operate.

Short-run Output and Costs

A ***short run*** is so brief that at least one factor of production becomes fixed in place. The fixed factor is typically physical capital, including buildings, large machines, and equipment. The short run gives rise to several cost functions. We describe each cost function in detail.

Total fixed costs (TFC) remain constant regardless of the production level. Businesses and firms pay insurance premiums, property taxes, salaries for administrators, and loans for factory buildings or machines that do not fluctuate with production levels. Furthermore, ***average fixed costs (AFC)*** refer to the fixed costs incurred per unit of output. As the production level increases, the average fixed cost decreases. The firm spreads fixed costs over more units, a process known as "spreading the overhead." We depict total fixed costs in the left panel of Figure 1, while the right panel shows average fixed costs. We calculate the average fixed costs in Equation 3, where Q represents the production level.

$$AFC = \frac{TFC}{Q} \tag{3}$$

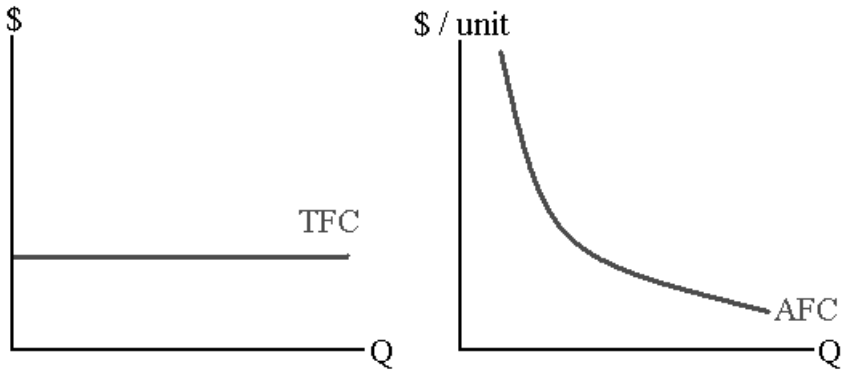


Figure 1. Total fixed cost (TFC) and average fixed cost (AFC) functions

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)*** refer to the variable costs incurred per unit of a product or service produced. The left panel in Figure 2 shows total variable costs, while the right panel depicts average variable costs. The total variable cost function has two "kinks," which result from the marginal cost function, which we will explain later. Meanwhile, the average variable cost shows a "U-shape" and is calculated in Equation 4.

$$AVC = \frac{TVC}{Q} \tag{4}$$

Marginal cost (MC) refers to the additional cost incurred by a firm as it produces one more unit of a good or service. Marginal cost has a "U-shape." We depict a marginal cost function in Figure 3. Initially, the marginal cost function declines, reaches a minimum, and then rises.

We use an example to illustrate why a marginal cost function exhibits a U-shape. We bought a factory and started hiring workers. Initially, the factory began with zero workers. We hire one worker who produces 10 units of output. The average production per worker is 10 because we divide 10 output units by one worker. We hire a second worker, increasing the total production to

30 or 15 units per worker. This additional worker has contributed to a production gain through ***specialization of labor***. Workers who specialize in an assembly line create more products than if they were to build one product each. We hire a third worker, boosting total output to 60 or 20 units per worker. These production gains initially cause the marginal cost function to decrease. As we produce one more unit, our marginal cost falls.

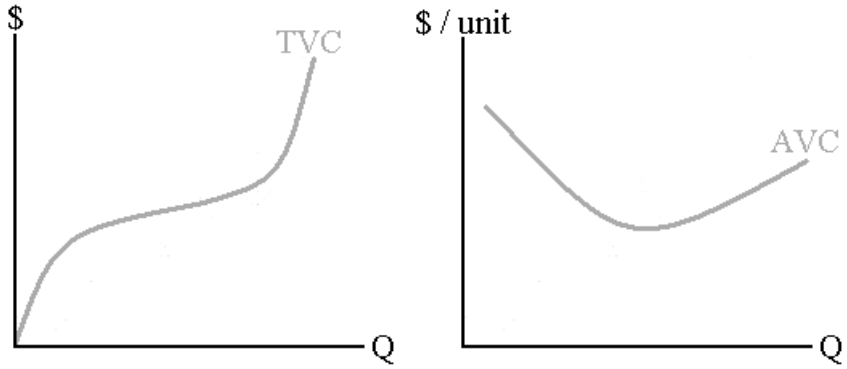


Figure 2. Total variable cost (TVC) and average variable cost (AVC) functions

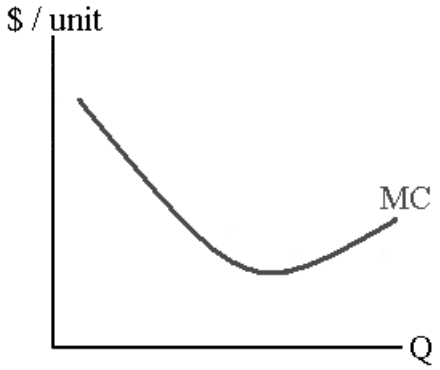


Figure 3. The marginal cost (MC) function

Production gains do not occur indefinitely. Our factory reaches a point where adding more workers causes production inefficiencies. Currently, our factory has 50 workers and produces 1,000 or 20 units per worker. We hire the 51st worker, causing total output to climb to 1,001 units or 19.6 units per worker. Additional workers caused the average output per worker to decrease because the factory had too many workers in place. For example, managers have problems coordinating and monitoring the workers. We refer to this inefficiency as the ***Law of Diminishing Returns***, where the output increases by a progressively smaller amount as the firm adds more labor (a variable resource) to a factory (a fixed resource). The 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:

Total Cost (TC) = Total Fixed Cost (TFC) + Total Variable Cost (TVC) (5)

Average Total Cost (ATC) = Average Fixed Cost (AFC) + Average Variable Cost (AVC) (6)

We compute the total cost by dividing the total cost by the output, and the total cost is the average total cost multiplied by the production, as shown in Equations 7 and 8.

$$ATC = AFC + AVC = \frac{TC}{Output} \quad (7)$$

$$TC = TFC + TVC = ATC \cdot Output \quad (8)$$

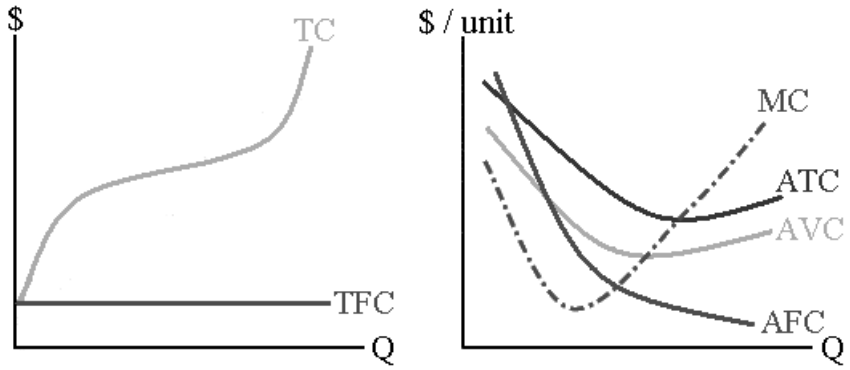


Figure 4. All costs functions

The marginal cost function causes the average total and variable cost functions to exhibit U-shaped curves. If MC < ATC, the marginal cost is "pushing" the ATC function downward. If MC > ATC, the marginal cost is "pulling" up the ATC function. Consequently, the MC intersects ATC at its minimum point. At last, the marginal cost function influences the average variable cost function similarly and intersects the average variable cost at its minimum point.

A female student, for example, earns an average grade of 80% after completing two exams. We view the 80% as a position on the ATC function. Students will take a 3rd test, which becomes the marginal cost because the student is taking one more exam. If the student scores 90%, then her average score increases. In other words, the MC exceeds the ATC. If the student scores 70%, then her average score decreases, or the MC lies below the ATC. This same concept applies to the average variable cost function. The magnitude of the MC determines whether it pulls up or brings down the ATC or AVC function.

Long-run Output and Costs

The ***long run*** is a time sufficient for the firm to alter all factors of production. The long run depends on the industry. For instance, the long run for an automobile factory, which utilizes 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. Lastly, 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 the long-run average total cost (ATC) in Figure 5, where firms pay the average cost in dollars per unit of output and produce at a particular output level, Q. The ATC is represented by the dark line. It shows the firm pays the average cost to make 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, denoted by three small "U-shaped" lines: ATC_1, ATC_2, and ATC_3. The subscript indicates the number of factories, and the number of factories entails a level of capital. Factories should produce at the minimum costs in the long run, where the average total cost function is at its lowest point. Consequently, the firm should use the second factory because ATC_2 gives the company the lowest per-unit costs. Additionally, this firm may produce at the first or third factory, thereby raising its long-run average total costs. However, the firm must have sufficient demand to meet that production level.

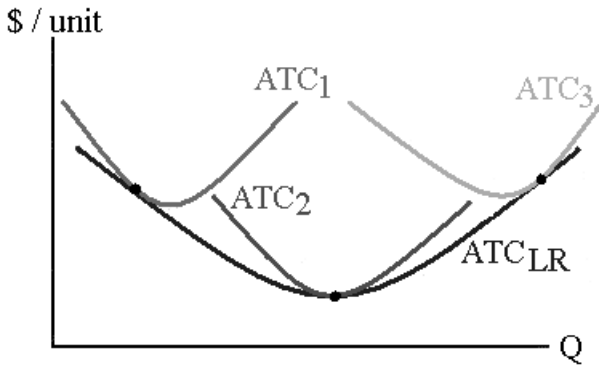


Figure 5. Varying factory sizes over the long run

The firm earns profits in the long run when the market price (P*) exceeds the long-run ATC. Furthermore, a firm can go bankrupt or leave the market if the market price (P*) remains below the long-run ATC for a long time. The long-run average total cost varies across different regions, and each company operates in a specific segment. We show the three regions for ATC_{LR} in Figure 6 and define the regions areas as:

Region 1: ***Economies of scale*** are per-unit costs that 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, and other securities, while small companies are more limited. Second, a larger firm can buy or

sell in bulk, receiving discounts from suppliers that lower costs. These discounts can be significant for large retail chains with thin profit margins. Third, sizable firms utilize mass production, which necessitates substantial investments in capital and machinery. Consequently, laborers specialize in tasks at which they excel, thereby boosting 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.

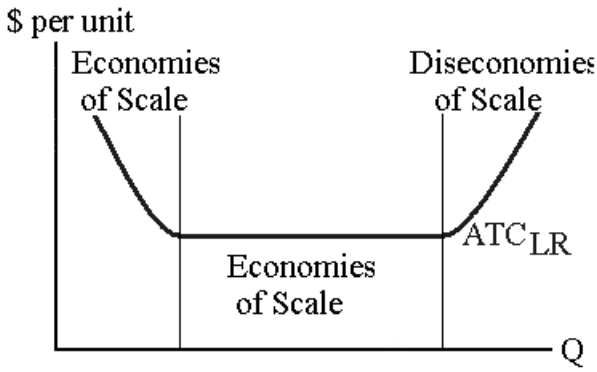


Figure 6. The regions of long-run average total cost

Region 2: ***Constant returns to scale*** are per-unit costs that 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*** refer to per-unit costs that increase as factory size and output expand. Usually, diseconomies occur from bureaucratic inefficiencies. Business becomes so large that the company struggles to monitor, coordinate, and motivate its workers. Some employees may not work and not contribute to the business's production. Furthermore, a firm could become bureaucratic and impose stringent paperwork, hinder all progress and advances with complicated rules and regulations, or have 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 change the supply function. The following factors will shift cost functions:

Factor 1: If the price of a resource used in production increases, the cost curves shift higher. For example, firms pay higher wages, thereby increasing their labor costs. Thus, the average cost function increases and shifts upward, as shown 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, businesses pay more taxes, raising their costs. Hence, the average cost functions increase, as depicted in Figure 7. Furthermore, the supply function decreases and shifts to the left.

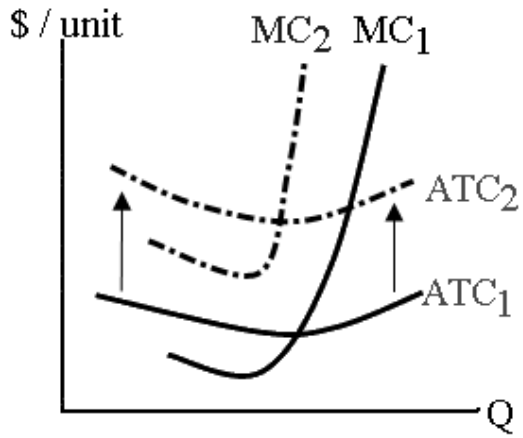


Figure 7. The firm's cost functions increase and shifts upward

Factor 3: If a government expands regulations on businesses, businesses 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 considerable cost; thus, the cost functions increase, as depicted in Figure 7. Moreover, the supply function would decrease and shift to the left.

Factor 4: Technology enables workers to produce more output with the same level of resource input. Thus, technology reduces a firm's cost functions. We assume the firm pays the identical 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 shift to the right. For example, a firm installs a new computer system that increases workers' productivity. Consequently, the workers produce more work with the same time and resources. Although firms pay costs to acquire technology, the gains in workers' productivity are so significant that their average cost functions still decrease.

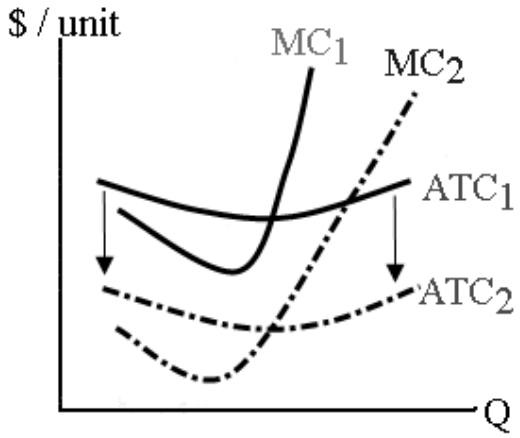


Figure 8. The firm's cost function decreases and shifts downward

Key Terms

business firm	accounting profit
proprietorship	economic profit
partnership	normal rate of return
corporation	sunk cost
stock	short run
limited liability	total fixed costs (TFC)
bonds	average fixed costs (AFC)
vertically integrated	total variable costs (TVC)
horizontally integrated	average variable costs (AVC)
conglomerates	marginal cost (MC)
contracting	specialization of labor
team production	Law of Diminishing Returns
shirking	long run
explicit cost	economies of scale
implicit cost	constant returns to scale
opportunity cost	diseconomies of scale

Chapter Questions

1. The De Beers Corporation controlled approximately 85% of the global diamond supply. How would we categorize this corporation?

2. A father dies, and his three children take over his restaurant. Identify this business type.

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

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

5. An electric utility company is constructing a new power plant. Halfway through the construction, the government changed the rules and regulations, which 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 in the construction of buildings and machinery. Identify Intel's cost and how Intel can reduce its per-unit costs.

7. What can we say about a firm's marginal cost function if average variable costs are increasing and average total costs are falling?

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 GM manager claimed his regional manager was only 2 miles away, but the regional manager was on the other side of the world in the management chain. Where would we place GM on its long-run average total costs?

10. Do fixed costs exist in the long run?

11. What happens to a firm's cost functions if a government lowers business taxes?

12. A company invests in new technology, but its workers are unfamiliar with how to use it. 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, unlike a monopoly, where a single seller charges the highest price and produces 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 contract as market prices change.

Market Structures

We assumed in this book that all firms have identical cost functions. They differ only in their interaction with consumers. Economists define several market structures, as shown in Figure 1. A market with ***pure competition*** achieves the greatest social welfare because consumers pay the lowest prices and receive the highest quantities of goods and services. On the other hand, a ***monopoly*** is a single firm that supplies a market and achieves the lowest social welfare. Consequently, consumers pay the highest price and receive the lowest quantity on the market. We explain monopolies in Chapter 7. An ***oligopoly*** is a market with between two and five firms, whereas ***monopolistic competition*** features many firms that possess a degree of monopoly power.

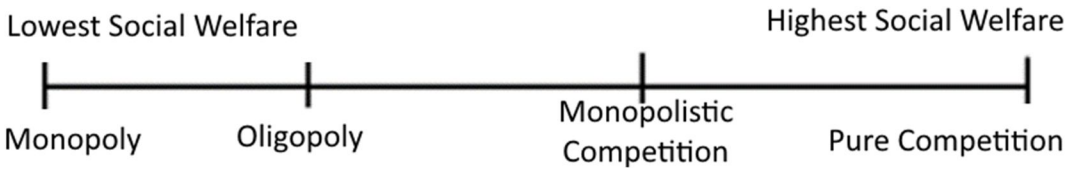


Figure 1. Market structures

A purely competitive firm is a price taker. It accepts the market price to sell its products. Thus, a competitive firm does not influence the market price. Characteristics of a competitive market include the following:

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

Characteristic 2: Many firms produce and supply products in the market. Consequently, each firm supplies only a small portion of the total market supply. When a firm changes its production level, it cannot influence the market price.

Characteristic 3: Competitive firms can freely enter or exit the market. The market has no barriers to entry or exit. For example, if one firm earns an economic profit, rival firms can easily enter the market and also earn profits. If firms incur a loss, they can exit the market.

Characteristic 4: Firms maximize profit by adjusting the 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 are dominated by many small farmers, who supply a homogeneous product, while tourist destinations compete fiercely for international travelers.

A monopolistically competitive market is similar to a purely competitive market, but firms have a touch of monopoly power. This monopoly power arises from the differentiation of products. A ***differentiated product*** is one that consumers can identify as originating from a specific producer because the producer creates real or imaginary differences in their product through promotion, packaging, and brand names. Thus, firms in monopolistically competitive markets employ extensive advertising and nonprice competition. ***Nonprice competition*** is when producers compete in areas other than a product's price. Some producers supply high-quality products, hire friendly and attractive sales clerks, and/or operate at convenient locations. Economists refer to firms in a monopolistically competitive market as price takers, 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. Lastly, collusion is impossible for this market. ***Collusion*** occurs when sellers in a market unite, forming a monopoly. Numerous independent, competing firms characterize this market.

Contestable Markets

The number of firms in a market does not correlate directly with social welfare. A market could have two firms that compete vigorously. Furthermore, a market can be contestable. A ***contestable market*** is highly competitive due to the potential for competition. Contestable markets can have few sellers, but the markets have low entry barriers and exit costs. For example, the airline industry is a contestable market. Although the airline industry has high entry barriers due to the cost of airplanes and facilities for ticketing, baggage, and maintenance, which can amount to millions of dollars, the industry can switch airline routes with minimal cost. If an airline earns economic profits by servicing the route between Salt Lake City and Albuquerque, other airlines can efficiently service this route, driving economic profits to zero. The government could enhance market competitiveness by reducing entry and exit barriers, thereby encouraging greater competition.

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

We list the other characteristics of an oligopolistic market:

Characteristic 1: Oligopolistic firms become larger through mergers. A ***merger*** occurs when one firm buys another firm and combines it into a single company. As a firm controls a larger market share, it gains more monopoly power. For example, the beer industry initially started as a competitive market but eventually evolved into an oligopoly. In 1947, the U.S. beer industry had over 400 independent breweries. By 1967, the United States had 124 suppliers; by 1980, the market had 33. Currently, four brewing companies dominate the U.S. market. Anheuser-Busch holds a 49% market share. SABMiller has 20% of the 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. A car manufacturer must produce millions of cars to achieve low unit costs. Thus, car manufacturers must be large to lower their average fixed costs.

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

The Short-Run Output for Competitive Firms

A competitive market is filled with price takers who sell their products to the market and accept the market price as their selling price. We show a competitive market for corn in Figure 2. The left panel represents a corn farmer, while the right panel represents the corn market. The 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 that occurs when a firm sells one additional 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.

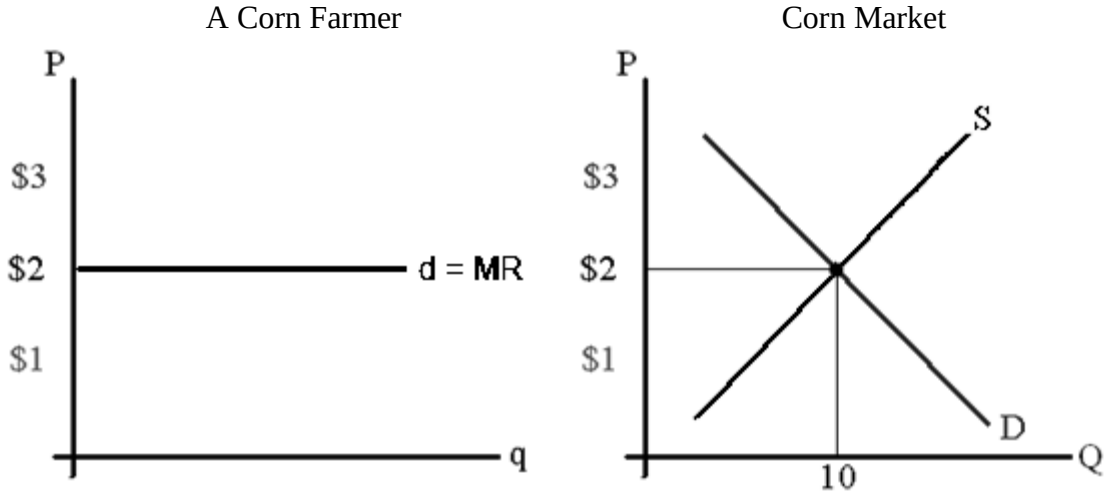


Figure 2. The market and a price taker's demand function

A competitive market exhibits the following three features:

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

Feature 2: Nobody buys if the farmer raises his corn price above the market price to $3. Consumers buy the corn from the farmer's competitors for $2.

Feature 3: If the farmer lowers his corn price below the market price to $1, he lowers his revenue and potentially loses money. Consumers will buy their 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. The farmer can only sell his corn for the market price, so marginal revenue equals the market price, or MR = P* = $2. A 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 the last additional unit, which only costs $2 to produce. Thus, profit rises by $1, and firms continually 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 will incur a loss and reduce production by 1 unit to increase profits. Consequently, firms reduce production when MR < MC.

Example 3: A 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*. The asterisk indicates 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. A firm sells q* units, so a firm's total economic profit becomes (P* – C*) q*. The height of the rectangle, (P* – C*), represents the profit per unit, while the width, (q* – 0), represents the quantity sold.

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 its total quantity, q*, for the market price, P*. Thus, the ***total revenue (TR)*** equals TR = P* x 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. We substitute the terms into a firm's profit function, yielding Equation 1. Lastly, we can factor the quantity q*out, representing the lightly shaded rectangle.

$$Profit = Total\ Revenue - Total\ Costs = P^* \cdot q^* - C^* q^* = (P^* - C^*)q^* \qquad (1)$$

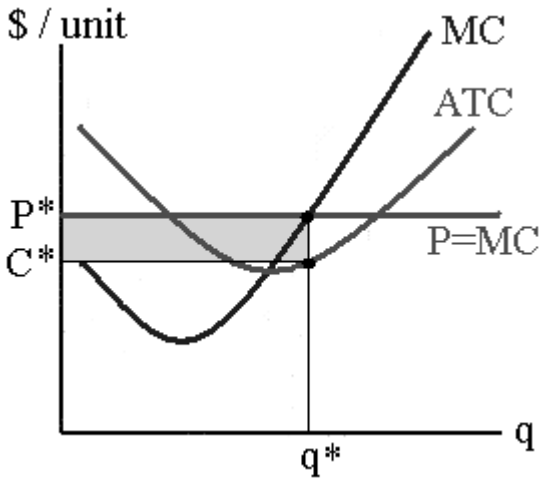


Figure 3. A competitive firm's profit is the lightly shaded rectangle

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 and the marginal revenue and marginal cost functions in the right panel. Referring to the left panel, a firm maximizes profits by locating the point at which the total revenue exceeds the total costs by the most. The firm takes vertical slices by adjusting output q until it maximizes the distance between total revenue and total costs, which is represented by the black line at q*. This production level is the same where MC = MR = P*. Economists use the right panel, MR, and MC, to determine a firm's production level.

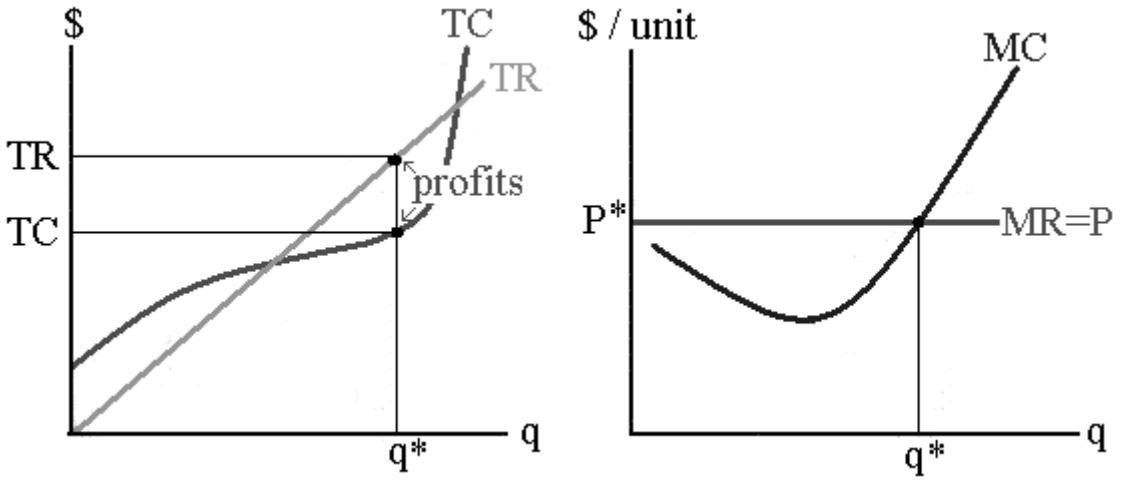


Figure 4. A competitive firm maximizes profit when MR = MC

A competitive firm could experience losses and go out of business. However, a firm experiencing losses could still operate in the short run if it can cover its average variable costs. For example, if a firm has an average variable cost (AVC) of $12 per unit, an average fixed cost (AFC) of $8, and sells the product for $15 per unit, then the market price exceeds the average variable cost, or P* > AVC. Thus, the firm earns a $5 loss ($15 – $12 – $8). The firm recovers all its variable costs and applies $3 towards its average fixed costs. If the firm shuts down, it still incurs the average fixed costs, resulting in an $8 loss per unit. Consequently, a firm could incur losses in the short run, but it will operate if it can cover its variable costs.

A firm shuts down when the market price falls below the average variable costs, or P < AVC. A ***shutdown*** is when a firm temporarily halts its production or operation of its business. The 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 and an average fixed cost (AFC) of $8, with a market price (P) of $5, then the firm incurs a $15 loss per unit. If the firm shuts down, it incurs a loss of $8 per unit, which is the fixed cost. Consequently, a firm shuts down because it incurs smaller losses than it would if it continued 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 < ATC. Going out of business occurs when a firm permanently ceases operations and stops incurring 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. The competitive firm produces q* units, where MC = MR = P*. Unfortunately, the average total costs exceed the market price, or C* > P*. The loss per unit is (P* – C*), and the firm produces q* units. The total loss equals (P* – C*) x q*, where the profit is negative. Although the formulas are the same, profits become negative when losses occur. The shaded rectangle in Figure 5 represents this firm's economic loss.

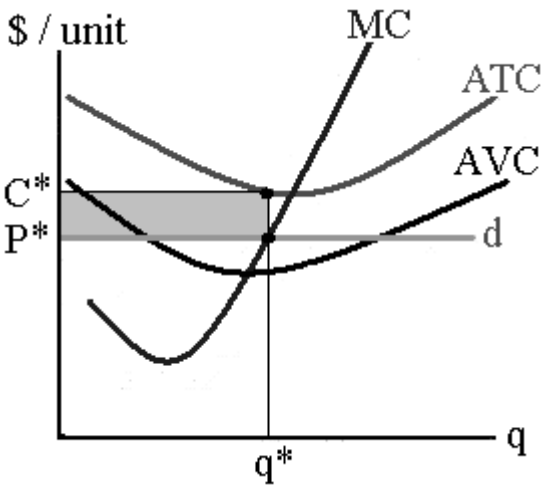


Figure 5. A competitive firm earns a loss in the short run

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 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. The 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_{min} shows the minimum price at which a firm begins production. Any market price below P_{min} causes a firm to shut down. Usually, economists omit the vertical segment from the supply function.

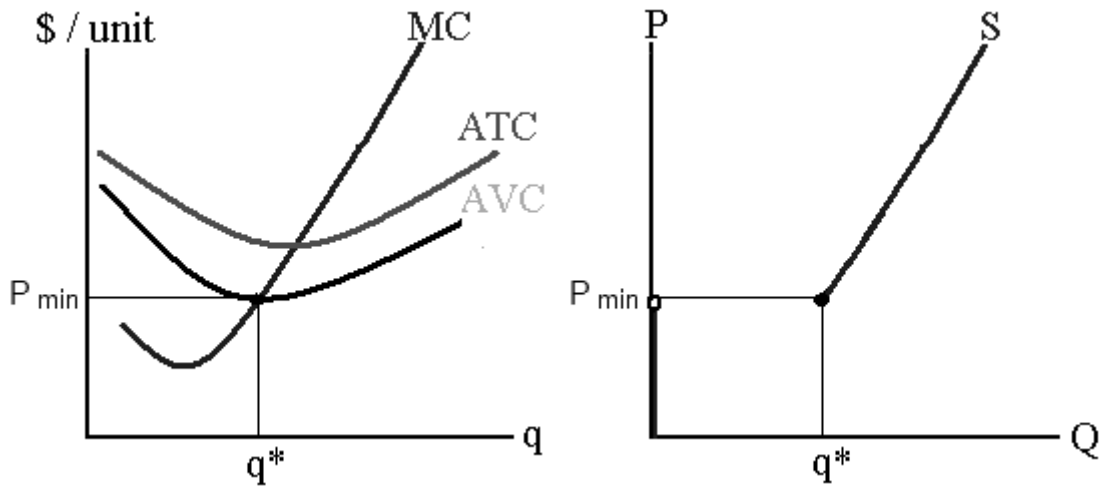


Figure 6. Deriving a competitive firm's supply function

The short-run market supply is the horizontal summation of all firms' short-run supply functions in a market. A firm determines its production level at each market price, and then we sum the market quantity across all firms' quantities at that price. We derive a market supply function in Figure 7, assuming a market with two firms. At a market price of $1, Firms 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.

The Long-Run Output for Competitive Firms

In competitive markets, firms earn zero economic profit in the long run. Economists refer to this as the 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, causing the market price to decrease until it equals P* = ATC again. Once economic profits equal zero, then firms stop entering the market.

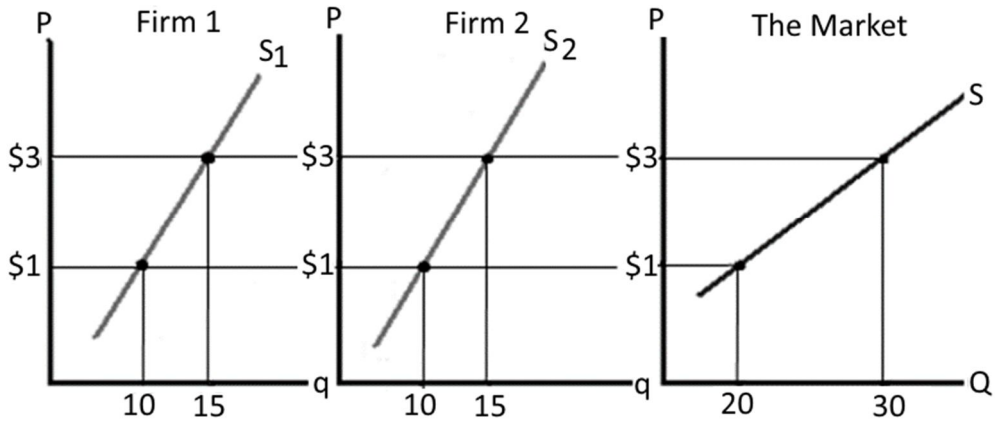


Figure 7. Deriving a market supply function from individual firms

Mechanism 2: If firms earn a loss, 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, causing the market price to increase until it equals P* = ATC again. Once economic profits equal zero, firms cease to leave the market.

Market supply and demand functions determine the long-run equilibrium. For example, Figure 8 illustrates the competitive milk market. The left panel represents a milk producer, while the right panel represents the market. The market determines the price and quantity of milk, and 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, illustrating the expansion of the milk industry. The left panel represents one dairy farmer, while the right panel represents the milk market. The market price is P_1, and the market quantity is Q_1. We represent the original demand and supply functions by solid lines. The U.S. government says that drinking milk is good for the body because milk is a healthy food. Thus, consumers buy more milk, increasing demand and shifting it to the right because their tastes and preferences have changed. The 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 over time attract new firms into the milk market, causing short-run supply to increase and shift to the right. The milk price continues to fall until P_1 equals 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. The black horizontal line in the milk market is the long-run supply function, which we discuss later.

If firms incur economic losses, then some firms will exit the industry. For example, we depict the rice industry in Figure 10. The 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.

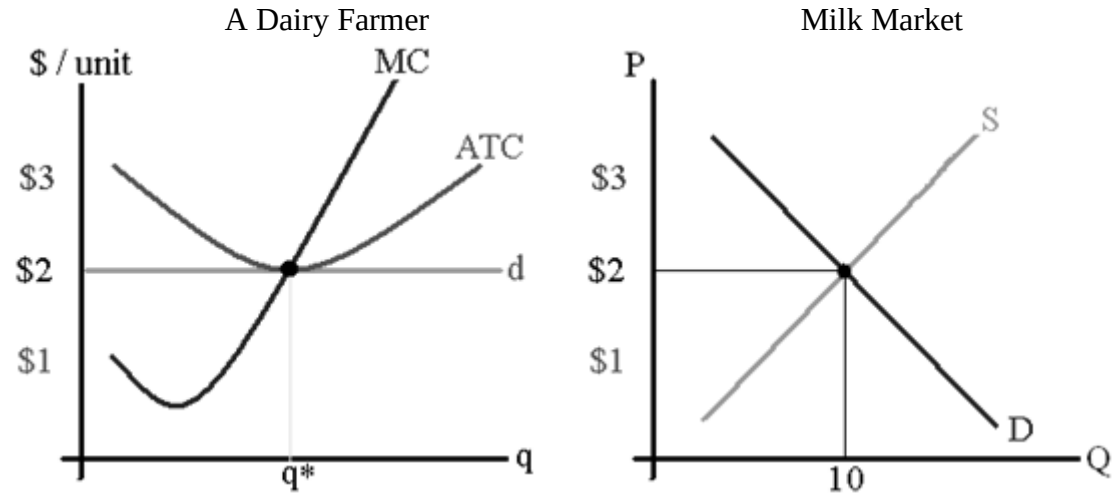


Figure 8. Competitive milk market

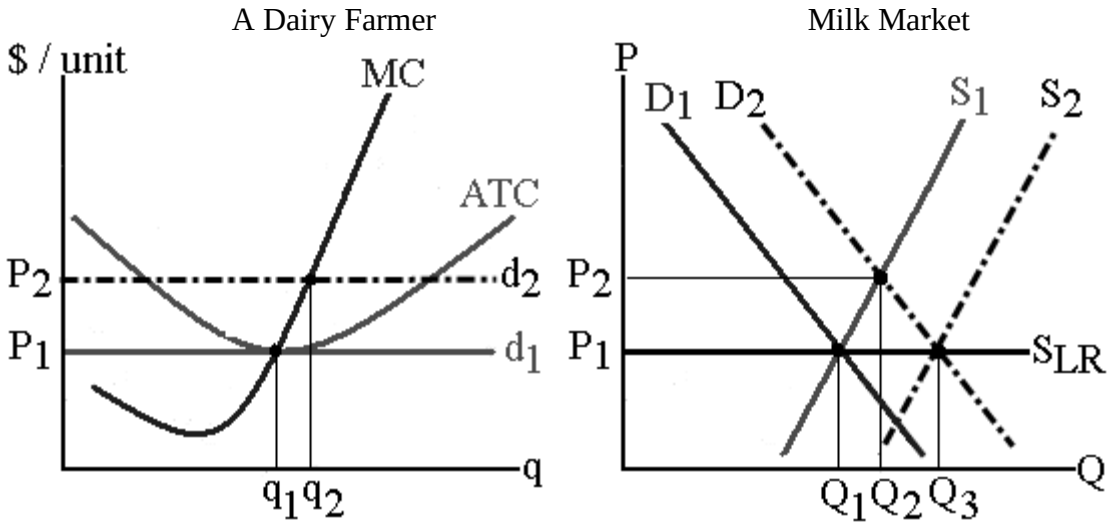


Figure 9. Greater consumer demand expands the milk industry

Consumers' incomes increase, and rice is an inferior product. Hence, the demand function decreases and shifts to the left. 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 (or $P_2 < ATC$). Some firms leave the rice market, decreasing the supply function. Firms continue to leave the industry until the market price rises to P_1 again. At this price, firms earn zero economic profit and stop leaving the market.

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. The black horizontal line in the rice market is the long-run supply function. The milk market similarly has a black horizontal line for the long-run supply function.

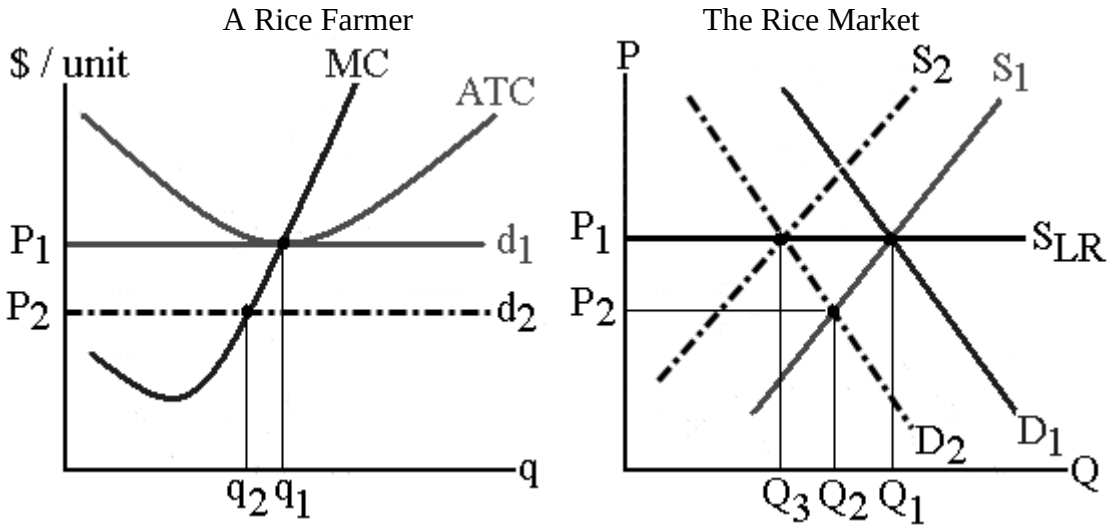


Figure 10. Decreasing consumer demand contracts the rice industry

The ***long-run supply function*** represents the minimum price at which firms are willing to supply, given that they can adjust all production resources. The black horizontal lines in Figures 9 and 10 in the right panels represent the long-run supply functions. Long-run supply is perfectly elastic because the industry has constant costs. As a ***constant-cost industry*** expands or contracts, the resource prices remain unchanged. Usually, small industries are constant-cost because an expanding or contracting industry has little impact on the resource markets.

An ***increasing-cost industry*** is one in which resource prices rise as producers expand their market output. This industry is the most common, and the long-run market supply function has a positive slope. We show the 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 of higher incomes. The market price and quantity rise to P_2 and Q_2. The automobile industry earns economic profits, which expand the industry. As the automobile industry expands production, resource prices rise. The industry increases demand for skilled labor, steel, plastics, and other resource inputs. Thus, resource prices increase due to 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 one in which firms expand market output while incurring falling resource prices. A decreasing-cost industry is rare, and the long-run market supply function

has a negative slope. The electronics industry may be a decreasing-cost industry. As producers etch more transistors onto computer chips, the cost of chips and computers continues to decline.

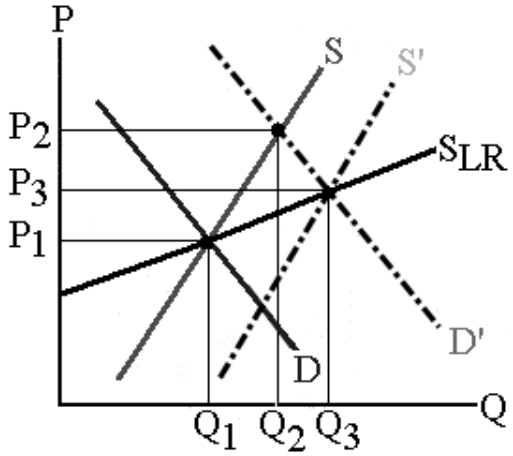


Figure 11. Automobile industry is an increasing-cost industry

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 rising incomes. The demand function increases and shifts to the right, raising the market price, P_2. Consequently, the computer industry expanded in Q_2, generating economic profits that further fueled its growth. As the electronic industry grows and new firms enter the market, the prices of resources for computer chips fall, decreasing the long-run price to P_3 while the market quantity expands to Q_3. Long run price falls below the initial price, P_1.

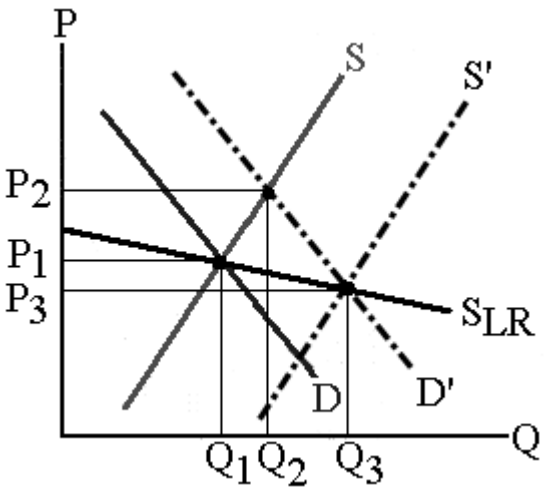


Figure 12. The computer industry is a decreasing-cost industry

The 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 they pay in costs. The 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, such as microwave ovens, personal computers, and DVD players. Lastly, losses penalize firms that reduce the value of resources. Firms must leave the market, restructure, or go bankrupt. Losses weed out inefficient firms.

Competitive markets are efficient, and economists use two definitions to measure efficiency. First, ***allocative efficiency*** is when businesses and suppliers transfer resources to profitable industries that consumers want, denoted by P* = MC. Market price, P*, represents the consumers' evaluation of the product or service, while MC is the firm's cost for producing that last unit. Second, ***productive efficiency*** is when businesses produce products for the lowest costs, or P* = 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 allocatively and productively efficient. Thus, a competitive market maximizes social welfare because consumers pay the lowest prices while producers sell at the highest prices, thereby maximizing both consumers' and producers' surpluses.

Key Terms

pure competition
monopoly
oligopoly
monopolistic competition
homogeneous product
differentiated product
nonprice competition
collusion
mutual interdependence
merger
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 of the 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 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 at which the firm breaks even, earns profits or losses, and shuts down.

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

7. The cell phone industry has experienced rapid growth since the 1990s, and prices for cell phones have been steadily declining. 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 allocatively and productively efficient.

7. Regulating Monopolies

A monopoly is a company that supplies most consumers in a market. A monopoly can manipulate the market by reducing its production and 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 preventing competitors from entering. Consequently, a lack of competition could lead to a monopoly mistreating its consumers, such as providing subpar service or products. Therefore, the government intervenes in the market to limit a monopoly's power, to foster competition, or to regulate the monopoly.

Market Entry Barriers

A pure monopoly is the sole producer of a product or service 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. The market has only one firm supplying consumers, resulting in a one-firm industry.

Characteristic 2: Consumers have no close substitutes for the monopolist's product. No other product or firm competes with the monopoly. Consumers buy the product from a monopolist, or they do 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 due to the presence of entry barriers. ***Market entry barriers*** prevent competitors from entering the market, thereby strengthening a monopoly's power. A market can have four barriers.

First Market Barrier: ***Economies of scale*** create large companies that we refer to as natural monopolies. A ***natural monopoly*** must be large to produce at a low per-unit cost. We show a firm's long-run average total costs (ATC_{LR}) in Figure 1. Long-run average total costs continue to decline as the monopolist expands production, due to economies of scale. A monopolist sells a large volume to cover its high fixed costs. A monopolist pays high fixed costs for large levels of equipment, machines, and infrastructure. Natural monopolies require substantial fixed costs and typically serve the entire market. A new firm entering this market would need substantial capital to achieve this low-cost production level. Natural monopolies provide services such as 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 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 the government to provide their services. Other licenses impose restrictions on businesses, such as funeral homes and taxicabs. Licenses vary in cost from inexpensive to quite expensive. For

example, New York City restricts the number of taxicabs that can operate. If a new company wants to operate a taxicab, it must purchase an existing license from another company. The market price of a taxi license exceeds $1 million.

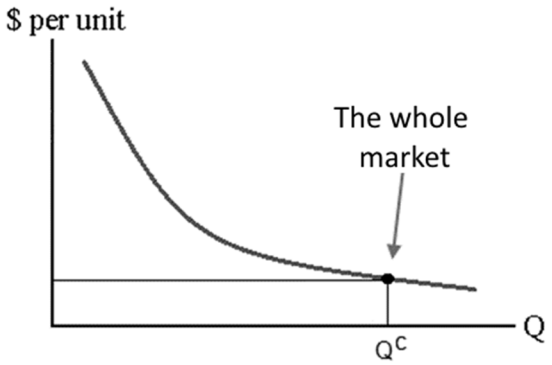


Figure 1. The economies of scale for a natural monopoly

Most governments worldwide grant patents, creating another legal barrier. In the United States, a ***patent*** grants the inventor the exclusive right to produce a product for 20 years, as a patent encourages scientists and inventors to invest in 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 of the medication and applies for a new patent. The company stops producing the old medication and introduces a new one that it protects with a patent.

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

As another example, the DeBeers Corporation of South Africa controlled 85% of the world's supply of diamonds through a cartel during the 1980s. A ***cartel*** occurs when several producers form a group and act as a single seller or monopoly. A cartel restricts output by setting a production quota for each member, raising the market price and profits. Members of a cartel have an incentive to cheat and secretly sell their excess output. The DeBeers Corporation would punish cartel members by "dumping" diamonds onto the diamond market. As diamond prices plummet, the cheating members incur losses. Thus, DeBeers punished the cheaters. DeBeers Corporation still controls approximately 30% of the market and invented the slogan, "A diamond is forever."

Fourth Market Barrier: Standard Oil represents the classic example of ***unfair competition*** in the 20th century. The 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. After eliminating the competition in the town, Standard Oil charged monopoly prices and moved to the next town. Consequently, John Rockefeller gained control over 90% of the U.S. oil market.

Some markets have exit barriers. For instance, a government creates them, or the firm has high sunk costs. Consequently, firms with exit barriers will stay in the market longer. We illustrate three exit barriers as follows. First, a firm needs the government's permission to exit a market in some countries. Second, a firm must pay its workers six months of salary or provide a severance package upon leaving the market, or it must sell its assets to the government, allowing the government to take over the company. Finally, a firm invested millions in machines, equipment, and buildings. The 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 displace older ones from the industry.

With enough time, firms can use technology to circumvent the 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 lost consumers. Some consumers do not use local phone services because they can use their cell phones instead. Lastly, YouTube and other online streaming services divert viewers away from traditional television networks.

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. The monopolist's demand function represents the demand for the entire market, as the monopoly supplies the product to all consumers in the market. Moreover, the marginal revenue (MR) function lies below the demand function. For the monopolist to sell more units, they 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. The point where the MR and MC functions intersect determines the production level. The market price is P*, while the production level is Q*. Then the 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. The high entry barriers prevent competitors from entering the market. A monopolistic market has lower social welfare than a competitive market because the monopoly market 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 stays 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 identical costs, 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 cost \$10. 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), produce Qc units, and charge a price equal to the average cost (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.

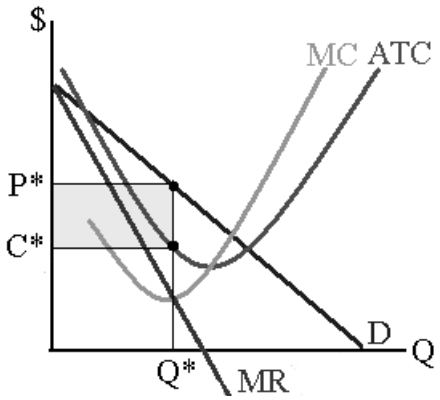


Figure 2. The price and output for a monopolist

A monopolist gains market power and reduces its production level to Q*, where the marginal cost and marginal revenue curve intersect, or MC = MR. Thus, the monopolist charges a higher 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.

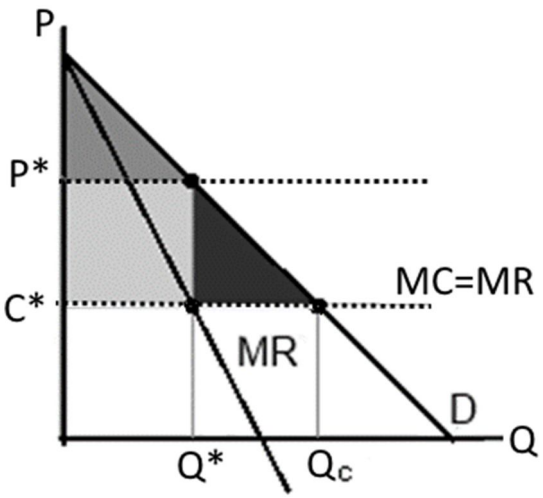


Figure 3. A monopolist's social welfare

A monopoly has an unusual feature. It has no supply function. A monopolist studies the market and sets the production to MR = MC, which becomes the only point at which the monopolist would produce. If a monopolist chose a different production level, he or she would reduce profits.

Some people believe that monopolies price-gouge their consumers. ***Price gouging*** is when a firm charges the highest price possible. However, a monopolist only charges a price where MR = MC. They are not incentivized to raise the price further because a higher price would reduce profit. Although a monopoly market may have a higher price than a competitive market, monopolists have no incentive to price-gouge consumers. Otherwise, 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 investor has already factored the monopoly's value into the stock price. On the other hand, a monopoly would be a good investment if the investor were an ***early bird*** and bought 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 detrimental to a market and society because the monopolist does not serve the interests of consumers. A monopolist often offers poor service or lacks the incentive to improve its products. Hence, monopolists limit consumers' options because one firm controls a market. The consumer either buys the product from the monopolist or goes without. Furthermore, we could consider a government agency as a monopoly because it has a monopoly over specific government services. For example, a consumer wants to drive a car. They must apply for a driver's license at a state bureaucracy. If a person needs to pay taxes, they must deal with another government agency.

Monopolies are not allocatively efficient. ***Allocative efficiency*** is when P* = MC. The allocation is based on the fact that consumers value the products, or P*, while a firm pays costs to manufacture the last unit, represented by MC. If we recall Chapter 7, the market price equals marginal cost for competitive firms or P* = MC, and the competitive market is allocatively efficient. Thus, we use the competitive market as the benchmark to compare other market structures. However, the market price exceeds its marginal cost for a monopolist (or $P > MC$). 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*** refers to firms or agencies that do not produce at a 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 may be poorly motivated. Furthermore, x-inefficiency is more

pronounced in government organizations because they are typically much larger and lack a profit motive. A monopolist or government agency can become bureaucratic and employ more workers than a competitive firm.

A firm with monopoly power could encourage rent-seeking behavior. ***Rent-seeking behavior*** is when an individual, organization, or firm seeks rents (unfair profits) by manipulating its economic environment. Thus, a monopoly uses power to protect itself from competition and earns massive profits. For instance, Russian companies bribe government officials, who, in turn, grant licenses to only the monopolies, thereby restricting competition. Rent-seeking behavior is when the monopolist bribes the Russian government to protect the monopolist's power and curb its competition. Rent-seeking behavior is more circuitous in the United States. Corporations and interest groups funnel campaign money to politicians, who, in turn, pass favorable laws that benefit these entities.

Measuring Market Power

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

The Herfindahl Index overcomes the problem of the Concentration Ratio. We calculate the ***Herfindahl Index*** by taking the percentage market share of each firm, squaring it, and summing across all firms in the market. Since a pure monopoly has a market share of 100%, the Herfindahl Index equals $100^2 = 10{,}000$. On the other hand, a firm in a purely competitive market has a zero market share, which equals zero when squared. Subsequently, we add across all the purely competitive firms in the market, resulting in a Herfindahl Index of 0. Thus, 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 1. Measuring Market Power for Various U.S. Industries

Market	Concentration Ratio	Herfindahl Index
Beer	91	NA
Breakfast Cereals	78	2,521
Cement	11	63
Cigarettes	95	NA
Computers	85	2,662
Motor Vehicles	81	2,321
Women's dresses	13	84

The Concentration Ratio and Herfindahl Index have the following 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 that becomes isolated from other markets. For example, cement production is competitive because the Concentration Ratio equals 11 in Table 1 while the Herfindahl Index is 63. Nevertheless, cement is bulky and has high transportation costs. Thus, cement firms could be monopolies in their local communities.

Problem 2: A product may have interindustry competition. ***Interindustry competition*** occurs when a product in one market competes with products from other markets. For example, breakfast cereals are a concentrated industry, as shown in 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 competing with large companies from other countries. For example, the motor vehicle manufacturing industry is a concentrated one, as shown in Table 1. However, U.S. car manufacturers compete with car manufacturers from Japan, South Korea, and Germany.

We have another measure of monopoly power, which we refer to as the ***Lerner Index***. The index is related to allocative efficiency and is defined in Equation 1. Purely competitive markets are allocatively efficient, so the price (P) equals the marginal costs (MC), or P = MC. Consequently, the Lerner Index would be zero since P – MC = 0. Lastly, a monopoly has the most market power, thus resulting in the largest difference between P and MC. Therefore, a monopoly would have the largest Lerner Index.

$$Lerner\ Index = -\frac{1}{\varepsilon} = \frac{P-MC}{P} \quad (1)$$

We calculate the Lerner Index from the price elasticity of demand. We denote the price elasticity of demand by ε. The 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, the quantity demanded falls, and vice versa. Unfortunately, some economists drop the minus sign. Finally, all elasticities share a common property: they have no units of measurement. Thus, economists can compare apples to oranges.

For example, economists estimated that foreign travel has a price elasticity of demand of -4. If the market price rises by 1%, the quantity demanded falls by 4%. Consequently, foreign travel is elastic, and consumers are sensitive to changes in the market price. The Lerner Index would equal 0.25 in this case. Furthermore, travelers will switch to competitors if a travel firm raises the market price. Elastic products have many substitutes or comprise a large portion of income. Nevertheless, 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%, the quantity demanded drops by 0.2%. Consequently, coffee drinkers are not sensitive to price changes, giving coffee producers 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, as coffee sellers have little monopoly power.

Government Policies

The government has four policies to curtail a monopolist's power. We rank policies from the most economically beneficial to the least.

Policy 1: The most effective government policy is to reduce or eliminate market barriers. For example, a government may reduce licensing requirements or expose monopolists to international competition. Tariffs and quotas protect a monopolist, and the government can lower these trade barriers to expose the monopolist to competition (Frank, 1968).

Policy 2: A government could regulate natural monopolies and set the regulated price for the product or service. The 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 inefficient. The market price still exceeds its marginal cost, or P > MC.

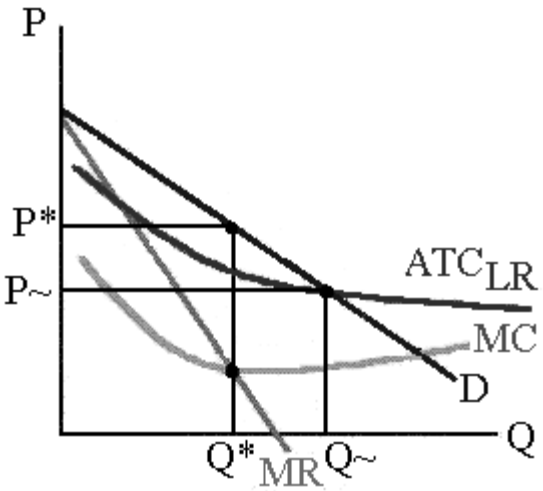


Figure 4. The government uses average cost pricing to set the price for a monopolist

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). The 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 allocatively efficient because the government sets 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, the government must subsidize this industry to keep the monopoly from going out of business.

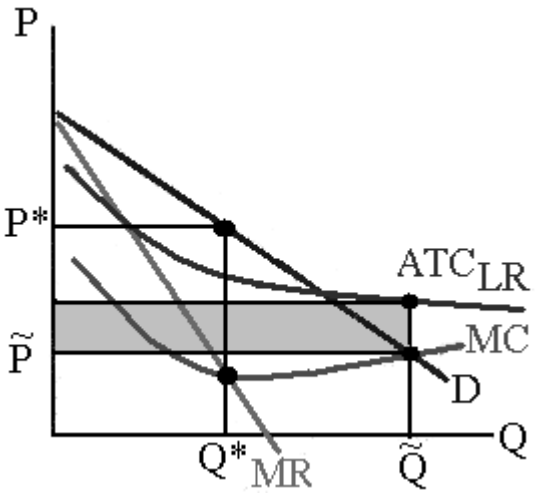


Figure 5. The government uses marginal cost pricing to set the price for a monopolist

Ramsey Pricing fixes the problem with Marginal Cost Pricing. A government allows the regulated monopoly to charge two prices: A unit charge and a fixed charge. A ***unit charge*** is when the government sets the price equal to the marginal cost, or P* = MC. Then the government allows the monopolist to pass the loss on to its consumers as a ***fixed charge***, dividing the loss among customers. Thus, the monopolist earns zero economic profit in the long run and is allocatively efficient. Lastly, the government does not subsidize this industry.

Policy 3: A government uses antitrust laws to curb a monopoly's power by breaking the monopoly into several smaller companies. These companies then 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 Mobil 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.

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

The government can use antitrust laws that do not involve breaking up companies. In the United States, corporations are required to obtain government approval for corporate mergers. Consequently, a government may stop two corporations from merging if the merger would reduce market competition. Moreover, the government can prosecute firms that engage in collusive behavior. ***Collusive behavior*** occurs when companies collaborate to set market prices and quantities, thereby reducing competition and potentially harming consumers. Markets with few firms can allow them to collude 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 satisfy consumers. At last, the government has no profit motive, and taxpayers may subsidize the monopoly if the government severely mismanages it.

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

Key Terms

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

Chapter Questions

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

2. Intel and AMD dominate the microprocessor market for computers. Identify the market barrier

for this market.

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

4. Apple iPhones set the standard for cellular phones, and everyone wants one. Assess whether we should buy Apple stock due to 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 poor customer service, employing excessive bureaucracy, and being closely tied 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 publicly owned, supplying water and treating sewage for their customers. These companies charge two prices: A monthly charge reflecting a household's water usage and a fixed annual charge that the company adds to a household's property taxes. Identify the pricing policy that the Texas government uses to regulate its water companies.

8. The government is concerned that Microsoft is making too much money and plans to break up the company into two separate entities. The 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

A government may have to supply public goods, such as national defense, flood control, or mosquito abatement. These 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, which is why companies may struggle to supply them. 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. The government can force people to pay for public goods, and it finances industries, such as building more highways or funding more colleges, because these investments greatly benefit society. This chapter presents the reasons for public ownership, as well as the benefits and challenges associated with government ownership.

Public Goods

A ***public good*** possesses two unusual properties. First, a public good is ***non-rival***. One person's consumption and enjoyment of a good do not prevent others from consuming it as well. 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***. Suppliers of public goods cannot exclude people who do not pay for the product. Consequently, free riders will consume the goods without paying for them. Typical public goods include national defense (military), public safety (police), radio and TV signals broadcast over the air, clean air, and a stable financial environment. Unfortunately, a market undersupplies public goods because firms and suppliers cannot restrict consumer consumption.

The 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 downloading a file does not prevent another from doing the same. Thus, free riders enjoy the material without paying for it. The 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 governments in Europe and the United States have started a crackdown on internet piracy, it continues to flourish and grow.

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 Licinius Crassus started a private fire department. Crassus would negotiate a price for his services as a person's house was burning down. Crassus possessed market power and became one of the wealthiest Roman citizens. Consequently, the government should supply public goods to prevent adverse incentives.

The government may supply quasi-public goods. A ***quasi-public good*** is rival and excludable. Thus, one person using a quasi-public good prevents rivals from enjoying that product. Furthermore, a producer or supplier can restrict the 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. Therefore, private companies can restrict consumption to consumers who pay for them. However, the government believes that these goods and services are so vital to society that it supplies more public goods than a private market would.

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

We depict a public good in Figure 1, and the government supplies 100 units of a public good. If the market has two people who truthfully reveal their willingness to pay, then Person A pays \$50 for the public good while Person B pays \$75. Consequently, the government uses vertical summation and collects \$125 from the people. If we recall Chapter 3, the total market demand for a regular good was the horizontal summation of individuals' demand functions, where, in this case, it is a vertical summation.

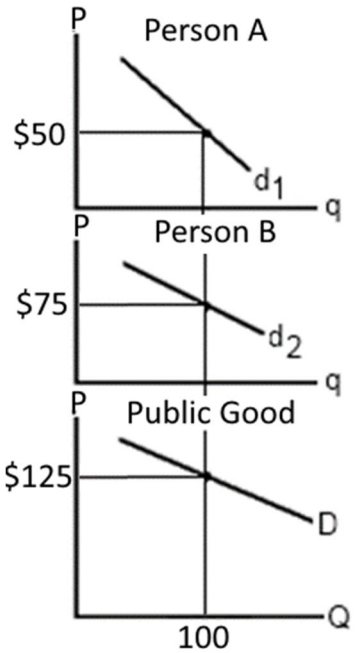


Figure 1. Deriving a demand function for a public good

Reasons for Government Ownership

A government has many reasons to regulate industries or markets. However, we do not cover some reasons because some reasons are not true. For example, the government claims it can lower production costs, offer better service, or increase investment. This could be true initially, but not

in the long run. The government typically incurs higher costs, provides subpar customer service, and decreases investment, resulting in the deterioration of infrastructure and buildings. Thus, we do not list these reasons, as we do not want to create confusion in Chapter 9, which covers deregulation. Nevertheless, we discuss the benefits and problems of each reason.

A government takes over an industry to improve safety or strengthen national security. For example, many countries control their energy industries, as shown in Table 1. An energy disruption could shut down an entire nation. As another example, many city and county governments own and operate police departments, fire departments, and ambulance services. Could we 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

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

Source: Office of Energy Markets and End Use (1996)

A government redistributes wealth in society by transferring surpluses from consumers and producers between markets. For example, a company invests heavily in an infrastructure to supply water to consumers. A water company lays a grid network of freshwater and wastewater pipes, with various pumps and tanks crisscrossing 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. As another example, the government is a significant purchaser. The government utilizes its purchasing power to purchase sizable quantities of prescription medicine and vaccines, demanding discounts and price breaks from pharmaceutical companies. Then the 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 poor choice because it allows the government to become a monopoly. Monopolies charge higher market prices, produce lower quantities, and earn long-run economic profits. However, monopolies strive to maximize profits, so a monopolist is incentivized to keep costs as low as possible. Nevertheless,

a government may be worse than a monopoly because government leaders may not be able to manage a business effectively or may not be driven by a profit motive. Thus, the government may supply products and services at higher costs and offer poor customer service. Moreover, government agencies suffer from x-inefficiency. ***X-inefficiency*** occurs when government agencies fail to minimize costs, inflate salaries for management, and hire excessive numbers of managers. Then managers may fail to motivate their workers effectively. Companies and bureaucracies suffering from x-inefficiency have greater production costs.

A government can control the distribution of certain products to charge high prices and 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 such as minerals and energy generate substantial long-term profits and are a significant source of tax revenue. Hugo Chavez, the former President of Venezuela, used petroleum revenue to finance his socialist programs. As another example, Pemex, Mexico's state-owned petroleum company, has a monopoly on petroleum and natural gas in Mexico, controlling the extraction, refining, and retailing of these resources. If we want gasoline in Mexico, we buy it from Pemex through its gas stations. In 2005, Pemex paid the Mexican government $52.8 billion in taxes and duties, but incurred a net loss of $6.9 billion. Finally, Petronas is Malaysia's state petroleum company and contributes half the tax revenue to the Malaysian Government.

A government could become a rent-seeking state. Top government leaders own 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 of poor quality. Thus, the government, through the President, imposes tariffs and trade protection on car imports, discouraging citizens from buying foreign cars.

Governments may form international cartels to enhance profits. A ***cartel*** occurs when suppliers of a single product unite as a single entity, thereby forming 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 extraction. Quotas decrease petroleum production, which in turn increases the price of petroleum. Over time, OPEC has expanded its membership, and the current members include Algeria, Indonesia, Iran, Iraq, Kuwait, Libya, Nigeria, Qatar, Saudi Arabia, the United Arab Emirates, and Venezuela.

A government uses public ownership to reduce corruption. For instance, developing countries have a strong reason for government ownership. Privatization increases the likelihood of corruption when private capital markets are underdeveloped and regulatory agencies are weak, with limited funding and few inspectors. Consequently, the government could control the market to reduce corruption. Of course, this argument contains a flaw. When the government takes over and owns a company, it appoints officials who may be as corrupt as those in the government.

Corporations are large organizations, and some government leaders control them. 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, is a majority shareholder in 41 companies, and is a minority shareholder in 69 companies. Therefore, the

Kremlin, the seat of the Russian federal government, has a strong influence over 171 companies. Political leaders controlling their corporations are a form of corporatism. ***Corporatism*** occurs when a government indirectly controls its industry through associations. Hence, the bureaucracies, political leaders, and regulated industries work together for the same goals. Furthermore, the government determines which businesses, associations, and groups to work with. For example, national governments in China, Japan, Taiwan, and South Korea have utilized corporatism to develop their manufacturing industries in their respective economies. This swift industrialization becomes a driver of economic growth. Lastly, corporatism varies in the level of government power 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 & Chan, 1995).

Cartels are not Effective

OPEC successfully hiked petroleum prices three times since the 1960s. However, cartels have severe problems that prevent them from earning long-term economic profits.

Problem 1: As the number of firms increases, firms struggle to collude. Managers often face greater challenges in communicating, negotiating, and reaching agreements. Typically, OPEC was unable to agree on production quotas.

Problem 2: Firms have different market shares, varying costs, and other differences. Thus, firms struggle to agree on production quotas.

Problem 3: Cartel members are strongly incentivized to cheat and secretly sell their products on the markets. This was 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 in greater quantities, for the same price.

Problem 5: Some markets have low entry barriers. New rivals enter the market because they expect to earn economic profits, thereby reducing the economic profits of everybody. During periods of high oil prices, energy companies search for 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 their gasoline demand in the long run by purchasing fuel-efficient cars, traveling less, and relocating closer to their workplaces. As another example, consumers reduce their spending when the economy enters a recession. Thus, the cartel could break up if it cannot sell its quotas.

Problem 7: The 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. For example, a government can slow inflation by limiting salary increases. During the 2008 Global Financial Crisis, the U.S.

government started public ownership in U.S. banks and corporations. Banks are vital to the economy because they connect savers with borrowers, facilitating the flow of funds between them. Businesses borrow to invest in new machinery, equipment, and buildings, while households borrow to purchase homes, cars, and large appliances. Thus, banks link savers to borrowers, allowing them to invest and make large purchases. On the other hand, a collapsing banking system causes savers to hide their money under their mattresses. Thus, savers remove this money from the economy. Banks are essential because they inject savings into the economy, putting the money to work through investments.

A government uses ***import substitution*** to boost economic growth. The government erects trade barriers that hinder imports flowing into the country. The government could impose a ***tariff*** when taxing imports or create an overly complicated, bureaucratic system for obtaining import licenses. Thus, businesses cannot get the proper licenses to import products. Furthermore, a government can subsidize or own the industries that manufacture the products that are substitutes for the imports. Government-owned industries may suffer from x-inefficiency. Then a government creates monopolies within the country and protects them from international trade. Governments can use import controls, undervalue their currency, or impose price regulations to protect these industries. If these protected state industries start earning losses, the government may operate budget deficits as it subsidizes the industry. Consequently, the government may force its central bank to print money to cover the budget or borrow from foreign countries. Typically, import substitution leads to economic growth in the short term, until a financial crisis occurs. Many Latin American and African countries have not successfully employed import substitution (Rodrik, 1996).

Government leaders, finally, like their industries to charge simple rate structures, 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 and raise their revenues and profits. Businesses and firms offer various pricing options, including senior citizen discounts, student discounts, coupons, rebates, and family specials, to attract customers. Some consumers are more conscious about purchasing, 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 reducing the price for price-sensitive consumers. A firm needs three conditions to use price discrimination effectively:

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

Condition 2: Sellers must prevent customers who buy at low prices from selling to customers who pay higher prices. For example, a senior citizen sells her "discounted" medication to another customer.

Condition 3: The seller needs some monopoly power because they must raise the market price for groups that are not sensitive to high prices.

A college can use price discrimination to increase revenue. Figure 2 shows a non-price-discriminating college. The college charges all students \$10,000 per year, and 1,000 students enroll. Thus, the college collects \$10 million in revenue, as shown by the shaded rectangle.

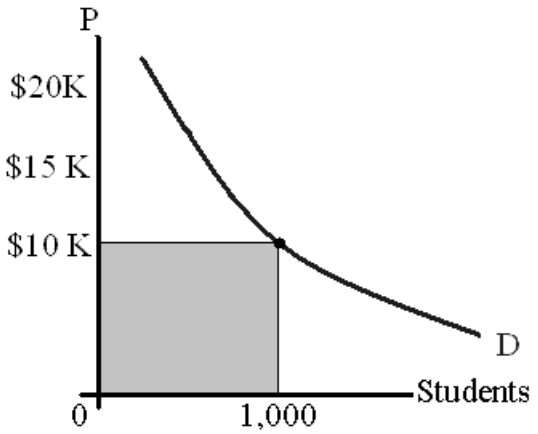


Figure 2. A college does not use price discrimination

In Figure 3, college administrators use price discrimination to raise tuition funding and prevent college students from transferring to another college. Thus, the same number of students enroll, 1,000 students. However, the college charges students \$20,000 per year. The 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 a height of \$20,000. The college charges \$15,000 to 300 middle-class students. The college awards \$5,000 scholarships to these students and generates \$4.5 million in revenue, as indicated in the gray rectangle. The gray rectangle has a width of 300 students (or 600 – 300) and a height of \$15,000. Finally, 400 low-income students receive a \$10,000 scholarship each. Thus, the 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. The college collects \$14.5 million in tuition, gaining an additional \$4.5 million through 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. Furthermore, colleges and universities have some monopoly power and are uniquely positioned. They require students to submit detailed financial information for financial aid and scholarships. Administrators have comprehensive accounts of students' willingness to pay. Have we noticed in Figure 3 that some students kept some of their surpluses? Some students kept three white triangles. If a college could use price discrimination ideally, it would extract all consumers' surplus that lies above the market price but below the demand function.

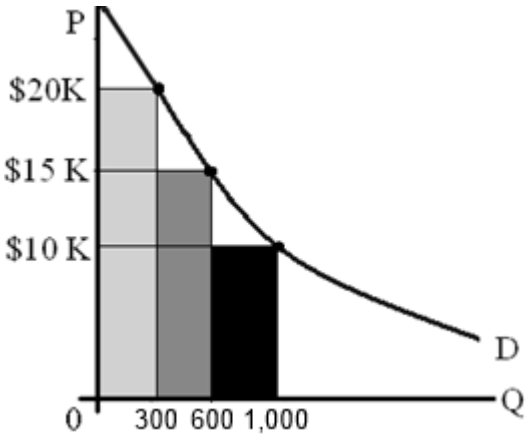


Figure 3. A college uses price discrimination

Public Ownership Types

Government ownership has various forms and dates back to ancient times. For example, the Roman government owned the water industry and the production of military arms. Early in the 20th century, Great Britain used large-scale nationalizations. ***Nationalization*** occurs when a government takes control and ownership of businesses and their assets, without compensating the owners or stockholders of the company for the loss of their assets. The British government nationalized the telecommunications industry in 1912, the 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 and 80% of the water companies. City governments also own and operate natural gas companies and local transportation systems, such as buses, subways, 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 began to take public ownership of financial corporations that were teetering on the brink of bankruptcy.

We define five types of public ownership:

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

Type 2: A government becomes a single producer in a market, effectively creating a monopoly that controls an industry or product. The government owns all the industry's machines, equipment, and buildings and hires the workers. Government ownership can occur on a large scale,

controlling an entire industry or market for a country. Refer to Table 1 for a list of governments that have nationalized their energy companies. Furthermore, the Soviet Union controlled agricultural producers through collective farms. The Soviet government owned everything, and workers became "slaves to the state," particularly those on the cotton collective farms in the Socialist Republic of Uzbekistan. The Soviet Union limited its citizens' mobility, restricting them to residing on collective farms. Finally, government ownership can occur on a small scale. Many U.S. municipal governments own water, electricity, and natural gas companies. Public ownership occurs on a small scale because a municipal government controls a small region within a state. Municipal government is the city and county governments.

Type 3: A government creates departments that extend the government. They can control industries and businesses. For example, the U.S. Department of Education enforces regulations for 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. Consequently, the government allows people to own businesses and resources, but controls them through its regulatory power. Then the government punishes people and businesses if it discovers they are not complying with the regulations.

Type 4: A government creates a ***quasi-government agency***, 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 serving as its shareholders. Although shareholders control corporations, the U.S. banks do not control the Federal Reserve. With Senate confirmation, the Board of Governors controls the Federal Reserve, and the U.S. president appoints board members, including the chairman and vice-chairman. The current chairman is Jerome Powell.

Type 5: A government establishes a company as a ***public corporation***, which then issues stocks. The government is usually a majority shareholder, controls the company, receives dividends, and collects taxes. Moreover, the government appoints the board of directors, who, in turn, elect the president. The 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. In 2009, both Fannie and Freddie earned massive billion-dollar losses. Unfortunately, the 2008 Great Recession caused many homeowners to default on their mortgages. The 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.

The city government resembles a public corporation. First, a city government approves a charter. A ***charter*** is a document that legally establishes a city and defines its structure. The structure refers to how the city government organizes powers and duties among all city departments and agencies. Second, a city council is equivalent to a board of directors. A mayor is similar to a corporate president, while city residents are akin to shareholders. In addition, residents elect the mayor and city council, and all city council meetings are open to the public. The goal is to make the city government responsive to its citizens, fostering an open and transparent government. The website www.municode.com features numerous U.S. city charters and laws.

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

The 2008 Great Recession led to the 2008 Global Financial Crisis. The U.S. government intervened in the U.S. financial markets during the Great Recession, preventing the collapse of large banks and financial institutions. The U.S. government started the unprecedented ownership of the largest corporations in the United States as a condition of the bailout.

The 2008 Great Recession started when the housing bubble deflated in 2007. Unemployment began increasing while some households defaulted on their mortgages. Consequently, banks foreclosed on properties that lost value during the recession. Furthermore, some experts believe that the U.S. economy will enter a decade-long recession, similar to Japan's.

The federal government intervened and assumed government ownership because the collapse of the banking system would have had a severe impact on the economy. Banks are vital to the economy because they connect savers with borrowers, facilitating the flow of funds between them. If savers stop depositing their money into banks, the banks will be unable to grant loans. Then businesses and households could not invest in the economy.

The U.S. government bailout has the following six problems.

Problem 1: The bailout package rewards the financial industry for bad decision-making. Finance companies should be punished. If the U.S. government bails them out, it should buy the mortgages for a fraction of their book value, forcing losses on the companies. If companies know the government will bail them out, they may take excessive risks.

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

Problem 3: The government bailed out the financial institutions to encourage them to lend again. Many of the companies the government bailed out hoarded the money. Of course, many U.S. consumers have too much debt, so they are hesitant to take on new loans or mortgages. Lastly, banks do not grant new loans on houses that lose value over time.

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

Problem 5: The government requires homeowners to default before the government can help them. Consequently, people deliberately default on their mortgages so that the government can also bail them out.

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

The U.S. government became a shareholder in various U.S. corporations in 2008; a partial listing is provided in Table 2. Corporations teetered on the brink of bankruptcy and financial collapse. The U.S. government bailed out the U.S. financial institutions by purchasing warrants. A ***warrant*** lies between a common stock and a corporate bond. Warrants do 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 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, similar to Japan's, the U.S. government will likely incur significant losses from holding these financial assets that will decline in value. The bailout could further weaken the U.S. dollar. 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.

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

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

Source: J.W. Verret 2009.

The Government's Optimal Size

The U.S. government has increased its size since the 2008 Global Financial Crisis. The U.S. federal government's budget mushroomed to $6.8 trillion in 2024 from $3.8 trillion in 2011. The U.S. government's share of the economy is approximately 23.6% in 2024, down from roughly 25.3% in 2011. Some claim that the government is overestimating the size of the GDP; therefore, view these numbers with caution. We present the main budget items in Table 3, which encompass both on-budget and off-budget expenditures. The U.S. Government defines Social Security and the U.S. Postal Service as off-budget. The government spends the largest amount on national defense, social security, income security, and Medicare. Income security is the safety net program that provides housing assistance, food stamps, and other federal assistance. Finally, the net interest on the debt was $882.0 billion in 2024 from $207 billion in 2011.

Is the U.S. government too large? The ***Rahn Curve*** illustrates the relationship between the size of the government and the economy's growth rate. Richard Rahn estimated that the optimal level of government spending lies between 15 and 25% of GDP. If a government spends over 25% of its GDP, it hinders economic growth. The U.S. government spends approximately 24%, which

is only one part of our government. After adding state and local governments, government spending rises from 35 to 40% of GDP. Similarly, the government of the United Kingdom accounts for approximately 43% of the GDP, whereas many European countries exceed 50%. Since the 2008 Great Recession, these countries have 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.

Table 3. Comparison of the U.S. Government's Budget

Budget Item	2011 Amount ($ millions)	2024 Amount ($ billions)
National Defense	768.2	883.7
Social Security	748.4	1,500.0
Income Security	622,7	671.0
Medicaid	494.3	618.0
Net Interest on the Debt	206.7	882.0
Total Budget	3,818.8	6,775.0

Source: U.S. Printing Office. Budget of the United States Government. Available at http://www.gpo.gov/

The Rahn Curve's weakness is that it classifies all government spending equally. If a government has generous social and retirement programs, these programs would not boost GDP growth rates. However, if the government invests in education, training, or infrastructure, these investments could 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, and federal spending is not likely to boost future economic growth.

The Rahn Curve underestimates the size of the government. Economists struggle to accurately measure the government's size, scope, and mission. Federal, state, and local governments created various quasi-government agencies, authorities, nonprofit organizations, and public corporations. We refer to these institutions as hidden governments because they are exempt from government oversight, independent of voter influence, and can issue debt that a government backs and guarantees. Some institutions are riddled with corruption, mismanagement, bid rigging, or maintaining the "good ole boy system."

The hidden government includes the three examples:

Example 1: Local and state governments create various organizations to operate airports, seaports, toll bridges, low-income housing, parks, schools, and universities. Local or state governments could be liable for the debt of these institutions if they experience financial hardship.

Example 2: Some city governments created public corporations or departments to provide utilities for their 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: The federal government created public corporations, including the Federal National Mortgage Association (Fannie Mae), the Federal Home Loan Mortgage Corporation

(Freddie Mac), and the Student Loan Marketing Association (Sallie Mae)[1]. 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 as such, these institutions may not operate in the same manner as private businesses. A personal business has one purpose – to earn profits. If managers mismanage a private business or a firm that manufactures low-quality products or provides terrible customer service, that business could fail and go bankrupt. The threat of financial failure compels a business to focus on its market, customers, and products and services; otherwise, the business is likely to fail. Unfortunately, fiscal failure provides little feedback to public institutions. Public institutions can approach government leaders and request subsidies, tax breaks, or favors to keep inefficient and mismanaged public corporations operational.

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 property ownership as tools. Then they utilize their tools to expand their power and increase the size, scope, and mission of the government. Alongside the government's growth is the explosion of corruption. Growing government and corruption go hand in hand. Although corruption is difficult to define, everyone knows it when they see 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 where tyrants dominate the state and monopolies flourish in the market. Corruption thrives in heavily taxed and regulated societies with concentrated power. Widespread corruption has three requirements:

Requirement 1: A society needs 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 wealth, power, and status inequality can exacerbate a state's corruption. After leaders and wealthy individuals have ascended to the top, they often become selfish, proud, and arrogant. They do everything they can to maintain their position, even if it is to society's detriment (Dobel, 1978).

Requirement 3: Society breaks into warring factions. Factions are sources of wealth and power. They aim to usurp the government and recruit leaders to their cause. A faction can sway regulatory agencies, police, and the criminal justice system to its camp. After a faction has gained power, it influences the lawmakers, who write the laws. Then it utilizes the judicial and criminal justice systems to pursue its opponents.

[1]The U.S. government split Sallie Mae into two companies. While Sallie Mae handles private student loans, Navient handles federal student loan servicing.

Corruption becomes detrimental to society because it causes three negative problems. First, corruption creates uncertainty. Business leaders are uncertain about how taxes, government regulations, and laws will evolve in the future. They pay higher taxes and greater regulatory costs. Consequently, businesses reduce their investment to minimize their exposure to a growing government. Second, large businesses bribe government leaders and bureaucrats. Businesses incur higher costs and face greater uncertainty. Government leaders and bureaucrats can develop a habit of accepting bribes over time. Since bribes are illegal, parties cannot set future bribes in contracts. Finally, as corruption pervades regulatory bureaucracies, bureaucrats hinder the creation of new businesses. Old businesses often bribe bureaucrats to prevent new competitors from entering the market, or the bureaucrats create overly complicated rules. Thus, businesses must pay more to overcome these complex rules, or the bureaucrats withhold or deny the necessary permits and licenses. Typically, monopolies are associated with corruption because they can generate substantial profits, which can lead to unethical practices. They pay bribes to the government and bureaucrats, and, in turn, the bureaucrats help protect the monopolists' power. A 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, favoring one faction while punishing another (Dobel, 1978).

Impact 3: Violence becomes more prevalent as people lose faith. The government has more difficulties reforming itself (Dobel, 1978).

The government can use simple methods to reduce corruption by reducing the concentration of power. For monopolies, the government breaks them up, regulates them, or exposes them to international trade. For the government, political leaders must lower taxes, reduce the size of the government, eliminate subsidies, and streamline bureaucratic processes. Of course, governments rarely invoke these policies. Instead, political leaders tend to increase the size, scope, and mission of the government to eliminate corruption. Hence, 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, determine whether they can collaborate without forming a cartel.

2. The current market price of petroleum is $150 per barrel. Imagine we were the President of an OPEC nation, and OPEC reduced our country's petroleum production by 10%. Identify ways we can boost our profits.

3. Explain how a theme park uses price discrimination.

4. Determine whether software companies can employ price discrimination, such as offering student discounts.

5. After the 2008 Financial Crisis, the government strengthened bank regulation, increased several bank taxes, and hiked deposit insurance rates. Banks are required to purchase deposit insurance from the Federal Deposit Insurance Corporation, a public corporation. Assess whether a government is employing an effective strategy.

6. A country nationalized all its industries after a socialist party came to power. Socialists strongly distrust free markets. Identify the economic problems that nationalization would cause.

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

8. Many former Soviet countries suffer from severe corruption. Identify the methods a government can use to reduce corruption.

9. Deregulation

The government is often criticized for its poor management of businesses. For instance, a private company would likely go bankrupt if its managers mismanaged it, if it sold low-quality products, or if it could not compete with its competitors. If managers mismanage a government-operated company or if it produces inferior goods and lacks competition, the public company could avoid bankruptcy and financial hardship. Unfortunately, a public company has connections to the government, and the government may subsidize the business to keep it operating.

Government agencies and monopolies may suffer from x-inefficiency. ***X-inefficiency*** occurs when firms and government bureaucracies fail to minimize production costs for goods and services. They face little to no competition, have no incentive to minimize costs, often mismanage the company, and poorly motivate their workers. X-inefficiency may be more severe in government agencies because they are typically larger than private ones and lack a profit motive. Consequently, governments deregulate markets because they believe that private companies generate more wealth than public companies and adopt new technologies more quickly. Thus, the government deregulates the public entity, introducing competition and imposing financial discipline on it.

Benefits and Problems of Deregulation

Many countries are deregulating their financial and energy markets, allowing corporations to compete internationally. ***Deregulation*** occurs when the government removes regulations, reduces taxes and subsidies, eliminates price controls, or privatizes a government agency. Some governments remove regulations and add new ones. This is not deregulation but ***re-regulation***. For example, California "deregulated" its electricity power generation. The state government removed old regulations and added new ones in 2000. When the new rules proved ineffective, state officials declared deregulation a failure.

The government has the following six reasons to deregulate a company or industry.

Reason 1: A government deregulates a public company to stimulate new investment and technology. Usually, but not always, the government slowly adapts to new technology and underinvests in public companies. When the government deregulates public companies, it opens the companies to foreign and domestic investment. Investors bring new technology with them. The new companies could evolve into international corporations and invest in activities abroad. In the United States, the government contracts with private technology companies to help implement new technology. The U.S. government depends on private subcontractors for its new technology. However, rumors abound that the U.S. government utilizes old, outdated technology.

Reason 2: A government deregulates to curb the power of labor unions. Government agencies and public companies often allow the formation of labor unions. ***Labor unions*** raise workers' wages, increase workers' benefits, reduce work requirements, and create more difficulties and barriers to terminating workers. Although a government may not offer as much as private companies, it allows unions to organize workers and provides excellent health and pension plans. On the other hand, private corporations tend to fight and resist labor unions. After the government

deregulates a company, the company breaks the labor union and reduces labor costs. Lastly, the company may also lay off workers and reorganize the business to improve efficiency and productivity.

Reason 3: Consumers gain from deregulated public companies. In a competitive market, producers compete for consumers and tailor their offerings to meet their demands. Consequently, consumers pay lower prices, have more choices, and receive better service. The keyword is competition. The government must subject the deregulated company to competition. For example, the government lowers trade barriers, forcing the deregulated company to compete with other companies in the international markets. Moreover, privatized companies could earn significant profits and experience an increase in labor productivity. ***Productivity*** measures the level of production per unit of labor. Thus, the privatized company has workers who work. How often have we wandered into a public company or government agency where the workers are idle? If the privatized company can reduce costs, it can sell products and services for lower prices.

Reason 4: A government financially gains from deregulated companies. The government has a new company to tax, could receive cash from privatizing a public company, or reduce subsidies and tax credits. Furthermore, the government could reduce its budget deficit by decreasing its borrowing because it no longer finances a public company. A budget deficit occurs when a government spends more than it collects in taxes.

Reason 5: A government deregulates a public company to end preferential treatment. Public companies and government agencies are closely connected to the government, and government officials and leaders may bestow favors, subsidies, tax breaks, and other benefits on public companies. Moreover, if a public corporation were to violate a law, would the government shut it down? The government usually has no problems shutting down private businesses for violating the law.

Reason 6: A government deregulates to reduce the power of interest groups. Interest groups strive to manipulate or influence the government and its regulatory agencies. Converting a government agency or public company into a private one reduces the power of interest groups. Subsequently, 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 entirely positive and creates two problems. First, privatized agencies usually reduce workers' wages because government agencies have 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 in limited supply, while labor with common skills is abundant in the labor pool. Unfortunately, a competitive market can be particularly harsh on workers with limited skills. Second, a privatized company may reduce its workforce through layoffs. A laid-off worker over the age of 40 may struggle to find new employment. Employers usually hire young workers because they are easier to train, possess computer skills, and tend to stay with the employer for a longer period. Nevertheless, the work ethic of Generation Z is challenging this notion.

Successful deregulation hinges on competition. If a government deregulates a public company, which is the only seller in the market, then this deregulated company becomes a monopoly. In this case, a monopoly permanently raises market prices by reducing production and earning profits.

Methods of Privatization

The government uses several methods to deregulate government agencies or public companies. All methods require the government to modify the legal system, as they introduce or expand property rights and contract law. Moreover, the judicial system must change because judges play a crucial role in enforcing contracts and protecting property rights. For example, the former communist governments converted public property, such as apartments, into private property. Governments changed the role of government agencies in monitoring and controlling apartments. Finally, government agencies must introduce property titles, allowing owners to sell and transfer property.

The government uses four methods to transfer state property to the public. First, the government transfers state property to families whose property was seized by the state. The state grants ***restitution*** to its citizens for the theft and expropriation of property. This method was popular in Eastern Europe but was 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. The Soviet Union was established in 1924, while the Eastern Bloc countries became communist following the Soviet Army's invasion in 1945. With the 1940s being more recent, owners can prove they owned the property. Typical forms of property returned to owners were farmlands and small businesses. One problem with restitution is that the owner must evict people and families who occupy the property (Brada, 1996).

The second method involves the government selling or auctioning the entire state company to the public or another private company. Then the government sells the firm to the highest bidder and receives revenue. Argentina, Chile, Hungary, New Zealand, and the United Kingdom used this method. However, auctions may touch a sensitive issue. Should the 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, capturing one-third of all investments in Eastern Europe and the former Soviet Union (Brada, 1996). Other countries, such as Czechoslovakia, Poland, and Russia, imposed stricter restrictions on foreign ownership because they did not trust outsiders.

The third method involves the government using ***vouchers*** to convert public property into private property. In this case, the government does not receive any cash. People usually have no money, and the vouchers become assets, creating wealth for the citizens. People with vouchers can convert vouchers into shares in a corporation or ownership of private property, such as apartments and houses. Then the government establishes a stock market exchange for the corporations. Former communist countries used vouchers to transfer public property to the people.

In some cases, the government issued vouchers to families as compensation for property seized during socialist times (Brada, 1996).

The fourth method involves the government organizing the public company as a corporation, with the government serving as the majority shareholder. The government has two options. First, the government gradually sells its shares to the public over time. Thus, a government gradually transforms a public company into a private one. For example, the British government sold British Petroleum this way, and the Canadian government did the same with Petro-Canada. Second, the government forms a joint venture between public and private companies. Hence, the government sells shares in a public corporation to a specific buyer. Consequently, the ***joint venture*** is a corporation with the foreign company, a public company, and the government as its sole shareholders. Joint ventures are popular with former Communist and Latin American countries. A joint venture enables a government to maintain control of a company by holding the majority shareholder position, while also allowing the public corporation to attract foreign investment and technology. Some governments channel all foreign investment to joint ventures within their countries. Consequently, the government can report high privatization rates while concealing its ownership through public trusts, public banks, and corporations (Brada, 1996).

The last method is for the government to reduce regulations, decrease taxes and subsidies, or remove price controls. For example, the U.S. government heavily regulated the banking industry prior to the 1980s, and President Ronald Reagan played a key role in deregulating the banking and financial markets. As another example, the South Korean government sought to expand its chemical industry with subsidies, but the industry continued to perform poorly. Finally, the Korean government withdrew all subsidies and opened the chemical industry to international competition. Thus, competition forces companies to be fiscally responsible; otherwise, they will go bankrupt and exit the market.

Conversion of state companies into private ones creates a host of problems. First, a state agency, typically referred to as the State Property Agency, holds onto the property. Then a company's management and workers experience uncertainty because selling the company to new owners takes time. The process is slow, and the State Property Agency usually does not actively manage the company. Second, the government and workers may resist privatization. New managers can lay off redundant workers to boost productivity, enabling them to compete with other firms. A government may also dislike the rising unemployment resulting from privatization or a surge in bankruptcies if the privatized firms are unable to survive. Moreover, the state firm loses power and income. Third, the government often retains burdensome regulations and high taxes, which hinder the success of privatized businesses. Finally, investors may be only interested in the most profitable enterprises, and they tend to avoid companies that they view as unprofitable (Brada, 1996).

In extreme cases, a government can evolve into a ***kleptocracy***, as seen in several former Soviet Union countries. As the government converts a state company into a private one, the country's President appoints the president of the newly formed company, who is often a close friend or relative of the 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

The government may subcontract some of its functions to a private company. The private company creates goods and services for a government agency because it reduces costs, provides better customer service, enhances customer choices, and improves efficiency. The government may subcontract functions to avoid complex regulations or conflicts with a government labor union. For example, a city subcontracts environmental inspections to a private company because the federal government's environmental laws are too complicated, or the government wants to change job duties that violate labor union contracts. Consequently, subcontracting appears to shrink the government. Although subcontracting is a form of deregulation, and the government subcontracts part of its work, it may enlarge the bureaucracy. 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 & Meier, 2004).

One city government subcontracted most of its functions. Sandy Springs, Georgia, was 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 that Fulton County collected tax revenue from Sandy Springs to develop areas in the county that were poor.

After the city government had incorporated, the city had no infrastructure, buildings, or employees. City leaders subcontracted most of their functions to private businesses, a public-private partnership. The city government administers the fire and police departments and employs the judges, but subcontracts the other court functions. The city contracted the following tasks 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. The city government has no liabilities or pension fund crisis, but the city is only 20 years old. Furthermore, the city has not raised its tax rates even after the 2008 Global Financial Crisis, which hurt many municipal governments across the United States. City leaders claimed the city pays half the cost to provide the same services as if the city had managed its functions. City leaders believe that the city government should provide services to the community, rather than acting as an employment agency. The city accumulated reserves in the operating budget that city officials used for capital projects. Furthermore, city leaders won their re-elections by a landslide. The candidate with the lowest number of votes received 84% of the votes. Lastly, five cities have adopted this model, and the State of Florida privatized Medicaid services and some of its prisons. A state receives Medicaid funding from the U.S. federal government to provide healthcare for low-income residents.

Most city and state leaders have no plans to subcontract government functions for several reasons. First, they are suspicious of subcontracting government functions to private companies,

particularly in areas such as police and fire departments. Second, they have fewer staff and people to manage. Finally, the public and leaders believe subcontracting would worsen corruption. City leaders select the companies to subcontract with and often demand kickbacks and bribes. If political leaders plan to use their offices to steal, they can easily do so under a traditional government or a government that uses subcontracting.

Communistic Countries in Transition

Communist countries in transition face many challenges. Under communism, the government controlled all means of production and distribution. Following the beliefs of Marx and Lenin, the government owned all factories, land, and property. Marx believed that private property becomes a means by which one person can exploit another. Thus, a factory owner exploits a worker. No one would be exploited if a government owned all the property. Consequently, the state owned and controlled everything, and no one in society was exploited. However, free markets require that the government separate economic and political power. Deregulation always reduces a state's power, as the appeal of Marx's and Lenin's ideologies wanes. Subsequently, the government and citizens adopted new ideas, including free markets, mercantilism, and economic nationalism.

Communism created large state bureaucracies that controlled the economy. Bureaucrats decided what should be produced, in what quantities, at what prices, and who would consume them. Soviet planners imposed production quotas, while quality became a secondary issue. Thus, the Soviet industries usually produced low-quality products. A problem with the production quotas is that they have become 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 bureaucrats would need to adjust production quotas accordingly. Hence, the Soviet system had no incentives to design new products, and manufacturers rarely updated product designs. Under a market system, if one firm offers a better product, consumers tend to flock to that firm for the best quality goods. Consequently, competitive firms are strongly incentivized to adopt new technology, while communism hinders technology adoption.

Production quotas have a flaw. The state bureaucracy must match inputs and outputs for all industries. This requires the Soviet planners to possess perfect information. Consequently, shortages and surpluses plagued the Soviet economy because the planners could not plan everything perfectly. For example, the iron mining industry did not meet its quotas for iron ore. This ore shortage would trickle down through the other Soviet sectors. Thus, the steel factories are unable to meet their quotas. Then a steel shortage trickles through the economy, causing scarcity in different industries. Typically, the military industry would receive its steel first, while consumer steel products were supplied last. Therefore, the Soviet government had a large number 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 required materials (Katsenelinboigen & Levine, 2010).

Transitioning to a market economy necessitates adjustments to a country's legal system. The government must write a new constitution and create political parties, electoral rules, and administrative and judicial structures. Then the state must educate its citizens on the latest "rules of the game" as new, unprecedented concepts emerge. The government allows firms and businesses to earn profits, enabling them to compete. Lastly, the government would allow inefficient, non-profitable firms to go bankrupt. Of course, countries in transition will experience unemployment. However, unemployment did not officially exist under socialism because the state required everyone to work and contribute to the state's utopia.

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

A country in transition must deregulate the markets. Prices send signals to the buyers and sellers because a market price reflects a product's scarcity. Thus, scarcity drives prices up, limiting the quantities consumers purchase in a market. In socialist countries, prices for goods were relatively low compared to wages because bureaucrats set prices accordingly. Lastly, consumer goods and services were often limited and of poor quality, while consumers found themselves with more money than they knew what to do with.

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. Some citizens resorted to bribery. For example, patients paid doctors for better health care. Store employees hid inventory and sold products to customers at a higher price. Even in the state factories, dead employees, called dead souls, collected paychecks, and the factory managers secretly pocketed the salaries (Katsenelinboigen & Levine, 2010).

As the government removed price controls, its economy experienced rapid price increases, leading to inflation. Unfortunately, inflation hurts the firms and people, especially the elderly and pensioners. Although the shortages disappeared, producers and suppliers continued to sell goods at higher prices. Then workers demanded higher wages from their employers, but the state still owned many companies. Unfortunately, state businesses were unable to increase salaries. Finally, some governments printed money to cover budget deficits. Printing money causes inflation or even hyperinflation. Hyperinflation devastates the economy as people stop taking cash and resort to barter.

Russia's Rocky Transition to Capitalism

Russia's road to capitalism illustrates several key problems associated with the transition to capitalism. The Soviet government was rooted in a one-party system, the Communist Party, whose founders were enshrined in the nation's constitution. The leader of the Soviet Union was also the leader of the Communist Party, known as the General Secretary. The Communist Party limited membership to 5 to 10 percent of the population. People referred to the party members as

nomenklatura. They controlled all the machinery of government. Nomenklatura lived better than the rest of the population, had the best housing, traveled abroad, and could shop at special stores stocked with Western goods or products in short supply.

Russia had little experience with democracy and free markets. Russia transitioned directly from an agrarian society to a socialist, industrialized society in 1917. Soviet planners rapidly constructed 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 experienced rapid growth, resulting in significant urbanization as people left rural areas and migrated to cities. However, by the 1970s, stagnation and resignation had set in, and economic performance had slowed. In some countries, 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 implemented economic and political reforms, including ***glasnost*** (openness), which led to greater personal freedom, and ***perestroika*** (reconstruction), which involved reorganizing 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 so intertwined that it was difficult to separate the two (Bialer, 1988). The Soviet Union collapsed in 1991 and dissolved into 15 countries. Soviet industries shut down because their suppliers were located in different countries, and they were unable to obtain critical supplies and resources.

After 1991, Russia cut subsidies for firms and agriculture and eliminated fixed prices on most goods. The Russian government also sold millions of apartments, over 100,000 small businesses, and more than 15,000 large ones. By 1994, the private sector had grown to account for 50% of the Russian economy (Brada, 1996). The government used vouchers and auctions to privatize the state's assets.

Vouchers overcome three problems associated with auctions. First, the Russian people had limited financial resources, and they could acquire assets from the state. Workers and managers can buy shares in their firms. Second, vouchers are politically popular because the state transfers wealth directly to the people, and voucher programs tend to be transparent. ***Transparency*** means citizens can easily understand the rules, regulations, and decisions made by the government. Ultimately, people are generally risk-averse and tend not to invest their money in 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 bought the largest and most valuable firms. Consequently, Marx's fear came to fruition – a few wealthy bankers owned the country.

Russia has other problems. First, Russia has not fully integrated into the global or European economy. The Soviet Union utilized its military to gain control over Eastern Europe, and the European countries resented Russia's presence. Thus, Russia must rely on its large internal market. Moreover, Russia is blessed with an abundance of 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 and $150 per barrel. Thus, the Russian Federation experiences large swings in petroleum revenue. Second, the Russian government struggles to enforce its laws. Organized crime quickly spread throughout the country. The mafia then 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, the Russian government passed a flat tax of 13% in 2001. A 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 fail to comply with all applicable rules and regulations. Thus, the Russian economy appears deregulated because the government lacks the resources to enforce its rules and regulations. Finally, the banks controlling Russia's large industry indirectly formed a Japanese Keiretsu. A ***Keiretsu*** is a group of corporations that merge into a single entity, with one member typically being a bank. A bank provides financial oversight and grants low-interest loans to businesses within its group. Consequently, Russia's economic reforms took root as the poverty rate fell. The poverty rate was 16% in 2007.

Russia's miraculous growth may not last. The last two Presidents, Vladimir Putin and Dmitry Medvedev, are strong leaders steering the state towards a more government-controlled system. If investors fear the state will re-nationalize their private property, they halt investing in Russia. Why would an investor invest in a society where a government may seize all our assets? Furthermore, after the 2008 financial crisis, investors feared that Russian banks might collapse, and Russia experienced large capital outflows. President Medvedev bailed out the banks, slowing the capital outflow and temporarily restoring investor trust. In 2022, Russia invaded Ukraine, which increased Russia's isolation from the world, disrupted agricultural and mineral markets, and sparked a refugee crisis as people fled the war zone.

China's Successful Blend of Communism and Markets

Chinese leader Mao Zedong (1893-1976) adopted the Stalinist model after the 1949 revolution. The 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 that of the Soviet Union. However, the Soviet model was not successful. Peasants became hostile to bureaucracies and centralization. People also preferred traditional family units rather than communal farms.

The Chinese leader Deng Xiaoping gradually opened the Chinese economy to free markets and capitalism during the 1970s, using Singapore as a model for economic growth. Although the

Communists still controlled the government, they successfully integrated elements of communism and free markets. China's real GDP grew at a rate of 9% per year before the 2008 Financial Crisis. Following the financial crisis, China has continued to experience phenomenal growth. Its mercantilistic policy fuels its strong economic growth. China devalues its currency, expands exports, and restricts imports. Their exports and substantial foreign investment enable China to export a wide range of manufactured products, including computers, textiles, heavy machinery, and industrial equipment. Ultimately, the trade surplus enabled China to accumulate approximately $2.2 trillion in foreign currencies and gold by 2009.

The government initiated the reforms in the 1970s, allowing peasants to sell their surplus food in free markets. Consequently, farmers experienced a dramatic increase in agricultural production as these reforms took hold. Agricultural reforms created a free food market, helping producers become more efficient and alleviating rural poverty. Consumers benefited from the greater quantity of food and lower prices. The national government then 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 the World Bank's estimates, China attracts approximately $80 billion in foreign investment each year. This openness policy gives China access to new technology, and Chinese leaders revised their slogan to "To be rich is glorious." Of course, Marx would strongly disapprove of this.

China continued with market reforms and legalized private businesses. Initially, the government privatized small firms. By the mid-1980s, the government had privatized large-scale firms with thousands of employees. Nevertheless, the Chinese government continues to operate and financially support state-run companies that are inefficient and outdated - estimates of state ownership range from 33 to 70% of all businesses. Furthermore, the government still owns the critical vital industries, such as energy and heavy industries. However, this represents a significant improvement, as privately owned businesses comprised only 1% of the economy in 1978. Finally, the Chinese government oscillates between cycles of relaxation and control over private markets and enterprises. The Chinese government tries to control private enterprises 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 Athens, Greece. A port opens a backdoor for China to export its products to Europe. Unfortunately, China faces two challenges that could hinder its growth and prevent it from becoming a global leader. First, China lacks sufficient resources to sustain this strong growth for future generations. 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, China's policy of one child per family will return to haunt them. Within several decades, China's population is expected to comprise a significant proportion of elderly and retired individuals, alongside a relatively small working population.

Xi Jinping was elected General Secretary of the Chinese Communist Party in 2012 and became President of China in 2013. President Xi's style was to use the Communist Party to direct economic growth. He also focuses on national security and directs China to be self-reliant in technology, as the West attempts to restrict China's access to technology. The Chinese economy

is also rocked by a real estate crisis as construction companies like Evergrande and Country Garden have defaulted on their debt and failed to finish large construction projects in 2022. The real estate bubble may have resulted from Chinese families buying multiple properties to build wealth. The Chinese slogan is that owning property confers stability, success, and social status.

Key Terms

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

Chapter Questions

1. The 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 deregulation successful?

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

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

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

5. The Republic of Kazakhstan quickly transitioned to a market economy by privatizing state-owned property. However, Kazakh citizens had no money or wealth. Which method should the government use to privatize the state's assets?

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

7. Eastern Europe depended on imports 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 the problems a country would experience if it undergoes cycles of state control and free market.

10. The Theory of Free Trade

Many countries, such as the United States, have experienced the rapid growth of free trade. In 2024, the U.S. exported $3.192 trillion of goods and services and imported $4.11 trillion. Although the United States has the largest exports and imports in the world in absolute terms, free trade accounts for a relatively 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 produced within a country over the course of one year. Comparing exports and imports to the size of the economy, U.S. exports comprised 10.77% of GDP, while imports were 13.87% of GDP. Critics argue that free trade harms the United States, while others contend that it becomes a source of wealth and economic growth. We explain the economics of free trade in this chapter, while Chapter 11 explains 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 various trade agreements with other nations. A ***trade agreement*** is an agreement between two or more countries that involves the negotiation of free trade. One of the most important international institutions was the ***General Agreement on Tariffs and Trade (GATT)***, which 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, the GATT eliminated import quotas and encouraged countries to agree on intellectual property rights, including patents, trademarks, and copyrights. The ***World Trade Organization (WTO)*** assumed its current role in 1995 and currently comprises 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. The United States lost several cases at the WTO. For example, the 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. The WTO compelled Mexico to open its sugar markets to international trade. Thus, U.S. firms can sell high-fructose corn syrup to Mexico.

Another factor encouraging trade growth is the decrease in transportation costs. ***Transportation cost*** refers to the expenses incurred by firms and suppliers when transporting products and services to the market, a form of transaction cost. With lower transportation costs, suppliers can ship products and services to any country at a lower cost. Moreover, companies have designed large barges and airplanes to carry massive amounts of cargo and have utilized high technology, such as Global Positioning Systems (GPS), to avoid storms and other maritime problems.

Communication technology has driven down costs and lowered transaction costs. Companies, people, and governments communicate and conduct transactions worldwide using telephones,

email, and computers. Some state governments and corporations in the United States have moved their information hotlines to India and the Philippines to reduce costs.

Multinational corporations and international banks have expanded their businesses globally. 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 the changing legal systems of various countries. 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 facilitate the transfer of money. Thus, global corporations and banks go hand in hand. One produces goods and services, while the other moves the money.

Table 1. Multinational corporations

Country	Corporation
Germany	Bayer Corporation, BMW, and Mercedes
Japan	Honda, Nissan, Sony, and Toyota
Netherlands	Unilever
South Korea	Hyundai, LG, and Samsung
United States	Coca-Cola, Chrysler, Ford, General Motors, and Pepsi
Switzerland	Nestle

The Production Possibilities Curve

A ***Production Possibilities Curve (PPC)*** graph illustrates the quantity of 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 critical assumptions:

Assumption 1: Countries only produce two products. Otherwise, we could not graph it. Given the limited resources, Figure 1 illustrates the maximum amount of bread and milk a country can produce.

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 another definition in this book, which relates 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 Walmart; Ted Turner, who owned WTBS, CNN, and TNT and bought the Atlanta Braves; and William “Bill” Gates III, who founded Microsoft.

Assumption 3: Society has no technological progress, which we will relax 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 represents the opportunity cost of moving from Point A to Point B. The ***opportunity cost*** refers to the value of the second-best alternative that is given up. Since society produces 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 know the prices of bread and milk.

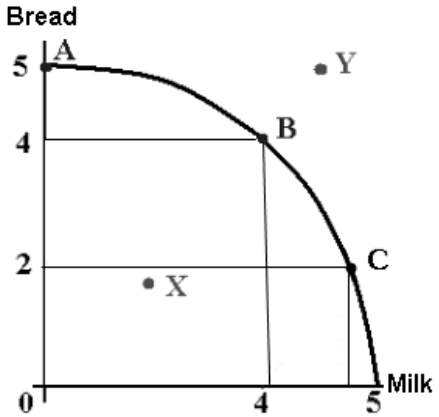


Figure 1. The PPC shows the economy's production of bread and milk

Figure 1 has two points. If this economy produces within the interior at Point X, then society does not use its resources efficiently. For example, during a recession, society does not utilize all its resources because 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 reach Point Y, but this economy lacks sufficient resources to sustain such a high 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 each other. For example, a PPC shows the production of vegetables and houses in Figure 2. Farmers grow vegetables on their farms, while developers build houses on the land. Thus, both products require land as a resource. The PPC is a straight line if the land is perfectly transferable between farms and houses. However, land quality varies, causing a curved PPC. If society were to produce at the midpoint, where both PPCs intersect, farmers would use the best land for farming, while builders would use the best land to build houses. As we move away from the midpoint, society's productivity declines due to deteriorating land quality. Some land is better suited for farms, while others are more suitable for houses. Hence, the largest losses occur if that society produces all the vegetables or all the 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 into the soft, damp soil.

The Production Possibilities Curve can shift outward, which we refer to as ***economic growth***, as 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 refer to investment in education as ***human capital***. Consequently, better-educated workers are more productive because they possess technical and computer skills. They can produce more when they use the same level of resources. Third, this society experiences technological progress. Inventors and entrepreneurs create new products and services, as well as better manufacturing techniques. Workers use technology to produce more products and services using the same resource level. Fourth, a government within a society improves its legal system. The government defines better property rights, introduces patents, or passes laws that allow private commerce or corporations to form. Corporations garner significant financial capital that enables investment in mass production, as mass production requires a substantial amount of machines and equipment. Finally, a society changes its workweek. If employees raise their working hours, they produce more goods and services.

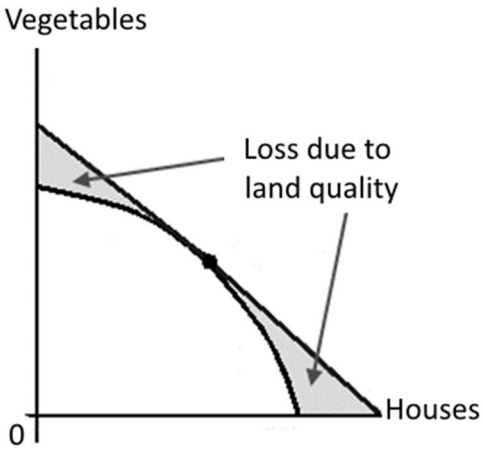


Figure 2. Straight and curved line PPCs.

The 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 its institutions. Furthermore, a government can develop a poor legal system. It imposes excessive taxes and complex regulations or has created powerful, overbearing bureaucracies that hinder business activity or raise business costs. Unfortunately, private enterprises struggle to survive, and society begins to stagnate.

Figure 3 illustrates the investments of the United States and China in machines and equipment. Both societies produce pizza and machines and have the same PPCs for 2024. In 2024, the United States produced more pizza than machines, while China produced more machines than pizza. The U.S. "parties" more on pizza while China invests in its future. In 2025, both economies grew because they made more machines (i.e., capital) and shifted their PPCs outward. However, China

produces more machines. Therefore, its PPC shifts more than the U.S. PPC. Consequently, China experiences greater economic growth.

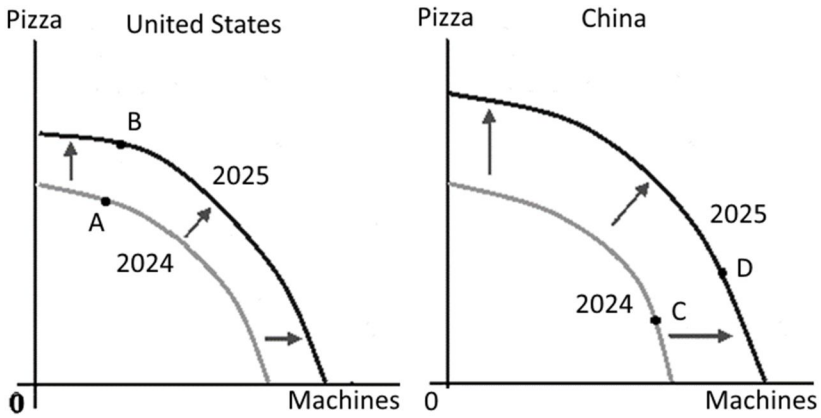


Figure 3. PPCs for the United States and China

Economics of Free Trade

Adam Smith, the father of economics, developed the concept of ***Absolute Advantage***. Countries can gain economically from international trade through absolute advantage when they specialize in producing goods or services. It becomes a low-cost producer and trades with other countries for other products. Specialization enables producers to increase production levels and reduce costs. Then countries can engage in trade to share the increased production.

David Ricardo, a British political economist, expanded on the concept of Absolute Advantage, which he referred to as the Law of Comparative Advantage. Comparative Advantage shows how two countries can benefit from trade, even if one country is significantly larger and produces a broader range of goods. The ***Law of Comparative Advantage*** states that each country specializes in producing goods with a relative advantage and trades with other countries for products that it cannot grow as efficiently. Relative advantage refers to a relative cost advantage or relative opportunity cost. Relative advantage does not mean the country is the cheapest producer. For example, a country can produce all products at the cheapest price but still gain from free trade. That country produces products where it has a relative advantage, allowing other countries to specialize in their relative advantage. Then the countries engage in free trade, thereby expanding global production.

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

We begin the analysis with Mexico and the United States not engaging in free trade. The 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 vehicles. Both countries produce 55 tomatoes and 65 cars.

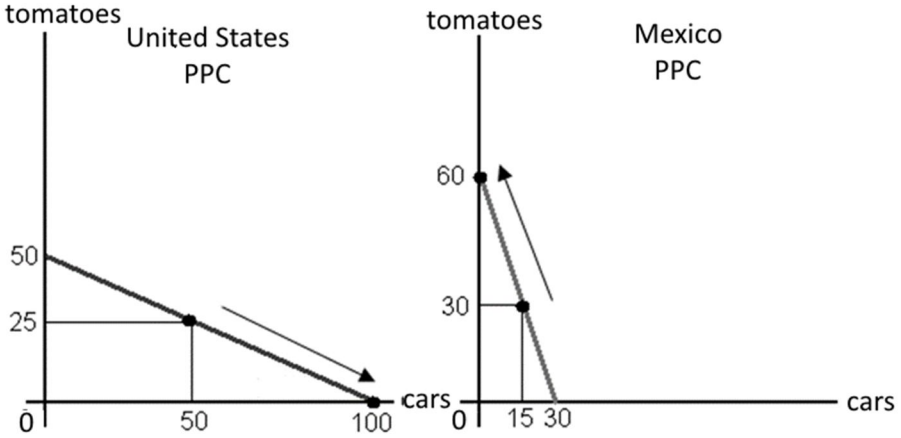


Figure 4. The Production Possibilities Curves for both the United States and Mexico

Mexico and the United States engage in free trade. ***Free trade*** occurs when a country imports or exports goods and services without any government restrictions or tariffs. Thus, these countries specialize in production, which gives them a comparative advantage. Slopes of the PPCs reflect the opportunity costs. To produce one more car, the United States must give up 0.5 tomatoes. For Mexico to produce one more car, it must give up two tomatoes. Consequently, Mexico has a higher opportunity cost for producing cars, while the United States has a greater opportunity cost for growing tomatoes. Thus, the United States will make all cars while Mexico will produce all tomatoes.

One characteristic of straight-line PPCs is that countries specialize entirely in producing one of the goods. If the PPCs were curved, countries would still specialize but still make a mix of both products. Consequently, both countries manufacture 100 cars and 60 tomatoes, shown in Figure 4. Both countries gain 35 vehicles and five 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 because we did not include a society's preferences in the analysis. A society's preferences could 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 that large countries engage in trade and can, in turn, 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. The 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. The excess

demand function must equal or exceed zero, which we show in the international market, indicating a country's import demand.

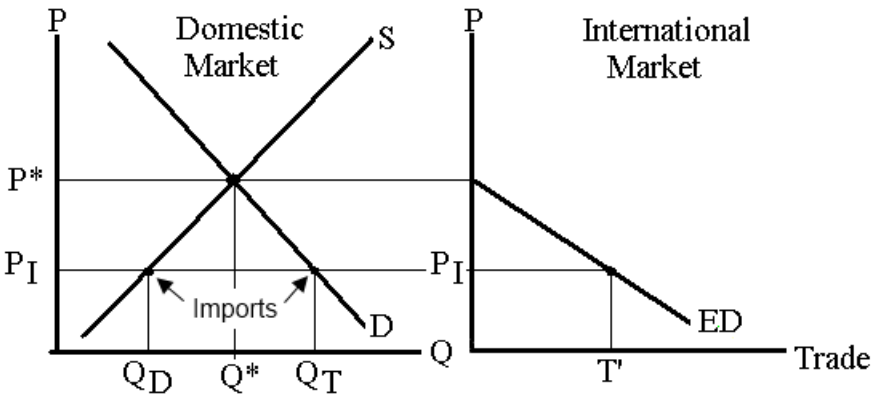


Figure 5. A country imports from the international market

The international market determines the market price for the domestic country. For example, domestic consumers pay a lower price, P_I, and consume Q_T. The 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, the contracting industry employs fewer workers. Consequently, domestic consumers pay for imports, resulting in 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, the market price and quantity are P* and Q*, and exports equal zero. Economists define an ***excess supply (ES) function*** to represent exports, which equals the domestic supply function minus the domestic demand function. The excess supply function must equal or exceed zero. We present an excess supply function for the international market, reflecting the global market's supply.

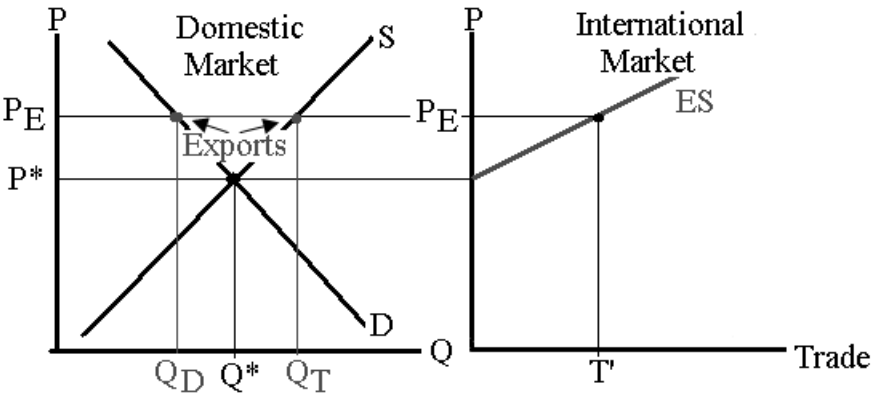


Figure 6. A country exports to the international market

The international market determines the domestic country's price. Domestic consumers pay higher prices for 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 and creates jobs as more money flows into a country from export sales.

We show the excess supply and demand functions for free trade between Kazakhstan and the United States in Figure 7. We show Kazakhstan on the right panel, while the United States is on the left. The international market is then sandwiched between the countries. Both countries produce petroleum, but Kazakhstan has a comparative advantage in this sector. The global market determines the price P*, where the excess supply and demand curves intersect, and Kazakhstan ships T petroleum units to the United States.

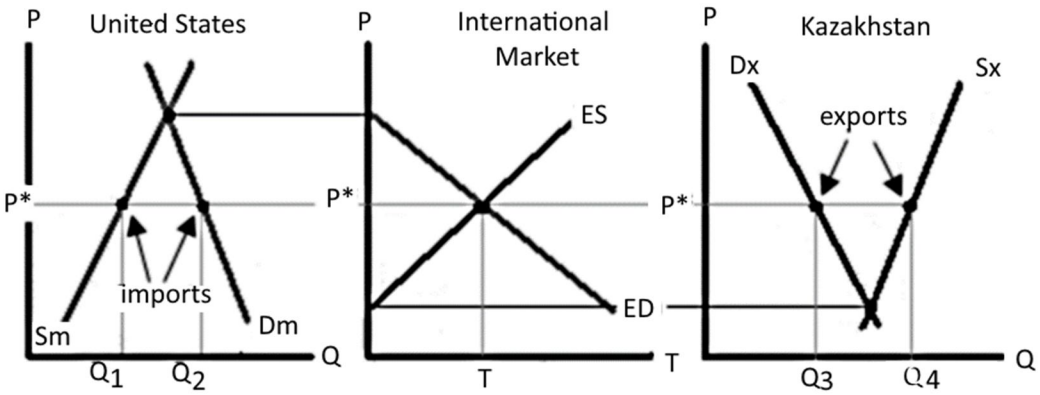


Figure 7. Free trade between Kazakhstan and United States

The domestic demand and supply functions for the United States are denoted as D_M and S_M, respectively. The 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 denoted by D_X and S_X, respectively. 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 Americans pay for the petroleum.

Economists can analyze and predict changes in international markets when a supply or demand function shifts. The factors that shifted supply and demand in Chapter 3 would also affect global markets. However, a change 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, while international travelers need foreign currency to pay for food, lodging, and entertainment in foreign countries. Lastly, international investors invest in foreign countries to achieve higher returns.

International investors employ a range of strategies for conducting business transactions. An investor uses ***hedging*** to invest in various currencies to reduce risk. Other investors include ***speculators***, who gamble on price changes. They buy currency at a low price and sell it at a high price. Ultimately, investors can utilize ***arbitrage*** to capitalize on the price discrepancies between two markets. Thus, they buy currency at a low price in one market and sell it at a high price in another. As arbitrageurs move commodities from one market to another, they drive the price difference between markets to zero.

The ***foreign exchange market*** is where individuals and businesses exchange one country's currency for another. The foreign exchange market is the largest, while banks facilitate currency transactions through electronic transfers that occur 24 hours a day, 7 days a week. The foreign exchange market has two markets. The retail market comprises a small market where agents buy and sell foreign currencies to consumers and tourists. The retail market has two exchange prices. The selling price (bid) must always exceed the buying (ask) price because the agents profit from the price spread. The large wholesale market has a network of about 2,000 banks and brokerage firms. They deal with each other and with large corporations. The wholesale market uses an international clearing system to exchange electronic deposits denominated in different currencies. An international clearing system is similar to a clearinghouse for checks.

We assume the government does not interfere in the exchange market, so supply and demand functions determine exchange rates. For example, one euro equals $1.30, or 1 € = $1.30. How much does a 1-liter bottle of Coca-Cola cost in dollars if it costs 1.35 euros? We multiply the euro price by the ratio ($1.3 / 1€), which equals $1.76. We show the calculation 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. We retain the currency units to ensure we have calculated the correct result.

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

The trade between Mexico and the U.S. illustrates an example of a demand function for foreign currency. The price for pesos is the exchange rate of dollars per peso. The currency price is always in the denominator of the currency exchange rate because a price decrease represents currency depreciation, while a price increase represents currency appreciation. A ***depreciation*** causes a currency's value to become lower, while a currency ***appreciation*** is a currency that increases in value. Furthermore, the demand for pesos originates from U.S. consumers who want to import goods and services from Mexican companies. Thus, U.S. consumers need pesos to purchase goods from Mexico. As U.S. consumers convert dollars to pesos, the demand for pesos simultaneously creates a supply of dollars on the 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, U.S. goods became more expensive while Mexican goods became cheaper. Americans buy more Mexican

imports, while Americans sell fewer exports. U.S. exports and imports would show the opposite pattern.

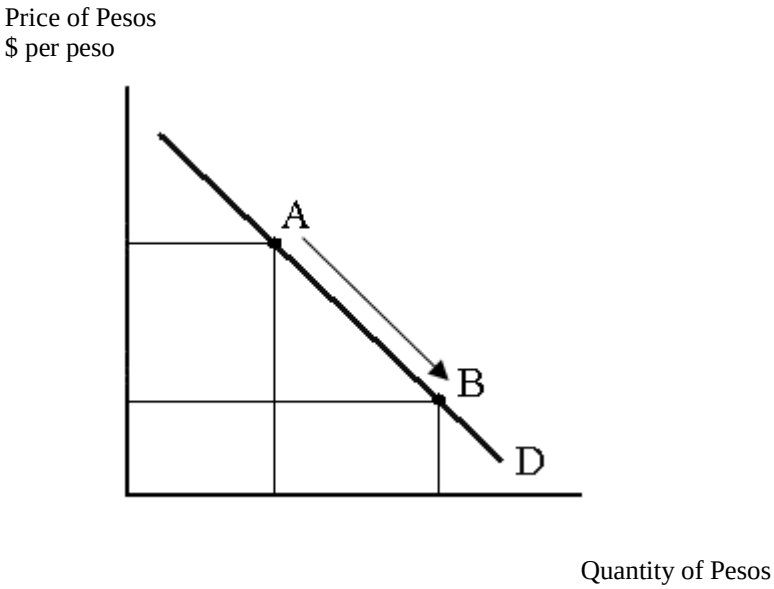


Figure 8. The demand function for the peso

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, as appreciation and depreciation are relative terms that compare the value of two currencies.

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

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

U.S. firms sell products and services to Mexican consumers, which are U.S. exports. Consequently, the peso supply function originates from 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. dollars, creating a supply of pesos on the exchange market. Thus, a demand for currency in one market automatically creates a currency supply in another market.

Figure 9 shows a supply function for pesos. The movement from Point A to Point B raises the peso exchange rate. The peso appreciated while the U.S. dollar depreciated. Consequently, U.S. goods became cheaper while Mexican goods became 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. The equilibrium exchange rate is P*, while the equilibrium quantity is Q*. Americans increased their demand for Mexican

products, ceteris paribus, and the demand for pesos shifted to the right. Thus, the dollar depreciates while the peso appreciates. U.S. products become cheaper for Mexicans. Meanwhile, U.S. exports rise while U.S. imports fall. The exact opposite occurs with Mexican-made products; Mexican exports drop while imports rise.

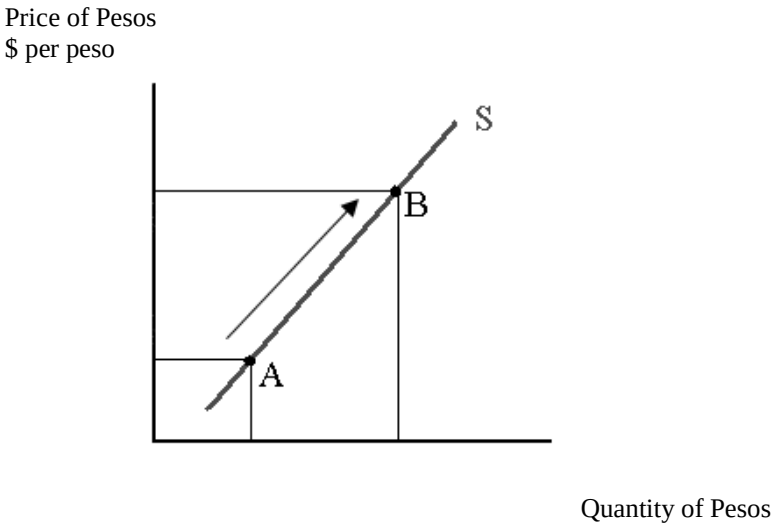


Figure 9. The supply function for peso currency

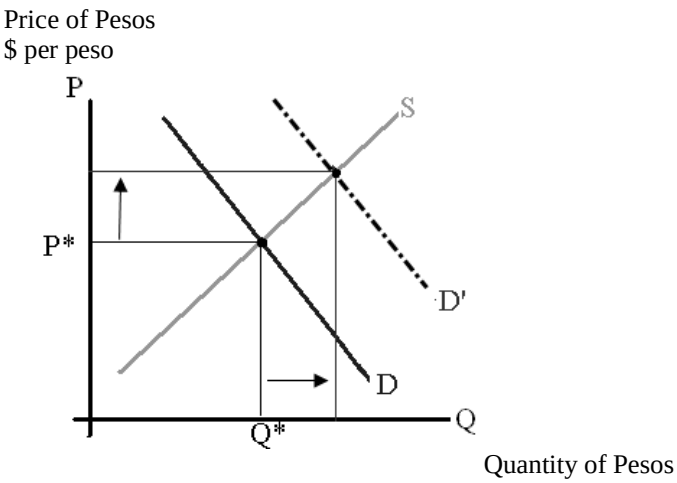


Figure 10. The demand increases for currency

Changes in exchange rates alter the prices of all goods, services, and assets that people and businesses trade on the international markets. Furthermore, analysts use appreciation and depreciation to compare the value of two currencies. If one currency appreciates, the other 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 dollar's value 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 key factors include interest rates, inflation, income, and the actions of central banks. For instance, interest rates affect a country's investment and financial capital inflows and outflows, while inflation affects a country's prices and, hence, its trade flows. Inflation is a continual increase in prices. Moreover, a growing economy creates higher incomes, and consumers increase their demands for everyday goods, which are the most goods produced in a society. Finally, central banks influence exchange rates by buying and selling currencies, as well as adjusting the money supply.

The real interest rate has an impact on exchange rates. The real interest rate is calculated by subtracting a country's inflation rate from its nominal interest rate. For example, we present the tenge exchange market in Figure 11, where the original market price and quantity are denoted as P* and Q*. Kazakhstan has a higher real interest rate than the U.S., prompting U.S. investors to invest more in Kazakhstan to earn a higher interest rate. Consequently, the demand for the tenge increases and shifts to the right.

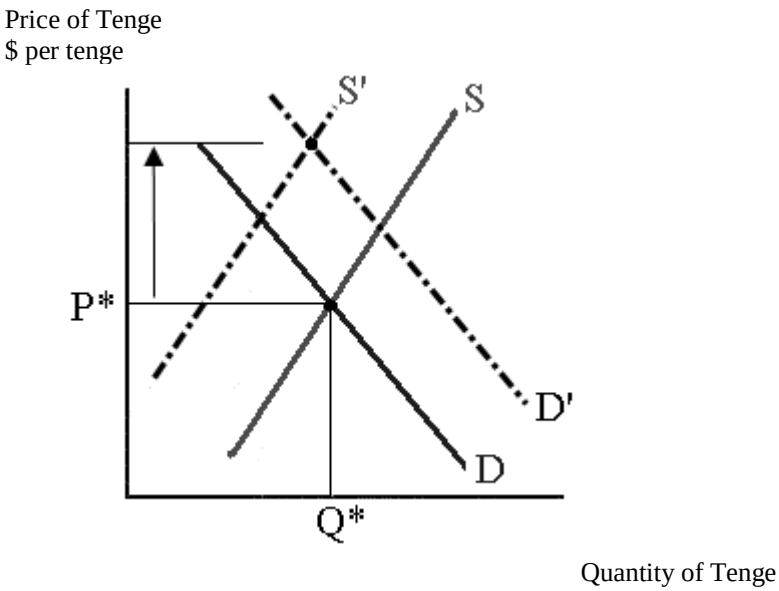


Figure 11. The impact of higher interest rates on the tenge exchange market

Kazakh citizens invest more within their country. They decrease their demand for U.S. dollars, which reduce their demand for tenge. They keep their currency stable by investing in it. When supply and demand shift, the market quantity or price becomes indeterminate. In this case, the

market price increases while the amount is indeterminate. Thus, the U.S. dollar depreciates while the tenge appreciates.

We can determine what happens in a market as both supply and demand functions shift. We shift the first function and then adjust the second function until either the price or quantity returns to the original point. Thus, we know which variable changes and which becomes indeterminate. Indeterminate variables will stay at the original price or quantity while the other increases or decreases.

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, where the original market price and quantity are denoted as P* and Q*. The higher inflation rate causes Mexican goods to become expensive while U.S. goods become cheaper. Therefore, Mexicans increase their demand for U.S. goods, increasing the demand for dollars. Consequently, the U.S. citizens bought more U.S.-made goods, decreasing their demand for Mexican goods. Hence, the supply of U.S. dollars decreases and shifts to the left from the lower peso demand. The U.S. dollar appreciates while the peso depreciates. In this case, the equilibrium quantity for dollars is indeterminate. Thus, countries with relatively higher inflation rates tend to possess depreciating currencies.

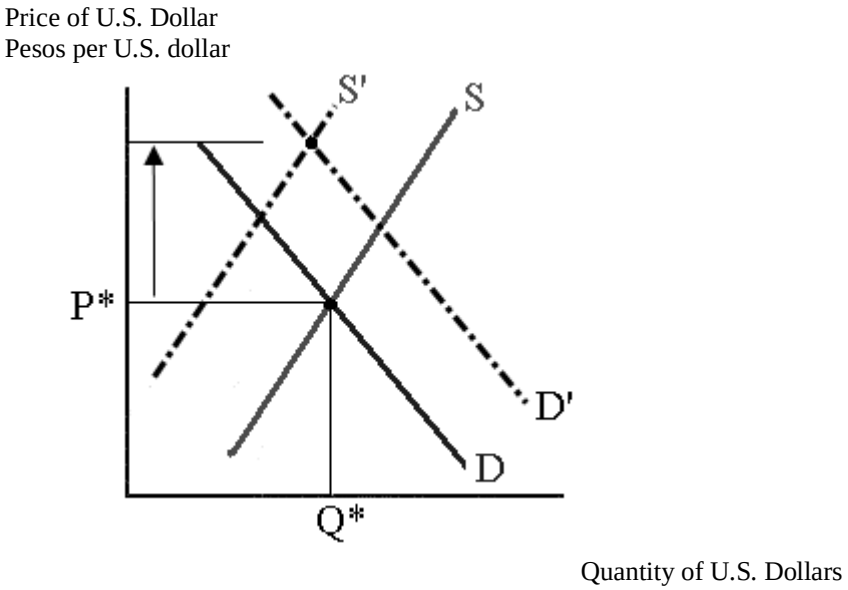


Figure 12. Inflation's impact on the U.S. dollar exchange market

A central bank can increase or decrease the supply of its currency in foreign exchange markets. For example, we illustrate a U.S. dollar exchange market in Figure 13, where the market price is P* and the market quantity is Q*. The Federal Reserve System, the U.S. central bank, increases the U.S. dollars on the international market. The Federal Reserve buys foreign currencies using U.S. dollars. Consequently, the supply function rises and shifts to the right. The market price falls.

Hence, the U.S. dollar depreciates while the euro appreciates. Thus, central banks increasing their money supply can create both inflation and a depreciating currency.

A central bank intervenes in a country's exchange rates, which affects international investment and the country's trade balance. 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 it using a foreign currency. Thus, a central bank's stockpile of foreign currencies decreases, leading to increased imports and reduced exports. If a central bank plans to depreciate its currency, it buys foreign currencies using its currency. Hence, a central bank accumulates foreign currencies, which boosts exports and reduces imports.

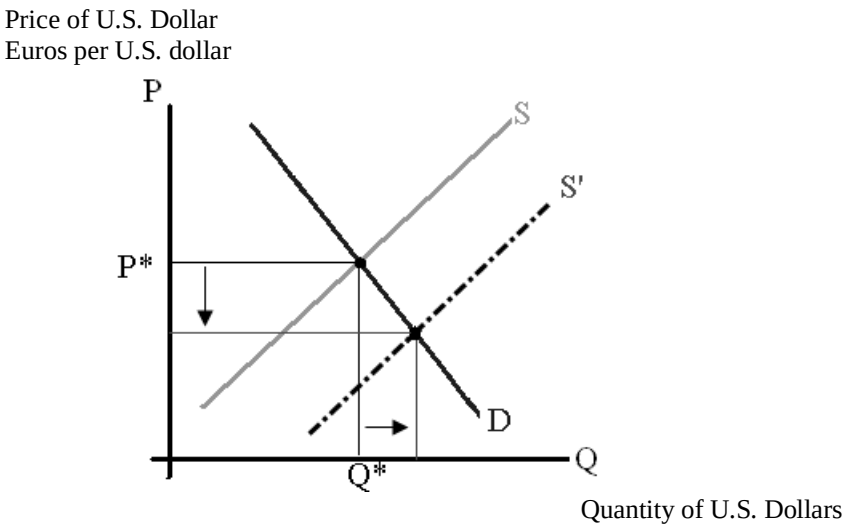


Figure 13. The Federal Reserve increases the supply of dollars on the exchange market

Supply and demand analysis is not precise in some cases. For example, incomes in Mexico grow faster than 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 devalues its currency, counteracting the gain from higher incomes.

In the real world, many factors influence exchange rates. A country can impose trade barriers, such as 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. Ultimately, investors' expectations and uncertainty have a significant impact 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. An excellent example of trade uncertainty is the President Trump's tariff war in 2025, when he tried to pressure countries into trade negotiations or face high tariffs for their products. The

countries resisted this pressure tactic generating large uncertainty that disrupted international supply chains.

The Asian Tigers

Heavily regulated and highly taxed economies tend to grow slowly, while countries with free and competitive markets tend to grow quickly. A totalitarian state can sometimes develop rapidly, but the high growth rate is temporary. For example, the Soviet Union grew during the 1960s by expanding and adding cities and factories. However, the Soviet economy was stagnating during the 1980s. Subsequently, Venezuela experienced rapid growth under the leadership of Hugo Chávez, as the country exports petroleum and is a member of the Organization of the Petroleum Exporting Countries (OPEC). President Chavez used the petroleum revenue to finance his socialist society. Currently, Venezuela is experiencing high inflation, food and product shortages, and a humanitarian crisis.

Asian Tigers, on the other hand, have free competitive markets, are business-oriented, and grow incredibly fast. Their real gross domestic product (GDP) has increased by roughly 10% annually 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); therefore, they require 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*** occurs in wealthy countries that attract foreign investment, which in turn appreciates their currency. Appreciating currency increases a country's imports by making them cheaper and reduces exports by making them more expensive. Thus, manufactured products from resource-abundant countries are at a competitive disadvantage internationally. Second, resource-rich countries could suffer from a ***resource curse***. A country with extensive mineral and petroleum wealth tends to suffer from increased corruption, greater income inequality, higher poverty rates, and an authoritarian government (Tax Justice Network, 2005). Political leaders are aware that their country possesses significant petroleum and mineral wealth, and they believe they will reap the benefits someday. 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 limited resources, such as the Asian Tigers, have few options, and their leaders open their economies to free markets because that is the only viable alternative.

Characteristic 2: Asian Tigers pursue export-oriented policies. Export-oriented policies are when a country opens its economy to international trade and has low trade protection. Typically, international trade accounts for a significant 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 & Thacker, 2005). International investors

avoid non-transparent countries because they risk losing their investments. Corruption plagues non-transparent governments, while the Asian Tigers have low levels of corruption.

Singapore and Hong Kong became ***entrepots***, countries that allow 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 ships them from Singapore to the United States. That way, one company does not ship products directly from India to the United States.

International investors can freely invest in the Asian Tigers, resulting in a significant 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 are closely linked (Frank, 1968). We present in Table 2 the investment rates for the Asian Tigers in 2011, where investment accounts for approximately 23% of their GDP.

Table 2. Economic Characteristics of the Asian Tigers in 2011

Country	Investment (% of GDP)	Budget Surplus (% of GDP)	Public Debt (% of GDP)	Taxes (% of GDP)
Hong Kong	22.9%	+3.5%	10.1%	22.9%
Singapore	23.4%	+0.3%	118.2%	14.8%
South Korea	25.5%	+2.2%	33.3%	23.0%
Taiwan	22.4%	-2.6%	34.9%	15.5%

Source: Central Intelligence Agency. 2012. The World Factbook. Available at https://www.cia.gov/library/publications/the-world-factbook/index.html (Accessed on 6/10/2012).

Characteristic 3: Asian Tigers have low price distortions. A ***price distortion*** prevents the market from determining the price. A government creates distortions by imposing taxes, subsidies, price controls, and regulations. A large controlling government creates significant price distortions by intervening 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 and have low volatility. However, the Asian Tigers experienced the 1997 Asian Financial Crisis, which led to a rapid depreciation of their currencies.

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 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, 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 at low, long-run average costs. We discussed economies of scale in Chapter 6. Moreover, export industries lead to spillover effects. A significant export industry uses energy and resources from domestic suppliers. Thus, the resource and energy industries quickly expanded to meet the demands of the export industry (Frank, 1968). Then their export industries can compete with those of companies and industries in developed countries (Lim, 1994; Gerring & Thacker, 2005).

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

Characteristic 8: Asian Tigers have small governments with budget surpluses, which they can use to pay their debts. We present the budget surpluses in Table 2 for the Asian Tigers in 2011; however, Taiwan is the only country with a budget deficit. A small government deficit or budget surplus creates four benefits. First, a low deficit means the 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 revenue source, which can lead to 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 indicate that the government is not financially strained and therefore does not need to raise taxes. Their economies grow rapidly, expanding the tax base, so the 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 typically have strong governments that manage their economic growth, and these countries are not democratic.

Characteristic 9: Asian Tigers have large trade surpluses. Consequently, more money flows into the countries than leaves. Thus, the Asian Tigers accumulate foreign currencies, primarily U.S. dollars and euros. The governments of the Asian Tigers use these foreign currencies to purchase machines and equipment, and invest in foreign countries by buying 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, enabling them to grow rapidly. Furthermore, the Asian Tigers experienced rapid industrialization. For example, South Korea's manufacturing sector accounted for 14% of its GDP in 1960 and grew rapidly to 30% by 1980. Taiwan's manufacturing sector accounted for 26% of its GDP in 1960 and rapidly expanded to 40% by 1993. During the same period, their agricultural sectors experienced a rapid contraction relative to their GDPs. The Asian Tigers employed mercantilism to achieve this remarkable 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, which in turn fuels growth. After the 2008 Financial Crisis, industrialized countries could no longer continue subsidizing the growth of the Asian Tigers.

Key Terms

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

Chapter Questions

1. Free trade has many supporters and critics. Has free trade benefited our 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 began expropriating land and buildings because people could not pay their property taxes, and it imposed complex rules and regulations that halted all land development.

6. Two countries, the United States and China, are major producers of computer chips and soybeans. China can produce either 100 computer chips or 50 bushels of soybeans, while the United States produces 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 halfway 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 costs and benefits of importing goods for a market.

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

10. The 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 would happen to the market if the 2008 financial crisis caused 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. The Federal Reserve reduces the U.S. interest rate to jumpstart the U.S. economy. What happens if the Fed pursues a low real interest rate in the U.S. dollar exchange market?

15. The United States suffered from the 2008 Financial Crisis and the Great Recession. The U.S. government has taken over bankrupt businesses, introduced business subsidies, and strengthened the U.S. dollar. The U.S. government aims to maintain a strong U.S. dollar to attract foreign investors to purchase U.S. government debt. By comparing U.S. policies to those of the Asian Tigers, evaluate the U.S. government's policies.

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 grow while others 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, the government also uses trade protection to protect consumers. Of course, the government wants free trade for its exports and devises means and methods to restrict its imports; that way, a nation benefits from trade at the expense of its trading partners.

Why Government Intervenes in Free Trade

The government has 11 reasons for interfering with free trade. The reasons include the following:

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 lead to the bankruptcy of inefficient industries, resulting in increased unemployment and reduced tax revenue. Thus, the 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, such as Japan, have limited energy resources and are vulnerable to disruptions.

4. A government protects its "Infant Industry."

A country's industry may be relatively new and cannot compete with foreign industries. Therefore, a government protects its industry, encouraging it to grow until it is large enough to compete. For example, the United States became independent from England in the 18th century. The newly formed U.S. government imposed trade restrictions to encourage the growth of U.S. industries. Most manufacturing was concentrated in Europe at the time, and England produced

products that were exported to the United States. Then England wanted the U.S. colonies to ship food and raw materials to England. This policy would create a trade deficit for the colonies because manufactured goods have a higher value than raw materials and food, resulting in a perpetual outflow of money from the colonies. We cover mercantilism in Chapter 12, where governments use trade to enhance their authority and power.

5. A government protects national health.

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

6. A government intervenes in its foreign exchange rate.

The government views its currency as either too strong or too weak. Consequently, it imposes trade restrictions to correct the currency problem. Typically, Asian countries devalue their currencies, which boosts their exports and reduces imports. Hence, a weak currency can strengthen export industries, creating jobs and wealth and leading to an inflow of foreign currencies.

The United States government pursues a strong dollar. A strong dollar encourages U.S. consumers to purchase inexpensive products from China, but it hurts U.S. export industries. Unfortunately, the United States has lost industries to China and other countries for 50 years. One reason for this policy is that the U.S. dollar became the international currency. Thus, global investors will not hold dollars if they believe dollars will become weaker. Furthermore, the U.S. government operates with a substantial federal debt, while sizable trade deficits persist in the U.S. economy. Investors either hold onto U.S. dollars or use them to buy U.S. government debt or purchase corporate stocks, bonds, and real estate in the United States.

7. A government corrects its balance-of-payment problem.

The 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 massive outflows. Hence, the government imposes trade restrictions to reduce the balance-of-payment problem.

The United States has large trade deficits, resulting in an outflow of U.S. dollars into international markets. Because the U.S. dollar is a strong, widely accepted currency, foreign governments, 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 about 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 weakens the dollar. According to reports, the U.S. government is allegedly

following a "controlled" devaluation. A weaker U.S. dollar increases U.S. exports and decreases imports, thus reducing the 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). The government can collect tariffs more easily than income taxes because it has better control over its ports and borders. Consequently, tariffs are more effective for countries with widespread income tax evasion.

9. A government prevents the export of high technology.

Some countries ban or restrict technology exports because they do not want other countries to use technology to develop military weapons or become future competitors. Moreover, a country's military invests in high technology because it provides the military with a tactical advantage over its adversaries. Thus, governments prevent the export of technology that could give newcomers a comparative advantage. For example, the U.S. government prohibited software exports, including internet browsers that utilized strong encryption technology in 2000. As another example, in 2023, the United States and developed countries attempted to prevent China from establishing a computer chip industry that would eventually compete with the West.

10. A government protects its domestic industries from unfair trade practices, such as dumping.

A government could accuse another country of dumping to protect its domestic industries. ***Dumping*** occurs when an exporting country sells its products at a price so low that its trade partners are unable to compete. Consequently, the domestic industries of the importing country go bankrupt and cease operations. 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.

The Law of Comparative Advantage states that a country specializes in producing goods and services that it can produce at a lower opportunity cost than other countries. Thus, by definition, the exporting country sells its products at a relatively lower price than the importing country. Nevertheless, if three conditions exist, an exporting country dumps products onto its trading partners. First, export industries benefit from economies of scale, resulting in lower costs per unit. Second, the exporting country sells its products to its citizens 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 go out of business.

11. A government protects or retaliates against the 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 to boost its export industries. Other countries may weaken their currencies to offset the initial action of the first country. Furthermore, the government could use trade protection to enhance or protect domestic industries. For example, the government could lie and incite a health risk or national security to restrict trade to protect domestic industries. Finally, a government can also use threats of trade protection as a bargaining chip to gain access to closed markets (Stein, 1984).

Economics of Trade Protection

The 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 tax imposed on each good imported. At the same time, a ***quota*** is a government-established maximum quantity that allows companies to import into the country. Lastly, an ***export subsidy*** is a government subsidy to boost its export industries.

We show free trade with a market price of P* and the amount imported, T, in Figure 1. Imports are the horizontal difference between the quantity demanded and the quantity supplied in the domestic market. The government imposes a tariff, causing a price difference of $P_T - P_I$ per unit imported. Domestic consumers pay higher prices, while P_t consumes less, and domestic producers expand their production. As domestic production grows, the industry employs more workers. However, tariffs cause 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. Tariffs in the international market are similar to a government tax on goods and services. Thus, the tariff reduces the social welfare of these two countries. We analyzed the economics of taxes in Chapter 4.

The government could impose an import quota and set the maximum imports at T_t, as shown in Figure 2. Have we noticed something familiar about the quota? It looks identical to a tariff. Consequently, an import quota, T_t, is equivalent to a tariff of $P_t - P_I$. The quota has the same economic impact on the market, but with one significant difference. The 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 raised the international price and lowered the producer's marginal cost. Typically, market competition drives profits to zero. However, economic rent is a special term that indicates an unfair advantage to producers because the market has an imperfection or government interference.

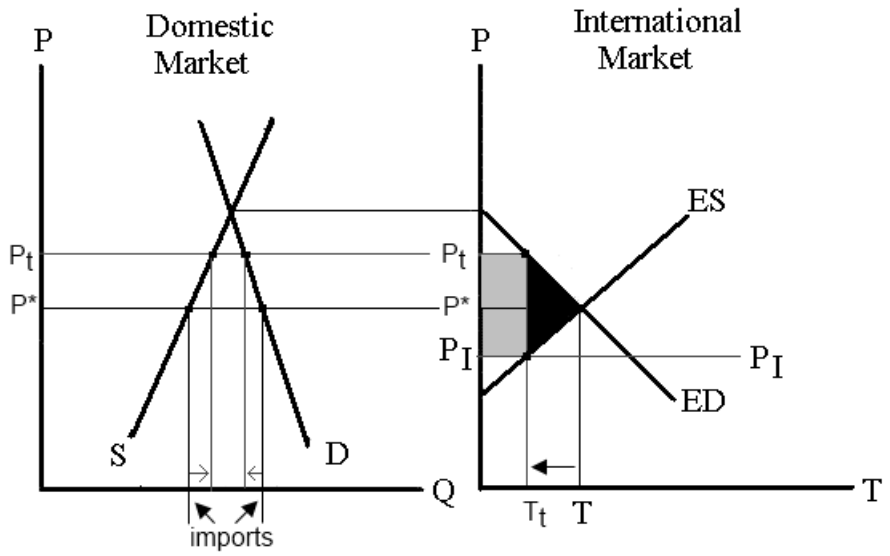


Figure 1. The government imposes a tariff on imports

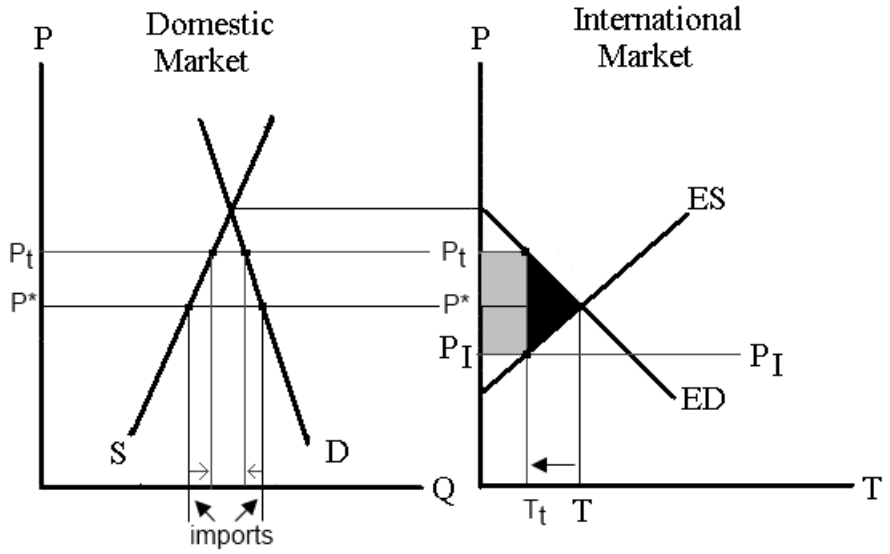


Figure 2. The government imposes a quota on imports

Producers can improve the quality of their imports by exporting to a country with import quotas. During the 1980s, the U.S. government pressured Japan to voluntarily impose export restraints on its manufacturers, specifically Honda, Nissan, and Toyota, as they were hurting the U.S. car companies. Consequently, Japanese producers earned the economic rent and exported high-quality cars. On the other hand, a government could set an import quota that exceeds the

amount a country imports or is greater than T in Figure 2. In this case, the quota would have no impact on the market.

The government can impose subsidies to boost its export industries: the United States and the European Union grant subsidies to agricultural producers. We show the economics of an export subsidy in Figure 3. The market price without the subsidy is P* with the country exporting T units. Exports are also the difference between the quantity supplied and the quantity demanded in the domestic market, which we labeled on the graph.

The government institutes an export subsidy, paying 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 lower prices and purchase more imports by paying P_I. Thus, the domestic industry expands, producing more output and employing more workers. The government subsidy is the lightly shaded area plus the black triangle. The black triangle represents the deadweight loss of the subsidy to society. The government must pay for a subsidy by taxing another market. Have we noticed that the subsidy for an international market differs from a regular market subsidy discussed in Chapter 4? Domestic consumers pay a lower price for regular subsidies, but a higher price if that country exports the product. It is the foreign consumers who buy at the lower price, P_I.

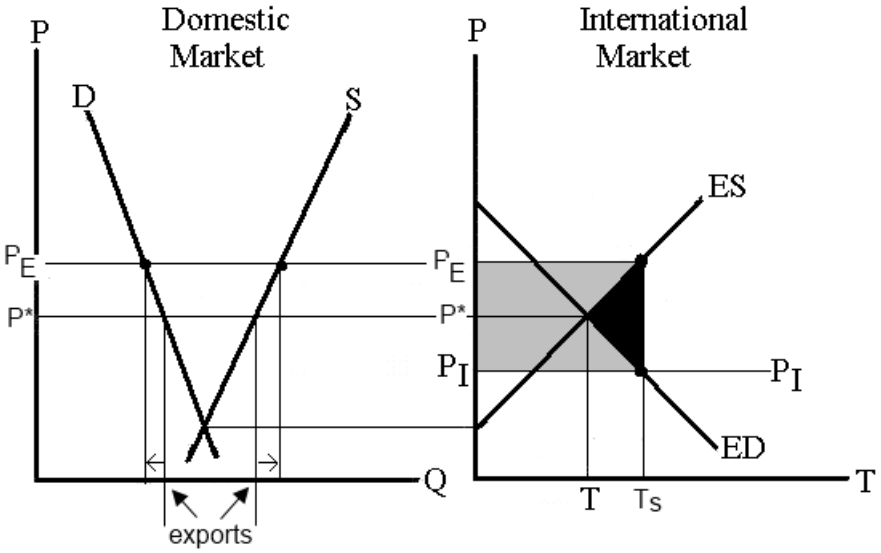


Figure 3. The government subsidizes its exports

Tariffs, quotas, and export subsidies are "***Beg-thy-neighbor***" policies. The 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 trade restrictions. Furthermore, a government may impose non-tariff barriers. The ***non-tariff barrier*** includes a government imposing licensing requirements or standards,

creating bureaucratic red tape. For instance, the 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 are unable to obtain the proper licenses to import foreign products and finance both the trade deficits and U.S. government debt.

Economists can expand this analysis to predict the market impacts of 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 include the following:

Trade Restriction 1: The government manipulates the exchange rate. A government could weaken its currency to expand exports and boost the export industries, or strengthen its currency to increase the consumers' purchasing power, boosting imports. China and the Asian tigers weaken their currencies to boost their exporting sectors, while the United States strengthens its currency to fuel imports.

Trade Restriction 2: The government imposes import subsidies and encourages its citizens to buy products manufactured outside the country. This strategy may not be common unless a country rapidly adopts technology to enhance and further develop its industries.

Trade Restriction 3: The government imposes an export tax. An export tax increases the prices of exported goods, leading to lower demand from foreign customers. The government typically uses an export tax to raise revenue, especially in countries with widespread tax evasion problems.

Trade Restriction 4: The government uses trade restrictions to reduce production in domestic industries, raising market prices and profits. For example, the government reduces agricultural production to help farmers receive higher prices and profits, and utilizes trade restrictions to maintain these higher prices.

Trade Blocs

Countries could create trade blocs. A ***trade bloc*** promotes internal free trade among member countries while maintaining trade barriers with non-member nations. This is a form of trade discrimination. Although trade blocs violate the GATT and WTO principles of nondiscrimination, the GATT and WTO have never sanctioned countries for creating trade blocs, unlike the United States and Europe, which have done so.

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

Type 1: A trade bloc is a free-trade area characterized by the lowest level of free-trade integration among member countries. A ***free-trade area*** is a group of countries that remove trade barriers among themselves but maintain their separate barriers for outsiders. For example, the North American Free Trade Agreement (NAFTA) established a free trade zone among Canada, Mexico, and the United States in 1993, reducing trade barriers among members and eliminating them in 2008. The goal is to expand trade, create more jobs, and generate wealth. However, each country maintains its own customs and trade barriers with the rest of the world.

NAFTA has many critics and supporters. Economists estimated that Mexico gains the most from NAFTA, followed by Canada. The United States supported NAFTA to prevent Japan from

heavily investing in Mexico. Consequently, NAFTA could reduce Japan's influence. Furthermore, NAFTA created positive benefits for Mexico. Before the 1980s, Mexico was a closed economy, similar to the Soviet Union, and then it experienced a financial crisis during the late 1980s and early 1990s. The previous presidents of Mexico opened Mexico to free markets and international trade, but the current president has increased government intervention and reversed some of the privatizations. Consequently, products and services from different countries can slip through Mexico and into the U.S., circumventing the U.S. trade barriers. NAFTA members also discussed the expansion of NAFTA to South American countries. In 2024, Donald Trump was elected president again of the United States and initiated a trade war with all U.S. trading partners, including Canada and Mexico.

Type 2: A ***customs union*** is a group of countries that removes trade barriers among themselves while erecting a common external tariff against outsiders. For example, Russia, Belarus, and Kazakhstan formed a customs union in 2010. Thus, these countries allowed free trade within the union but erected the same tariffs and import policies for all members. As 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. One example is the European Union (EU), comprising 27 countries. However, the EU strives for further integration because it has created a common currency, the euro, and public institutions that govern all its members. These institutions include the European Parliament, the European Court of Justice, and the European Central Bank.

In some cases, the EU has deregulated its 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 a member country that unifies its financial policies and becomes a single unit. All members share the same monetary, fiscal, and welfare policies, as well as a common currency. For example, the 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, it imports Q_C products from China for a market price of P_{China}. Have we noticed that the supply function is perfectly elastic, forming a horizontal line at the price, P_{China}? We did this to simplify the analysis. Consequently, the Chinese producers supply all consumers' demand at 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 imposed a tariff, reducing Chinese imports. The market price rises to P_{tariff} while the U.S. imports Q_t. Furthermore, the U.S. government collects tariff revenue, which creates a price wedge. U.S. consumers pay the tariff, while Chinese exporters receive the P_{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 the market quantity falls.

The United States entered a trade bloc with Mexico, and Mexico began exporting products to the United States with zero tariffs. The Mexican price, P_{Mexico}, is between the tariff and Chinese

prices. Consequently, a trade bloc increases the world's welfare by promoting trade rather than protection. The trade bloc causes the market price to fall to P_{Mexico} while consumers increase the quantity Q_M demanded. Consequently, a trade bloc creates trade diversion. ***Trade diversion*** occurs when a country shifts its trade 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? The answer is ambiguous in this case because the U.S. government loses tariff revenue, but U.S. consumers gain as they pay a lower market price and buy a greater volume of goods in trade.

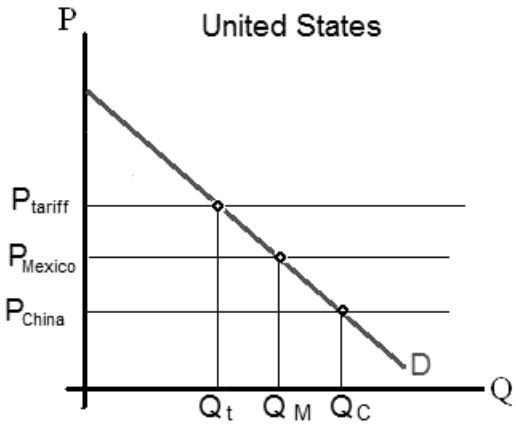


Figure 4. The economics of the United States creating a trade bloc

A trade bloc has the following three benefits:

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

Benefit 2: A trade bloc fosters competition and reduces market prices. Moreover, monopolies in individual countries compete with those of other 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 global trade and finance, as they must use a system to settle payments between countries. We refer to this system as the ***exchange rate regime***. In the last chapter, we explained 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 government's role in this context.

The gold standard was the first and oldest exchange rate regime, dating back to 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 when a central bank sets its currency's exchange rate to gold. Subsequently, the central bank agrees to convert its currency to gold on demand. For example, the United States, Japan, and Britain established the following exchange rates as in Equation 1.

If the U.S. central bank wants a money supply of $40 million, 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.

2,000 U.S. dollars = 1 ounce of gold (1)

200,000 Japanese yen = 1 ounce of gold

4,000 British pounds = 1 ounce of gold

The gold standard establishes a fixed exchange rate system, which economists refer to as a ***fixed exchange rate***. Consequently, one U.S. dollar equals 100 yen or 2 pounds. We calculate the exchange rates in Equation 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 ounce of gold = $2,000 = 200,000 yen = 4,000 pounds (2)

$$\frac{\$2{,}000}{2{,}000} = \frac{200{,}000\ yen}{2{,}000} = \frac{4{,}000\ pounds}{2{,}000}$$

$$\$1 = 100\ yen = 2\ pounds$$

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 flow from the United States and into Japan. On the other hand, Japan accumulates U.S. dollars, and the Japanese central bank exchanges them for gold with the U.S. central bank. Then gold began 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 adjusts the ratio between the gold the government holds and the currency in circulation. As the money supply declines, prices in the economy will decrease, which is referred to as ***deflation*** or negative inflation. Thus, U.S. products become cheaper than those of other countries. Then U.S. businesses export more goods abroad, while 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. The exact opposite would occur in Japan. Consequently, a gold standard automatically eliminates trade deficits and surpluses.

The gold standard provides the following three benefits:

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, it must buy gold. For example, the U.S. inflation rate averaged less than 1% 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 are stable. All exchange rates become fixed.

Benefit 3: The gold standard significantly constrains a government's power. For instance, central banks have limited power to influence the money supply, so they cannot implement policies that significantly impact their economies. Thus, gold goes hand in hand with free markets, strong property rights, and limited government; however, this benefit depends on the reader's viewpoint, as it could also be seen as a problem. The Federal Reserve granted $2 trillion in emergency loans to banks during the 2008 Financial Crisis and trillions more during the 2020 COVID-19 pandemic, which would have been impossible under a gold standard.

The gold standard has one flaw: it 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 in New Hampshire where the delegates met. The ***Bretton Woods System*** established fixed exchange rates among nations from 1945 to 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 one ounce of gold, as the nation held a significant portion of the world's gold supply. The United States accumulated gold from Europe as Europeans purchased U.S. military goods during World War I and World War II. However, the gold-dollar exchange rate was applied to foreign governments because U.S. citizens were prohibited from possessing 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 a form of payment. If a nation did not want to hold dollars, it could 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 use 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 Bretton Woods system established two key institutions: the International Bank for Reconstruction and Development, commonly referred to as the ***World Bank***, and the International Monetary Fund. The World Bank lends to developing countries to support large-scale development projects that enhance a country's infrastructure, including highways, bridges, power plants, and water supply systems. The World Bank lends to countries to help them eradicate HIV and AIDS, reduce poverty, and improve their education systems. The World Bank sells bonds in international markets to raise funds for its projects and solicit contributions from developed countries.

Countries established the ***International Monetary Fund (IMF)*** as a lender of the last resort. The IMF is similar to a central bank because a central bank can grant emergency loans to 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, it can subsequently ask the IMF for a loan.

During the early 1970s, the U.S. experienced a large government budget deficit and trade deficits, which could cause an outflow of gold. Consequently, President Nixon ended the Bretton Woods System in 1971 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 various controls for their country's currency. Governments specify the rules and limits on how people and businesses can exchange one currency for another. Furthermore, governments impose controls on imports, exports, and international investment. The government can prohibit foreigners from buying real estate, land, and financial assets. Lastly, a government establishes its currency exchange rates. We define the main currency controls and systems that governments use.

Free float, also known as ***clean float***, is a flexible exchange rate system that allows for a market-determined exchange rate. The government does not intervene in its currency exchange rates. Consequently, the supply and demand in the foreign exchange markets determine the exchange rates. Canada, the Eurozone, Japan, South Korea, and the United States allow their markets to determine exchange rates, but governments occasionally intervene to adjust them.

A ***managed float*** is when the government intervenes in the foreign exchange market to achieve its policy goals. If people are pessimistic about the government's ability to regulate a market, they refer to this as a ***dirty float***. The 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, they start selling it. Furthermore, investors can overwhelm a government, and subsequently, the government devalues its currency. Hence, investors' expectations become a self-fulfilling prophecy.

A ***pegged exchange rate*** occurs when a country fixes its currency to a fixed exchange rate against a strong currency, such as the U.S. dollar or the euro. For example, the United Arab Emirates defines its currency as 1 dirham = 0.272 USD. 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 term used to describe a country that uses the U.S. dollar or the euro as its official currency. Panama has used the U.S. dollar since 1904, Ecuador since 2000, and the U.S. territories of Guam, the Marshall Islands, the U.S. Virgin Islands, and Puerto Rico use the U.S. dollar. Although Montenegro and Kosovo are not members of the European Union, they use the euro as their currency. One benefit of dollarization is that the country integrates its economy with the United States or the Eurozone, which ties the inflation rate to that country and removes the exchange rate stability. Nevertheless, 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*** refers to the profit a government or central bank can generate by printing money. For example, the Federal Reserve pays 7.8 cents to print a $100 bill, creating $ 92.20 of value from thin air.

Fixed Exchange Rates

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

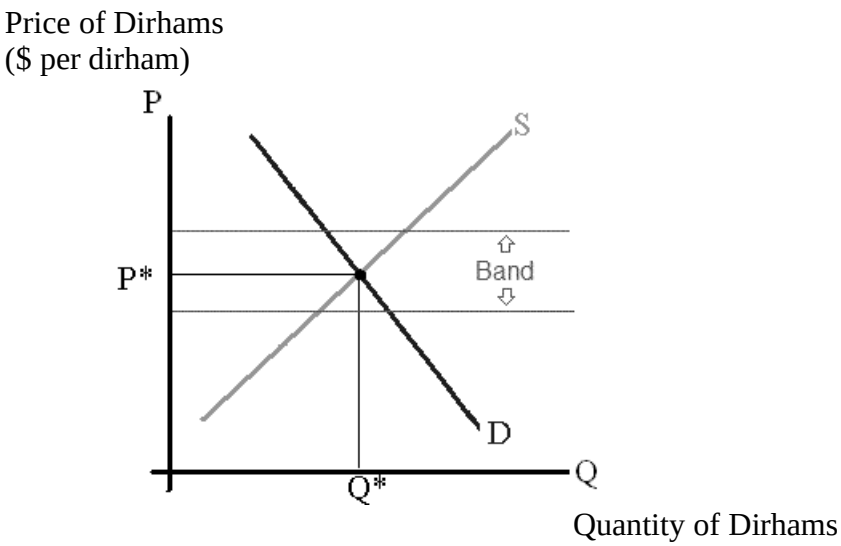


Figure 5. The currency exchange market for dirhams

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

Uzbekistan and many African countries peg their currencies' exchange rates to the U.S. dollar. Unfortunately, the government has established a stronger exchange rate than it can sustain, and it rarely allows the central bank to maintain a stable exchange rate. Consequently, two markets

emerged for exchange rates: the official government market and the black market. The black market reflects the actual market value of the currency. Black market participants always underprice the currency relative to the official rate. Then the government imposes numerous regulations and controls on its currency, preventing people and businesses from using the black market. For example, a government requires an official document to confirm that a company or person exchanged currency at the official government rate.

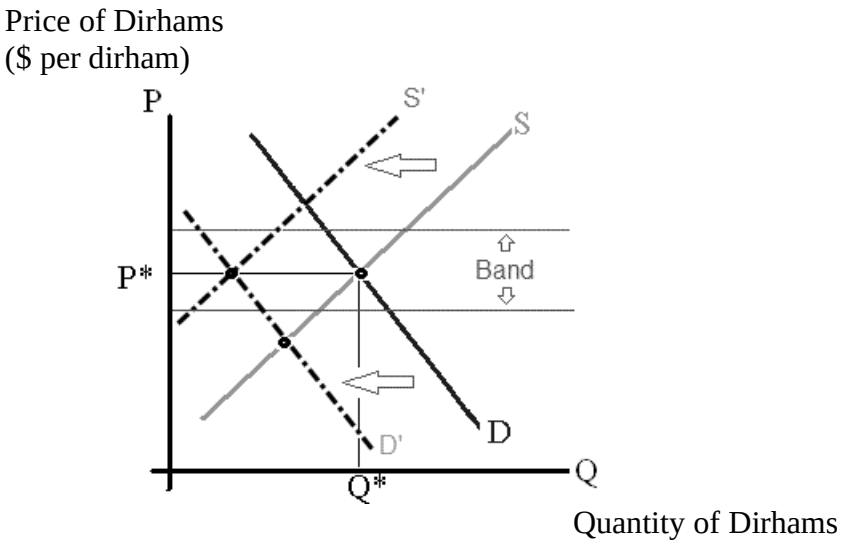


Figure 6. A central bank intervenes in the currency market

Currency controls cause legitimate companies to participate in the black market. For example, the Pepsi Corporation sold Pepsi in Burma. Unfortunately, the Burmese military controlled the government and pegged its exchange rate at a level higher than it could sustain. Consequently, the Burmese government imposed numerous regulatory controls over the banking system, prohibiting the export of hard currencies, such as U.S. dollars. The Pepsi Corporation circumvented these currency controls. As people bought Pepsi and paid in kyat, the Pepsi Corporation purchased agricultural products, such as mung beans. Then Pepsi exported these agricultural products to other countries and accepted U.S. dollars as payment. Nevertheless, this strategy could put the Pepsi Corporation at a disadvantage if agricultural prices start to decline. The 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).

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

A financial crisis can cause capital flight. ***Capital flight*** occurs when foreign investors become spooked and withdraw their investments from a country. Capital flight causes a massive outflow of currency, rapidly depreciating a country's currency. Investors believe they will lose

their investments, and they rapidly cash out. Capital flight is similar to a bank run, where all depositors appear at their bank to withdraw money from their accounts, but on a national scale. Unfortunately, capital flight causes problems for a government because it rapidly depreciates a country's currency. Furthermore, that country could enter a severe recession, which would lead to reduced economic growth and increased unemployment. For example, the Asian Financial Crisis started in Thailand in 1997. The Thai government was unable to maintain a fixed exchange rate for the baht, resulting in its devaluation. 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, which encouraged the rich to transfer their investments out of the country. Although the French government collected $2.6 billion annually, it lost over $125 billion in capital. Moreover, the Thai government devalued the baht, sparking the Asian Financial Crisis and harming 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 include the following:

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

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

- Investors can convert their currency into precious metals, including gold, silver, and platinum. Then they smuggle the metals out of the country.

- Investors can use money laundering to structure cash deposits into the banking system, thereby hiding their activities.

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

Besides, these activities may be illegal.

Key Terms

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

Chapter Questions

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

2. The Chinese economy is experiencing rapid growth, and its currency, the yuan, is appreciating. Identify the reason the Chinese government would use to weaken its currency.

3. The U.S. government threatened Japan with trade restrictions during the 1980s because Chrysler, Ford, and GM could not compete against Toyota and Honda. Japan 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 our community?

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

7. The European Union (EU) accepts new member countries and imposes specific conditions. The candidate country must peg the value of its currency relative to the euro. Identify the exchange rate regime the candidate country is using.

8. The Chinese government is expanding its exports to the United States. Which exchange rate regime does China use to weaken its currency relative to the U.S. dollar?

9. An Asian Tiger pegged its currency to a weaker value than the U.S. dollar. Can an Asian Tiger maintain a weak currency if its currency is always appreciating?

10. A country recently pegged its currency to a value greater 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 influential idea to emerge 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 sought to harness this wealth and power for the state, enabling them to finance large armies and navies. Then the nations could conquer and add colonies. Consequently, a government intervenes in its economy to accumulate wealth and power, thereby strengthening its authority. Although mercantilism is an old idea, Japan successfully employed mercantilist principles to rise from a war-torn country into the world's second-largest economy. In 2025, Japan fell to the fourth-largest economy.

Mercantilism

Classical economics views international trade as a positive-sum game. Thus, all participants will win if countries are allowed to specialize in products and services where they have the lowest opportunity costs. On the other hand, mercantilists view the world in a different light. 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 the war had destroyed Europe's factories. Hence, Europeans purchased manufactured products from the United States (Stein, 1984), significantly expanding the U.S. manufacturing economy during the 1950s and 1960s.

The original definition of ***mercantilism*** is that the state promotes exports and limits imports, creating a trade surplus. Thus, money travels in the opposite direction to the products and commodities, creating a money inflow into a country. Before the 20th century, money was primarily made of gold and silver. Of course, gold and silver were the primary sources of wealth that governments used to finance armies and navies. Consequently, the military becomes the source of power. The government can defend itself against other countries, conquer new territories, and establish additional colonies.

The 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. The government also uses gold and silver to expand its infrastructure. The government builds roads, ships, and ports. This infrastructure enables regions within a country to specialize, leading to the emergence of large-scale industries. Furthermore, navigation and shipping significantly improved during the Renaissance. Lastly, governments imposed trade protection to maintain their trade surplus, keeping the money flowing into the country.

Mercantilism has one significant drawback: it can lead to inflation. A large flow of money into a country causes the prices of all goods and products to rise. For example, the Spanish conquistadors discovered and stole gold from the Aztecs Indians in Mexico. Then Spain suffered from high inflation due to the large influx of gold, and as a result, it lost its global influence.

Who benefits from mercantilism? The government benefits first. In those days, the top government leaders were the monarchy, the kings and queens. The king used the gold to build a large and strong military, thereby enhancing his power. Then the king granted licenses and permission to the monopolies of manufacturing and export industries, and businesses paid the king for these rights. Furthermore, bureaucrats benefited because they became an integral part of the government machinery 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, thereby establishing a large customer base.

European countries fought numerous wars, so the king wanted a strong military. The weaker the nation, the weaker and more vulnerable it became. National security became a primary concern, and implementing security measures proved to be expensive. The government must generate revenue to fund 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 when 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 independent. However, society saw improvements in production technology and transportation, leading to the economy becoming more national. Production technology enables producers to manufacture products efficiently and transport them anywhere within a country or the world. Regions begin specializing in the production of goods and services. Furthermore, other trends occurred. Countries developed markets and fairs to distribute resources and products, and people began migrating to the cities, thereby enlarging them. Urbanization continues to occur today, and with the addition of communication technology, these arguments remain valid.

Britain became a powerful nation during the 19th century, as the British Empire expanded, invading countries worldwide and establishing colonies. Mercantilists needed these colonies for consumer markets because a nation overproduced manufactured goods, often exceeding its citizens' demand. Thus, countries turned to imperialism to support and sustain their industries. Colonists bought manufactured goods and shipped raw materials and food to their home countries. The manufactured goods are of high value, while agricultural products and raw materials are of low value. Again, a home country experiences a trade surplus while the colonies suffer from a persistent trade deficit, causing money to flow to the home country. Great Britain went to great lengths to protect its manufacturing industries. For example, the government forbade skilled labor from leaving the country and using their skills to develop manufacturing in other countries (Stein, 1984).

Germany and the United States were concerned about the rise of Britain's power. They also depended on Britain for trade. They exported agricultural products to Britain and purchased

British-manufactured goods. Nevertheless, Germany and the United States wanted to develop their industries and create an engine of wealth and power. An American, Alexander Hamilton (1755-1804), sought trade protection to foster U.S. industries. At this time, the United States was a relatively young country, having gained its independence in 1776. He advocated the ***infant industry argument***. U.S. industries were young and needed protection to thrive and grow. Consequently, the U.S. government imposed tariffs on imports. A ***tariff*** is a tax imposed by a government on imports. The tax does two things. First, the tax raises import prices in the market. Thus, U.S. citizens purchase fewer imports and buy more products locally. Second, the tariff generates revenue for the U.S. government. Finally, Hamilton also wanted to give subsidies to industries to help them grow larger, similar to a mother breastfeeding her child.

The infant industry argument is similar to the import substitution argument. ***Import substitution*** occurs when a government develops a domestic industry to manufacture products that replace those imported from abroad. Usually, import substitution fails because a government allows large monopolies to form while protecting them from international trade. The government sometimes owns industries, which can increase the likelihood of failure (Rodrik, 1996). Another problem is that these governments do not encourage exports. Exports are important for economic development because a country earns foreign currency from 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, as a government restricts imports while maintaining the same level of exports, thereby creating a trade surplus. Import substitution creates two benefits. First, businesses and governments have a low risk of establishing a brand-new business because the market already exists. They manufacture products that replace imports. Second, foreigners may invest in the country to avoid the trade barriers. Unfortunately, import substitution has six problems. First, the government has problems picking winners and losers. Second, the government could foster the growth of monopolies that restrict competition. If the country is small, a firm faces a tiny market and cannot achieve economies of scale in production. Third, the protected industry resists the government's efforts to remove the protection. Fourth, the 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 governments, businesses, and people can use to finance imports. Finally, many governments were unable to control their spending and resorted to borrowing to cover budget deficits. Consequently, Mexico and Latin American countries suffered a financial crisis in the late 1980s and early 1990s, while Turkey experienced a crisis in 2001.

Germany took mercantilism one step further. German Friedrich List (1789-1846) advocated that the state should promote education, technology, and industry. Education and industry complement each other because manufacturing industries require more mental abilities than agricultural industries. Thus, the state must promote education, which in turn promotes industry. Of course, we still have this argument today. Many countries encourage their citizens to pursue degrees in science, technology, engineering, and mathematics (STEM), laying the foundation for high-tech industries.

Hegemony

A nation can exert relational and/or structural power over other nations. ***Relational power*** occurs when one nation can compel another nation to act or refrain from acting. Many sports, such as football, soccer, or chess, are forms of relational power. The strength of a nation's military determines its relational power. On the other hand, ***structural power*** refers to a nation's ability to shape and influence international institutions. All countries, political institutions, businesses, and people operate under international institutions. Some nations possess the ability to influence international institutions and alter the rules in their favor, a form of structural power.

The United States has both forms of power, which it gained after World War II. The United States became a leader in technology and grew into the world's largest economy, possessing a strong military. Initially, the technology gave the United States a comparative advantage in product manufacturing, while its strong military allowed the U.S. to protect its global interests (Stein, 1984). Furthermore, the U.S. has structural power. It can influence the World Bank and the International Monetary Fund. Of course, the U.S. helped create these institutions; it pledged $4 billion to the World Bank in 2024 and $183 billion to the IMF.

Hegemony goes beyond relational and structural powers. A ***hegemony*** is a situation where one country dominates the international commerce of other countries. A hegemony rises when it becomes the wealthiest and most powerful nation, establishing the institutions for international trade. Hegemony becomes a source of wealth, power, and economic growth. The modern world has witnessed three modern hegemonies. The United Provinces (i.e., Holland) dominated international trade in the 18th century, Great Britain in 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, hegemony fosters free trade and ensures peace and security. It protects international trade from pirates and rogue nations, creates a system of international payments (i.e., the money system), and establishes international institutions. The 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 international public goods, including free riders, because the benefits outweigh the costs. When hegemony emerges, the world economy expands and thrives as countries engage in free trade. Markets create wealth for all participating nations. For example, the United States supports a system of free trade. After World War II, the U.S. was the most significant industrial producer while the European factories lay in ruins. Creating international trade greatly benefited the United States, as the country experienced strong world demand for products produced in its manufacturing industries during the 1950s and 1960s.

The hegemony's costs rise over time, weakening its 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. We can add an interesting twist to the concept of hegemony. A rich and powerful nation gains control after a large war. Over time, the hegemony declines while its

costs rise and harmonious relationships break down. Then a war follows as a new hegemony rises in the aftermath.

The United States has evolved into a selfish hegemony because the U.S. government has abused this system. The U.S. government relies on the U.S. dollar as the ***international reserve currency*** and 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 these dollars or 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 U.S. government debt. Again, they buy U.S. Treasury Securities, which are pieces of paper. These pieces of paper have value; however, some question whether the U.S. government can continue financing the dual deficits. If the U.S. dollar collapses, foreigners would hold worthless pieces of paper. Consequently, they would stop accepting U.S. dollars as payment, halting international trade. Other countries that accumulate debt do not have this financing ability. Consequently, a nation whose currency is used and accepted worldwide can borrow beyond its means. In 2025, the U.S. debt had climbed to $37 trillion, and investors started questioning whether the U.S. government could sustain this debt level.

Trade Sanctions

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

Trade sanctions are not effective for four reasons. First, third-party nations become the intermediaries, circumventing the trade sanctions. For example, the West sanctions Russia, but Russia finds new countries to sell its petroleum to, or a third country becomes an intermediary and sells Russian petroleum to the West. Second, food embargoes starve the people while the leaders rarely go hungry. If the starving people protest against the government, then the 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, a trade sanction further isolates it. Moreover, the government may become more xenophobic after the trade sanctions. Finally, a country may produce and export illicit products to generate revenue. The government then uses this currency to purchase military equipment, including 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 a free trade agreement with Mexico via the North American Free Trade Agreement (NAFTA), while Mexico has a free trade agreement with Cuba. Thus, Americans could eat Cuban sugar as traders transported it

through Mexico. Another example is the trade sanctions against Burma. The military controls the government in Burma and does not allow democratic elections. Trade sanctions have isolated Burma because countries do not trade or invest in the country. 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).

The last example is that President Trump initiated a tariff war with his trading partners in 2025, employing tariffs as a strategic tool. The President intended to negotiate favorable trade terms with its trading partners, but many countries refused to engage in negotiations. Unfortunately, the tariff war disrupted supply chains and generated much uncertainty. This tariff war may push the U.S. economy into a recession in 2025 or 2026. It is difficult to determine whether the tariff war contributed to a supply chain disruption, as the high inflation rate had already driven many consumer goods out of the market. Many Americans have reached their borrowing limit.

Industrial Espionage

Industrial espionage occurs when governments, businesses, and individuals gather secret intelligence, often for technological purposes. During the Cold War, the United States and the Soviet Union created vast spy networks and gathered intelligence. Hence, the spies helped improve military security and gathered information about hardware and technology. Following the collapse of the Soviet Union in 1991, nations and businesses began to engage in espionage to acquire information and technology.

Governments employ various methods to combat industrial espionage. China sends visiting students and professors to developed countries. Students obtain PhDs, while professors advance into 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 used computer espionage to fund a computer-hacking school in Frankfurt. The government uses hackers to break into the computer databases of other nations and businesses. Countries may plant listening devices in hotels and on flights of executives of large companies. Additionally, approximately 75% of commercial intelligence is available through computers, publications, and research journals. For example, the U.S. Patent Office posts patents online, allowing foreign spies and counterfeiters to access and potentially steal patents. Many countries, especially those in Asia, have weak or nonexistent patent laws, and their manufacturers often utilize the latest technologies without incurring the associated costs.

Many countries are part of the military-industrial complex. Countries use high technology to develop defense industries, which provides 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. The Internet has one feature. If a nuclear bomb destroys a city, the internet communication system still works, and 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 on foreign countries for critical resources and products. Thus, many countries produce 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 high-tech weapons. Thus, a nation figures out how the weapons work, expanding its defense industries to manufacture them on a large scale. Lastly, 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 until China overtook Japan in 2010. Japan's GDP grew phenomenally at a rate of 9% for many decades until the 1990s. In addition, 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. Thus, we attempt to explain the origins and sources of Japan's phenomenal growth.

Japan has an unusual characteristic that contributed significantly to its remarkable ascent to the top. Japanese can imitate, adapt, and assimilate ideas, institutions, and technologies from cultures they view as superior to their own and adjust 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, the German school system, and Prussia's national Constitution. Thus, Japan incorporated the best into its culture. Usually, culture can impose boundaries and prevent countries from adopting the finest practices in the world.

The United States government played a significant role in shaping the institutions of modern Japan. The U.S. government drafted Japan's current Constitution after World War II, which extended the Constitution to all men and women and granted civil rights to Japanese citizens. Furthermore, the United States prohibited Japan from maintaining a military presence, yet the United States stationed troops there. The military is a large item in a government's budget, and the Japanese have the resources to spend and invest in other areas. Moreover, the United States provided Japan with technology and opened its markets to Japanese products. However, Japan closed its markets to outsiders. The U.S. government looked the other way because it wanted to stop communism from spreading. The U.S. wanted a strong, capitalistic Asian country as an ally near the Soviet Union. Of course, Japan's mercantilist policy worked exceptionally well for Japan.

The Japanese have another unusual characteristic. They view the world as a hierarchy, perceiving countries, empires, races, classes, and companies as strong or weak. Initially, the Japanese viewed their nation as inferior to its powerful neighbors. An inferiority complex does not hinder progress if this complex motivates people to overcome and improve. However, as Japan rose to a dominant power, the Japanese became proud and viewed other cultures and countries

with disdain. Furthermore, the Japanese are relatively homogeneous and have a strong sense of nationalism. Everyone shares the same ethnic background, and the government can foster a strong national identity that appeals to all groups. Lastly, the Japanese have a mercantilist view of the world. Business is war; thus, only the strong prosper. Many refer to Japan as "Japan, Inc."

The Japanese government directly became involved in its economic growth. The Japanese government used corporatism to accelerate its rapid growth. ***Corporatism*** occurs when the government forms alliances and associations with businesses, typically large corporations and heavy industries. Consequently, the government became a partner with industry and aided its growth. The government agency in Japan was the Ministry of International Trade and Industry (MITI), which played a crucial role in fostering Japan's economic development (Unger & Chan, 1995). Moreover, the Japanese citizens highly regarded 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 the government provided a guiding hand, it did not repress market forces when it intervened in the economy. Thus, MITI preserved and nurtured the forces of competition.

Japan has several economic characteristics that differ from those of other countries. Employers provided their employees the "three sacred treasures" - lifetime employment, seniority wage scales, and company unions. As an employee gains seniority and longer service, the employer pays the worker a higher salary. This practice was also common in the United States before the 1990s. However, businesses phased this out as they competed for top talent. Furthermore, the Japanese company sponsors the company unions, which is unusual. Typically, unions are external forces that organize workers by trade and skill. Then the union leaders and company managers negotiate workers' wages and working conditions. If the unions failed at negotiations, they would call a strike, where 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 encourages high savings and investment rates. During some periods, the Japanese saved 40% of their incomes. Between the 1960s and 1980s, the savings rate averaged 20%. A high savings rate drives economic development because savers deposit money into banks, which, in turn, lend to businesses and individuals. Thus, this high savings rate has three impacts on the economy. First, the banking and financial sectors experience rapid growth. Second, businesses borrow from banks and invest in buildings, machines, and equipment, which boosts 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. Japan allowed its corporations to grow extremely large, enabling them to work together. We refer to the Japanese conglomerate corporation as a ***keiretsu***, with a bank being a key member. This bank offers low-interest loans to its members. Moreover, the keiretsu would supply resources and parts to each other and pool their resources together for research and development. Since keiretsu work closely with each other, corporations rarely acquire other corporations. For example, when one U.S. corporation acquires another, it typically incurs substantial amounts of debt. Then

the parent company squeezes as much money as possible from the newly acquired subsidiary to repay this debt. Finally, the keiretsu planned strategically for long-term market share, whereas U.S. corporations focused on maximizing short-term profits.

Japan's remarkable growth came to an end during the 1990s. As stagnation settled in, employers no longer guaranteed Japan's lifetime employment. Then corruption scandals riddled Japan's ruling party, the Liberal Democratic Party (LDP). This party ruled Japan for four decades. Some even compared the LDP to the mafia. Before the bureaucrats were embroiled in public scandals, the public held them in high regard because they were independent of the political party and played a key role in implementing Japan's economic reforms.

Japan's exceptionally 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 peaks, and subsequently, it drops, triggering financial chaos. A price increase differs from a bubble because prices are not sustainable in a bubble. After an asset's price has attained a peak, it quickly crashes. Unfortunately, asset bubbles attract speculators. ***Speculators*** buy an asset, hoping to resell it for a higher price, thereby earning a quick profit. Moreover, speculators can artificially inflate an asset's price before it crashes. They also use loans to acquire assets. For example, Japan has a high population density and limited land. Some speculators purchased parcels of land that were too small for construction, hoping someone would buy them for a higher price. During the 1990s, the Japanese land, real estate, and stock market prices experienced a significant decline. Real estate prices dropped by 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, representing an 82% decline.

The financial bubble financially harmed the Japanese banks. Some individuals and speculators were unable to repay their loans. The banks foreclosed on assets that lost value. Another complication came from the keiretsu banks. They continued to lend to subsidiaries that were incurring losses. Banks kept the poorly performing businesses afloat and were reluctant to let companies go under. Unfortunately, these bank loans significantly increased the government bailout costs. Lastly, 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.

The Japanese economy has experienced persistent stagnation since the early 1990s, and this stagnation persists to this day. 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 include the following:

Strategy 1: 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 minor spillover effects on the rest of the economy. Third, many Japanese firms converted their foreign currency holdings to bolster their domestic finances. This strengthens the demand for the yen, further strengthening it. Finally, companies make many Japanese products outside of Japan. For example, Honda, Toyota, and Nissan make cars in Thailand, the U.S., and Canada. Since they produce outside Japan, the manufacturing does not contribute to its economic growth.

Strategy 2: Some recommend that Japan reduce its savings rate and encourage more consumer spending. Unfortunately, a financial crisis tends to frighten people into saving more, and the Japanese are already phenomenal savers. Furthermore, consumers are reluctant to make large purchases, such as 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. Consumers must repay this debt, which will have a severe impact on the U.S. economy. Unfortunately, the U.S. government has accelerated its borrowing. The U.S. government cannot sustain the rapid growth in debt, which exceeded $37 trillion in 2025.

Strategy 3: Some recommend that Japan use ***Keynesian Economics***. We discuss Keynesian Economics in Chapter 14. The government should step in when private markets are weak. Thus, the Japanese government should either increase spending or reduce taxes. Allowing people to keep more of their after-tax income would encourage them to spend more, thereby expanding the economy. However, the economy will contract further if people save this extra money. Keynesian Economics requires a government to reduce government spending and raise taxes if a growing economy creates inflation.

The Japanese government extensively employed Keynesian economics and borrowed heavily. Japanese debt soared to the highest debt-to-GDP ratio globally at 240% in 2025. Thus, the Japanese economy has not recovered, and the Keynesian solution has not been effective. In addition, the U.S. debt-to-GDP ratio was approximately 125% in 2025. Eventually, investors will shy away and stop investing in the Japanese or American debt. Problems in one market will most likely trickle to the other, especially since Moody's downgraded the U.S. debt in 2025. A failure of one or both could lead to a severe financial crisis as these governments lose a substantial portion of their budgets.

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 World War II, the U.S. dismantled these powerful coalitions following Japan's defeat. Then the Zaibatsu families grew and coalesced into the powerful keiretsus. A new government established new institutions geared towards economic growth and development. Over time, these new institutions became fixed and rigid, and they were unable to adapt as their society evolved. A strong force must break up these coalitions before society can change in a new direction and start growing again. Thus, a reorganization of an economy may trigger another growth spurt.

Key Terms

mercantilism
economic nationalism
infant industry
tariffs
trade sanction
industrial espionage
corporatism
keiretsu

import substitution
relational power
structural power
hegemony
international reserve currency
asset bubble
speculators
Keynesian economics
zaibatsu

Chapter Questions

1. Asian Tigers employ an export growth strategy to drive 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 that 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 if the U.S. dollar were to collapse?

4. China holds nearly $1 trillion of U.S. debt and currency. Could China cause the dollar to crash by quickly selling its U.S. dollars and U.S. government securities?

5. If trade sanctions do not work, why do governments continually use them to punish countries?

6. Is the 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 from 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. We then examine the factors that influence these functions and predict changes in a country's gross domestic product and inflation rate. Students should review this chapter if they plan to read and study 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 when a government or central bank influences it.

The Aggregate Demand

Aggregate demand (AD) represents the total level of goods and services that people, businesses, and governments purchase at a specific price level, reflecting the total spending in the economy. We represent the goods and services a country produces by a country's gross domestic product (GDP). The price level is then an index of all prices of final goods and services. We present an aggregate demand function in Figure 1, which has a negative slope. Although an aggregate demand function has a negative slope, similar to a market demand function, it differs in several key aspects. Market demand represents the demand for a single product or service, while aggregate demand combines the value of all goods and services within an economy. Unfortunately, the aggregation loses information. For example, suppose the price of apples rises, causing consumers to switch from apples to oranges. In that case, the aggregate demand function loses this information because GDP includes both oranges and apples, thereby obscuring changes in specific markets.

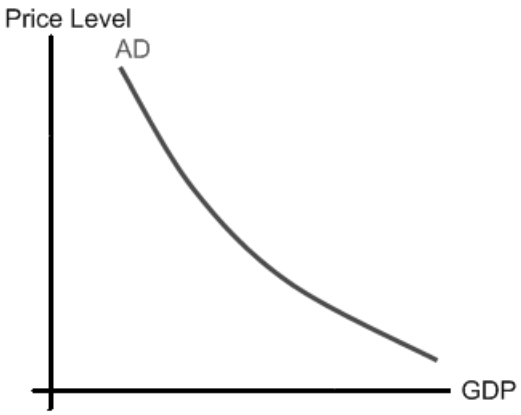


Figure 1. An aggregate demand function

Three effects explain why an aggregate demand function has a negative slope.

Effect 1: The ***Real Balance Effect*** is the public's response to inflation and its impact on wealth. The term "real" refers to the value of people's money, savings, and investments after adjusting for inflation. A high price level indicates that an economy has experienced inflation, as the prices have risen significantly. Unfortunately, inflation erodes the value of money, savings, and investments, such as stocks and bonds. Thus, these assets have a lower real value. When people have limited wealth, they purchase fewer goods and services, which reduces the GDP. Moreover, people have a higher real balance effect at a lower price level, resulting in increased spending on goods and services. Consequently, the real balance effect causes the slope of an aggregate demand function to be negative.

Effect 2: The ***interest rate effect*** is more complicated. Money in an economy is fixed until a central bank increases the money supply. People reduce their savings and withdraw from financial institutions at high levels because a high interest rate indicates a high inflation rate. Inflation reduces the value of savings. Consequently, banks must raise interest rates to attract funds. Businesses and individuals invest less in structures, machines, and equipment at high interest rates, which reduces the GDP. Thus, the aggregate demand function has a negative slope. Furthermore, we can relate this effect to the Fisher Equation, which states that the nominal interest rate equals the real interest rate plus the expected inflation rate. If the public expects high inflation rates, nominal and interest rates must rise, which in turn reduces GDP.

Effect 3: The ***foreign purchase effect*** entails the impact of the inflation rate 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 has a direct impact on exports and imports. Americans increase imports because they are relatively cheaper, while foreigners decrease exports because they become more expensive. Thus, the U.S. export industries contract while U.S. consumers pay more for imports, reducing the GDP. Unfortunately, the manufacturing industries in the foreign country experience increased production, thereby boosting its GDP.

The aggregate demand function can shift because a sector changes its spending. Sectors in an economy include consumers (C), businesses investing in machines and equipment (I), government spending (G), and net exports (X). Net exports are the total value of exports minus the total value of 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, aggregate demand increases and shifts to the right. If consumers decrease their spending, aggregate demand decreases and shifts to the left. We depict the shifts of the aggregate demand function in Figure 2.

We list five factors that influence consumer behavior and shift the aggregate demand function.

Consumer spending: Consumers save less income and consume more because they alter their behavior. Consumers purchasing more goods and services increase the aggregate demand function and shift it to the right. Remember, aggregate demand reflects society's purchases and expenditures for goods and services. If consumers save more and consume less, the aggregate demand function decreases and shifts to the left.

Real Wealth: If consumers' wealth increases, then consumers spend more. The aggregate demand function increases and shifts to the right. For example, the 2008 Financial Crisis negatively impacted wealth. Stock prices dropped by half during 2008. Consequently, the people's wealth plummeted as the value of pension plans and investments dropped by half. Thus, consumers reduced their spending and increased their savings, thereby decreasing the aggregate demand function and shifting it to the left.

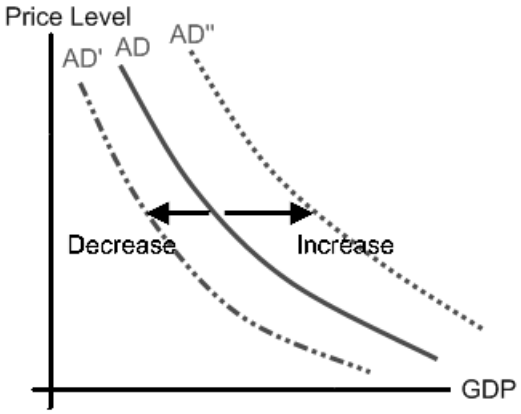


Figure 2. An aggregate demand function shifts

Consumers' expectations: If consumers are optimistic about the future, they tend to spend more now, which in turn increases aggregate demand. If consumers become pessimistic about the future, they pay less, which decreases aggregate demand and shifts it to the left. For example, if consumers expect layoffs, a tough job market, or a prolonged recession, they would reduce their spending and increase their savings. Lastly, consumers tend to avoid making large purchases, such as new cars, homes, or exotic vacations.

Household debt: If households have low debt, they can increase their spending by borrowing more, causing aggregate demand to shift to the right. If households have high debt, they cannot borrow to finance their spending. Lastly, they may even decrease their spending to lower their debt, which causes aggregate demand to decrease and shift to the left.

Taxes: If a government hikes taxes, then consumers have less income to spend. Consequently, households spend less, which decreases the aggregate demand function and shifts it to the left. If a government reduces taxes, consumers have more disposable income to spend, which increases the aggregate demand function and shifts it to the right.

Businesses affect the aggregate demand function through investments. Companies invest in machines, equipment, structures, and tools. They invest to boost inventory or replace worn-out equipment and machines. Consequently, businesses investing more increase the aggregate demand function, shifting it to the right. On the other hand, businesses that reduce their investment do the opposite.

We list the following 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 rate means businesses pay low borrowing costs, which would boost their investment. Of course, the change in interest does not result from the change in the price level. Otherwise, the economy would move along an aggregate demand function. Remember, inflation changes the nominal interest rates, not the real ones. A central bank can affect the real interest rate, which we discuss in Chapter 15. Similarly, when consumers pay low real interest rates, households tend to invest in new homes, cars, and appliances.

Expected Profits: Businesses invest if they wish to earn higher profits. Hence, businesses will invest if they are optimistic about the future business climate, such as when the economy experiences healthy growth or consumers have strong demand for products and services. However, businesses tend to 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. In 2025, large companies reduced labor costs by substituting labor with artificial intelligence. Layoffs were skyrocketing.

Production Capacity: When businesses operate at their full capacity, they invest in machines, equipment, and infrastructure to increase their capacity level.

Taxes: If the government decreases taxes on businesses, businesses will invest more because companies will pay lower costs. If a government raised taxes on corporations, companies would subsequently invest less.

The government is a large sector of the economy, purchasing goods and services, and constructing and maintaining schools, highways, airports, roads, and parks. Nevertheless, economists exclude government transfer payments, such as Social Security and Medicare, because the government does not alter the level of spending. Instead, the government redistributes incomes between groups in society. For example, the U.S. government transfers funds from workers to retirees via Social Security and similarly offers retirees a government medical plan, i.e., Medicare. In addition, government spending includes all three levels: Federal, state, and local. If a government increases its spending, aggregate demand increases and shifts to the right. If a government lowers its spending, aggregate demand decreases and shifts to the left.

The last sector is the international sector. Remember, aggregate demand does not shift in response to changes in the price level. We list the three factors that move the aggregate demand function:

Net Exports: If exports increase and/or imports decrease, a country produces more goods and services inside the country. A country that manufactures more can boost its exports, thereby increasing the aggregate demand function and shifting it to the right. If exports fall and/or imports rise, the foreign country manufactures more products, which does not contribute to the economy. Thus, the aggregate demand function decreases and shifts to the left.

Foreign income: If a foreign country becomes wealthier, foreigners tend to import more goods and services. Consequently, our exports rise, boosting manufacturing and economic growth. Thus, the aggregate demand function increases and shifts to the right. If foreign incomes fall, then the opposite would occur.

Exchange rates: If the U.S. dollar appreciates or strengthens, U.S. exports fall while imports rise because a stronger dollar makes foreign buyers purchase fewer of the more expensive U.S.-made products. Meanwhile, U.S. consumers buy cheap, foreign-made products. Thus, the aggregate demand decreases and shifts to the left because the foreign country expands its production and GDP. The opposite would occur if the U.S. dollar depreciates or becomes weaker.

The Aggregate Supply

Aggregate supply (AS) is a schedule showing the 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: the short run and the long run. In the ***short run***, prices for some resources do not change immediately due to changes in the price level. Some production prices are fixed, typically a worker's wages, while in the ***long run***, prices for all resources change immediately in response to changes in the price level. Thus, the long and short run exhibit two different aggregate supply functions.

We illustrate a ***short-run aggregate supply*** in Figure 3, which has a positive slope. The slope is positive because companies produce more goods and services when the price level rises, while workers' wages remain constant. Some economists say that the employer "fools" the workers into producing more for a lower real wage because the workers do not realize the inflation rate has increased and reduced their purchasing power. However, we could argue that employers exploit the workers as firms and businesses pay lower real wages. Consequently, a higher price level increases the total value of goods and services, which in turn boosts GDP. Firms earn higher profits, and the exploited workers increase production even though they earn lower real wages. Unfortunately, most workers are not in a position to negotiate salaries when the inflation rate rises.

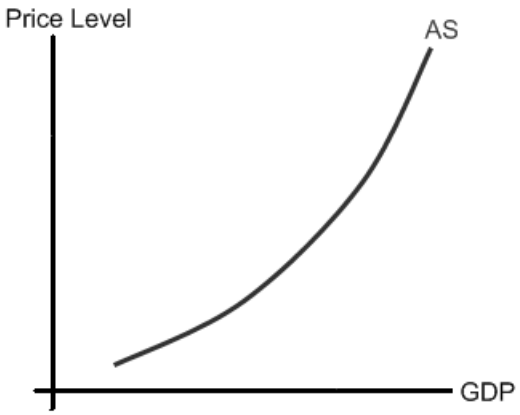


Figure 3. A short-run aggregate supply function

The ***long-run aggregate supply function (AS_{LR})*** differs from the short-run aggregate supply. All resource prices rise in proportion to the price level. Thus, the aggregate supply function becomes perfectly inelastic, as shown 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 workers' wages increase 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 cannot function under hyperinflation, as financial intermediaries stop channeling funds from savers to investors.

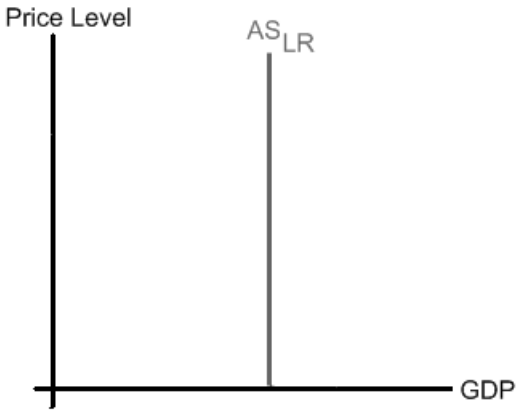


Figure 4. A song-run aggregate supply function

The aggregate supply function can also shift. We focus on the short run because Maynard Keynes once stated, "In the long run, we are all dead!" We show an increase and a decrease in the short-run aggregate supply function in Figure 5.

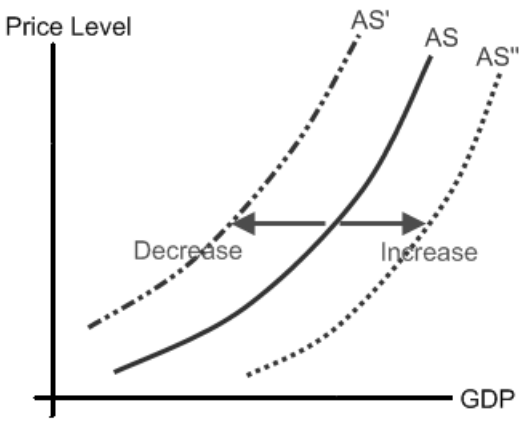


Figure 5. Shifting a short-run aggregate supply function

The 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, new workers enter the market, boosting the labor supply and reducing wages. Since businesses pay lower labor costs, they can expand production, thereby increasing the aggregate supply function and shifting it to the right. If many workers retire, the supply of workers falls, which raises wages. Thus, businesses pay more for labor, and they reduce their production. Consequently, the aggregate supply function decreases and shifts to the left.

Input 2: Businesses utilize buildings, equipment, machines, and tools, which we refer to as capital. If the price of capital drops, businesses invest more, increasing the aggregate supply function and shifting it to the right. If foreign countries sell machines and equipment at a low price, businesses import more, thereby boosting their investment.

Input 3: Businesses utilize raw materials in their manufacturing processes. Firms expand production if resource inputs become cheaper. Thus, the aggregate supply function increases and shifts to the right. 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 prices of the imported resources 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 utilize numerous petroleum-based products in manufacturing and production, while the transportation sector transports goods between markets and factories. Thus, as petroleum prices rise, all prices in an economy increase. Consequently, the aggregate supply function decreases and shifts to the left.

A nation's productivity affects the aggregate supply function. ***Productivity*** is when workers produce more using the same level of resource inputs. Thus, productivity gains enable a country to increase its output. Productivity is closely tied to new technology. In the United States, the average real GDP grew by approximately 3%, with productivity gains accounting for roughly two-thirds of this growth. Consequently, productivity causes a nation's aggregate supply function to increase and shift to the right.

A country's legal environment has a significant impact on its economy. For example, a government's rules and regulations affect manufacturing and production. If a government changes the legal system to lower businesses' production costs, then the aggregate supply function increases and shifts to the right. Some examples include reducing business taxes, improving property rights, reducing regulations, eliminating bureaucratic red tape, or boosting subsidies. If a government does the opposite, the aggregate supply function decreases and shifts to the left.

Changes in Equilibrium

Equilibrium is a state of rest where nothing changes. Equilibrium occurs when the aggregate demand and aggregate supply intersect. We illustrate an equilibrium in Figure 6 using P* and GDP_{FE}, where FE denotes full employment. As long as nothing changes in an economy, the price level and GDP remain the same.

Equilibria 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, the government, businesses, and foreigners want to buy at Q_2 at this low price. Consequently, society's quantity demanded vastly exceeds the suppliers' production. Furthermore, producers are seeing their inventories of products decline. 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, the government, and businesses reduce spending until it equals GDP_{FE} again.

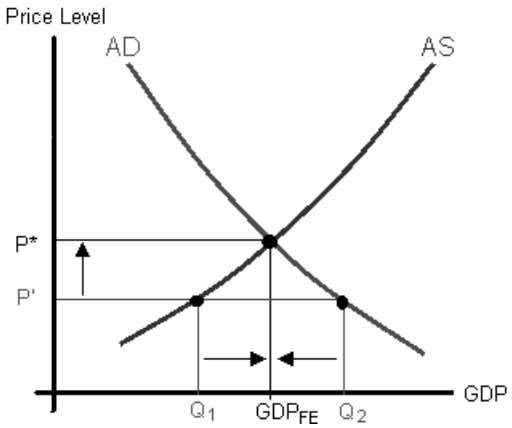


Figure 6. A price shock causes a lower price level

Another price shock strikes 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 Q_2. However, consumers, the government, and companies typically only make purchases at Q_1. The price level is too high, and consumers, businesses, and the government do not purchase all the goods and services. Alas, producers see their inventories rising. Thus, companies must reduce prices to sell their inventories and reduce production. Consequently, the price level falls until it equals P* again, and the economy returns to equilibrium.

Some factors change, such as higher business investment, the government boosting spending or reducing taxes, or foreigners earning higher incomes and buying more imports. Thus, the aggregate demand function shifted to the right, increasing its value, as shown in Figure 8. If the economy is at full employment (FE) and aggregate demand increases, the GDP expands beyond the full employment level. The rising price level leads to demand-pull inflation. ***Demand-pull inflation*** is when consumers have too much money and buy goods, bidding up the prices: "Too much money is chasing too few goods." For example, the United States faces inflation in 2025 because the federal government injected too much money into the economy after the COVID-19 pandemic, while the Federal Reserve is hesitant to raise interest rates to slow the economy, as the U.S. economy teeters on the brink of recession.

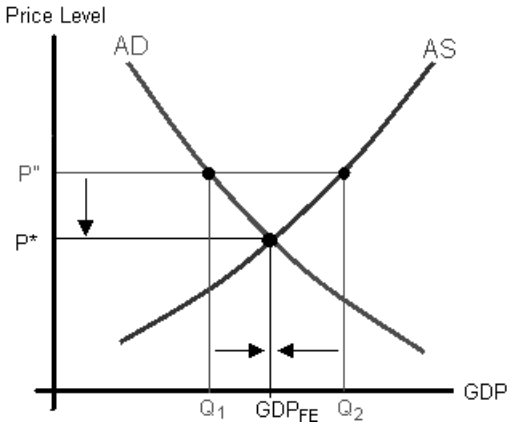


Figure 7. A price shock causes a higher price level

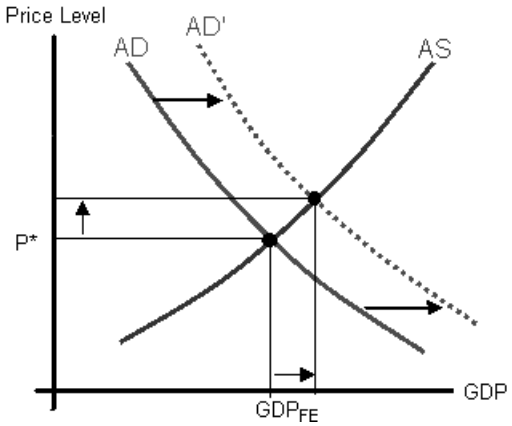


Figure 8. An aggregate demand function increases

The aggregate demand function can decrease and shift to the left, as depicted in Figure 9. Several examples include businesses reducing their investments because they become pessimistic about the future, a government decreasing spending or raising income taxes, or consumers becoming concerned about rising unemployment and increasing layoffs, which prompts them to save more. If the economy is operating at the full-employment level, the aggregate demand function decreases as the economy enters a recession. One question arises - how severe is the recession, and could prices decrease? The prices in an economy rarely decrease. Falling prices create deflation when the economy contracts to its GDP level, typically at Q_1, during a mild recession. If prices remain fixed and rigid, and do not fall, the economy will subsequently enter a more severe recession at Q_2.

Several factors, including the following, contribute to the rigidity of prices.

Factor 1: Companies do not want to trigger a price war because price wars destroy profits as companies undercut each other.

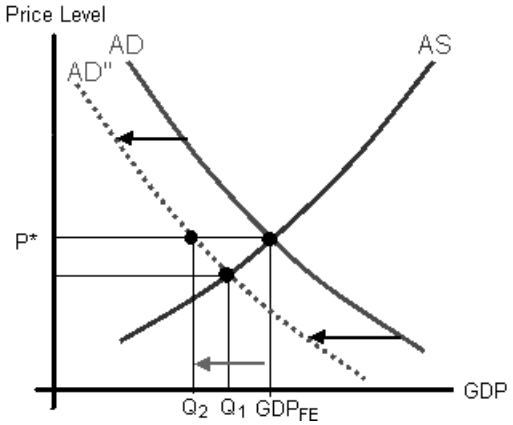


Figure 9. Aggregate demand function decreases

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 additional costs to print new catalogs and menus, re-price merchandise in inventory, or communicate the latest prices to consumers. Unfortunately, firms could lose consumers if they become angry from sudden and unexpected price increases.

Factor 3: Although labor is a significant cost, firms cannot lower workers' wages because firms and workers have specified wages in labor contracts. Even if a firm does not have a contract with its laborers, the government imposes minimum wage laws. Firms cannot pay wages below the minimum wage; otherwise, the government can fine and penalize the business. Consequently, firms cannot reduce their prices because they cannot lower labor costs.

Factor 4: Some employers pay better wages than the market because the high wages boost productivity, which economists call ***efficiency wages***. If a business reduced its employees' wages, workers' morale and work habits would suffer. Subsequently, workers become bitter towards their employers and experience a reduction in productivity (Bernanke & Parkinson, 1989). Furthermore, the firm's best workers may "jump ship" and work for another employer, while some 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. In contrast, other employees, especially in computer support, may plant viruses in their employer's computer system. Thus, managers are hesitant to reduce wages, fearing a backlash from their employees.

The 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 shifts it to the left, as shown in Figure 10. The GDP of a country contracts while the economy experiences inflation at a higher price level. If the economy operates at full employment, a decrease in aggregate supply can lead to cost-push inflation. ***Cost-push inflation*** occurs when an economy experiences both a high inflation rate and a high unemployment rate simultaneously. Economists also referred to cost-push inflation as ***stagflation***.

Significant price increases on a critical resource could create cost-push inflation. For example, the Organization of the Petroleum Exporting Countries (OPEC) rapidly boosted petroleum prices during the periods of 1973-1975, 1979-1980, and 2000. Manufacturing companies utilize petroleum to produce a wide range of products, including fertilizers, plastics, gasoline, diesel, and many others. As the price of oil rises, these products become expensive, instantly increasing the prices of 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. Thus, the Law of Demand dictates that consumers reduce their purchases of goods and services in response to higher prices. Then all producers must pay greater costs and sell fewer quantities of their products. Unfortunately, soaring petroleum prices caused the United States to enter a recession about a year later.

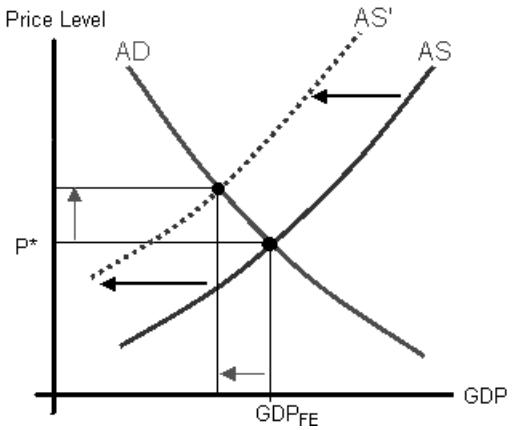


Figure 10. An aggregate supply function decreases, creating cost-push inflation

The aggregate supply function increases and shifts to the right for the last case, as depicted in Figure 11. For example, producers adopt new technology, or the government increases immigration, which lowers wages. If an economy were operating at full employment, the aggregate supply would increase, resulting in a higher GDP. However, the degree of change depends on whether prices are flexible or rigid. If prices were to fall, the economy would likely grow to Q_1. If the prices are rigid, the economy grows faster and attains Q_2. Nevertheless, we have already discussed inflexible and fixed prices, and prices may not fall because a firm has market power, menu costs, fixed labor contracts, or pays efficiency wages.

This analysis shows the impact of rigid prices on an economy. If an economy has rigid prices, then changes within the economy have a larger impact on the economy. Consequently, an economy experiences greater swings in its business cycle.

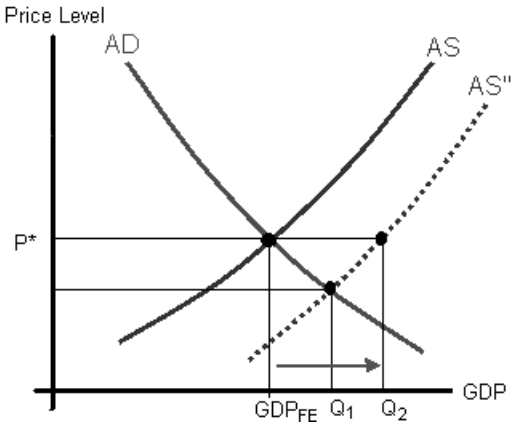


Figure 11. An aggregate supply increases

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 other currencies?

2. The 2008 financial crisis caused 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 reduced household taxes?

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, as President Trump is doing in 2025?

6. What would happen to the short-run aggregate supply function if the petroleum companies discovered a new petroleum reserve that boosts petroleum supplies and reduces the price?

7. What would happen to the economy in the short run if the government imposed 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 are willing to borrow more?

14. Fiscal Policy

John Maynard Keynes (1883-1946) had a profound influence on economics during the 20th century. Keynes advocated a mixture of government and market forces to help the economy grow and prosper. Keynes' thinking and writings were influenced by the Great Depression, in which he stated that 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. 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, society ends in a vicious cycle of layoffs, and people save more because they fear their employers will lay them off. Thus, Keynesians believe that the government should intervene in an economy, and it must spend and invest during economic downturns, filling the gap left by private markets.

Please review Chapter 13 before continuing with this chapter. We use aggregate demand and aggregate supply functions to show how the government uses fiscal policy to influence an economy.

Economics of Growth

An expanding and thriving economy has a growing, real Gross Domestic Product (GDP). Economists use real GDP to remove the impact of inflation because inflation raises nominal GDP. An economy that produces more goods and services or experiences inflation will always see its nominal GDP rise. If real GDP rises, society produces more goods and services because economists have removed the impact of inflation. Thus, everyone in society has access to a greater variety of goods and services.

Economists measure economic growth in two ways: the level of real GDP and real GDP per capita. A higher real GDP indicates that 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 that each person can buy more goods and services on average.

A growing economy has many benefits for society, which include the following:

Benefit 1: A higher real GDP implies a society has greater incomes. If people earn higher salaries, they tend to reduce their demand for government aid, such as 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 regional governments can hire more teachers and police officers. State governments can build more parks, universities, and highways, or offer medical care to the poor. Finally, the federal government can expand the military or increase state grants.

Benefit 3: A growing economy experiences a falling unemployment rate. Unemployment can be devastating, particularly in countries with high unemployment rates. Workers lose skills if they remain unemployed for an extended period. Moreover, unemployment can lead to family disintegration and racial tensions, while severe unemployment can escalate into a revolution or public unrest.

Evaluating an economy's health is challenging. 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, the economy could be in a recession. If most indicators are positive, 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 grows, the difference between short-term and long-term interest rates expands. During recessions, the interest rate spread typically narrows because it reflects the demand level in the credit markets.

Table 1. Index of Leading Economic Indicators

Items	Expansion	Recession
1. Average hours of the workweek	Increasing	Decreasing
2. Initial claims for unemployment	Decreasing	Increasing
3. New orders for consumer goods	Increasing	Decreasing
4. Vendor performance	Improves	Weakens
5. New orders for capital goods	Increasing	Decreasing
6. Building permits for houses	Increasing	Decreasing
7. Stock prices	Increasing	Decreasing
8. Money supply	Increasing	Decreasing
9. Interest rate spread	Expands	Narrows
10. Consumers' expectations	Improves	Weakens

The Multiplier Effect

The ***Multiplier Effect*** impacts 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. The company will invest $30 million in building the facility and hire 1,500 employees, resulting in a payroll of $50 million. Thus, the direct impact is that the new employees earn $50 million while the construction companies earn $30 million. Consequently, the construction workers and employees earn an income.

This investment causes the company to inject money into a local community. As company employees and construction workers earn higher incomes, they tend to increase their spending. They buy new houses, cars, and clothing. Moreover, they wine and dine at restaurants, visit coffee shops, or watch movies at 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. As a result, these employees earn higher incomes, which in turn increases their spending and savings. Hence, the process continues indefinitely, so a $30 million investment in a community can cause incomes to rise by more than $30 million as the investment generates additional income. Similarly, the $50 million payroll also boosts the economy.

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 acquire computer skills, thereby spurring growth in white-collar employment. Furthermore, the increase in income causes a government to collect more tax revenue because it has more income to tax and more properties to assess for real estate taxes. Hence, the 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, they spend the MPC proportion while they save the MPS proportion. Thus, by definition, MPC + MPS = 1 because every person spends and saves their after-tax income. Marginal is vital because households adjust their savings and consumption in response to changes in their incomes. 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 of 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 of the multiplier effect in Table 2. A business increases investment by $100. Consequently, the extra $100 results in households earning $100 in income, as the investment generates revenue, while a business investment injects money into the economy. If households have an MPC of 0.9 and an MPS of 0.1, then households spend an additional $90 and save an extra $10 for Round 1. The notation row is essential because we relate the investment change to income changes. The symbol delta, Δ, means change, while I represent an investment.

Table 2. A Numerical Example of a Multiplier

Round	Income	Consumption	Savings	Notation
Round 1	+$100.00	+$90.00	+$10.00	ΔI
Round 2	+$90.00	+$81.00	+$9.00	$\Delta I\ (MPC)$
Round 3	+$81.00	+$72.90	+$8.10	$\Delta I\ (MPC)^2$
Round 4	$72.90	+$65.61	+$7.29	$\Delta I\ (MPC)^3$
⋮	⋮	⋮	⋮	⋮
Infinity	$1,000.00	+$900.00	+$100.00	

As households increase their spending, businesses receive this money as income. They earn higher profits, pay their workers greater salaries, or hire new workers. Then Round 2 begins. These new workers earn an additional $90 in income. Consequently, they spend an extra $81 (0.9 × $90) and save an additional $9 (0.1 × $90). Notice that 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. Did we notice that the initial investment was leaked out to savings? Thus, savings leak money from the income-generating stream.

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, a change in income alters a country's GDP by the same amount. Although GDP measures a country's production value, consumers, businesses, and the government buy this production.

$$\Delta GDP = \Delta I + \Delta I \cdot MPC + \Delta I \cdot MPC^2 + \Delta I \cdot MPC^3 + \cdots \quad (1)$$

We factor out the common term, ΔI, which yields Equation 2.

$$\Delta GDP = \Delta I(1 + MPC + MPC^2 + MPC^3 + \cdots) \quad (2)$$

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 MPC + MPS =1 equation into Equation 3, yielding the multiplier.

$$\Delta GDP = \frac{1}{1-MPC} \cdot \Delta I = \frac{1}{MPS} \cdot \Delta I \quad (3)$$

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 in $1,000 increments using Equation 4 and present the GDP increase in the last row of Table 2. Furthermore, the difference between the increase in GDP and investment is $1,000 – $100 = $900. Consequently, the injection of $100 into the economy generates a $900 increase in consumer spending, resulting in an additional $100 in savings. Thus, savings must equal investment because savings leak money out of the economy, while investments inject cash into the economy.

$$\Delta GDP = \frac{1}{1-MPC} \cdot \Delta I = \frac{1}{1-0.9} \cdot \$100 = \$1{,}000 \quad (4)$$

Other events can trigger the multiplier effect, which we refer to as 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 critical assumptions.

Assumption 1: The multiplier includes only one leakage from a community. A ***leakage*** is when the government, person, or importer removes money from an economy, reducing 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. Have we noticed 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, the multiplier effect would become infinite. A $1 injection would lead to an infinite growth in income.

Assumption 2: Savers must deposit their money into financial institutions, which, in turn, grant loans to businesses for new investments. Consequently, the investment money originates from the savers. If people hide their money under their mattresses, banks will not have sufficient funds to lend to businesses for new investments or to households for homes and vehicles. Many people struggling during the Great Depression did not trust banks and hid their savings.

We use the multiplier to predict a government's macroeconomic policies. Once we know the MPS or MPC, 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, for every dollar the government invests in a community, it generates $5 in income. Consequently, government officials use the multiplier to predict changes in the economy.

$$multiplier = \frac{1}{1-MPC} = \frac{1}{MPS} \quad (5)$$

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.

The multiplier effect, unfortunately, can work in reverse. For instance, a large firm or factory shuts down and lays 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 lower revenues. Subsequently, they reduce their workforce and lay off workers, a process that continues indefinitely. Unfortunately, the local government collects fewer tax revenues and typically raises taxes to offset the decline. 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 the 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 behind. Then crime and drugs became rampant. Finally, local governments became fiscally strapped as their tax base disappeared while their economies continued to stagnate.

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 demand." Workers earn wages to produce products for businesses and spend their wages to buy them. Prices will adjust to clear the market if any market experiences a surplus or shortage. Furthermore, a rational person would never hoard money; people who save more and consume less deposit their savings into banks to earn interest. With greater savings, the banks lower the interest rate (i.e., greater supply of loanable funds). Consequently, businesses borrow more funds from banks to invest in machines, equipment, and infrastructure, while households borrow to purchase homes, cars, and appliances.

On the other hand, Keynes believed that savings do not translate into more investment because 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. Subsequently, banks stop granting loans as bankruptcies and loan defaults rise.

Keynes believed wages and prices were not flexible downward and might not fall. Employers and labor unions cannot cut wages because workers have labor contracts and could sue their employers in court for violating contracts. Furthermore, employers may not reduce wages because it hurts workers' morale, and as a result, the workers' productivity decreases. Disgruntled workers may also resort to theft from their employers, employing tactics such as sabotage, resignation, or working for a competitor. 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 because downturns may not be temporary.

Fiscal policy refers to the national government's adjustment of taxes and/or government spending levels to stimulate the economy and promote full employment, thereby increasing real GDP. We assume that the central bank maintains a fixed and constant money supply. Refer to Chapter 15 for monetary policy. Hence, fiscal policy changes the government's budget. The government collects revenue from taxes, tariffs, and fees and spends funds on the military, social programs, and the interest on the debt.

The government has three methods to affect the economy via its budget:

Method 1: If the government balances its budget, then government revenue equals government spending, or T = G, where T is for taxes and G represents government spending. A government does not accumulate debt or repay debt with a balanced budget.

Method 2: If the government operates a ***budget deficit***, it spends more than it collects in taxes, or G > T. Subsequently, the deficit creates a shortfall that the government must add to the debt. We keep it straight by thinking of a person digging a hole. The deficit represents the dirt removed from a hole with a shovel, while the hole depth reflects the total debt. From 1960 to 2025, the U.S. government operated a deficit every year except in 1960, 1969, 1998, 1999, 2000, and 2001.

A budget deficit has an expansionary impact on an economy. The government borrows from the future to inject more funds into today's economy. Thus, ***expansionary fiscal policy*** occurs when the government reduces taxes or increases government spending, thereby expanding the economy. We depict the aggregate supply (AS) and aggregate demand (AD) in Figure 1. The 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 price levels and creating inflation.

The degree of the shift is more complicated. If a government increases its spending, the change in spending is equal to the Keynesian multiplier times the amount of the increase in government spending. Government spending injects funds into the economy, creating additional consumer spending and increasing incomes.

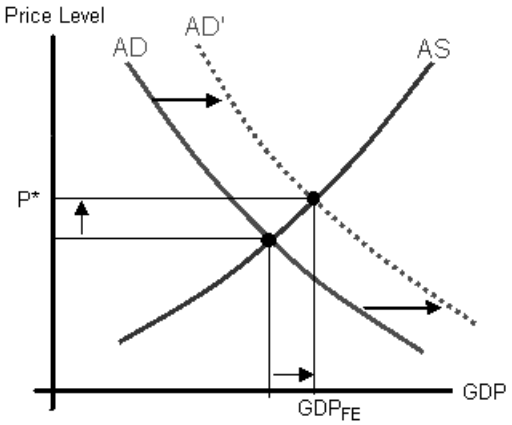


Figure 1. Expansionary fiscal policy

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.

For example, in 2007, President Bush gave taxpayers between $300 and $600 to stimulate the economy. For example, the United States has approximately 100 million households, and each household receives an additional $600 in tax refunds. Furthermore, the Keynesian multiplier equaled two while the households spent 90% (MPC = 0.9) of their income 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 were to spend this money. We calculated the GDP increase by $108 billion using Equation 6. The equation contains a negative one because tax decreases increase GDP, or vice versa; tax hikes would reduce GDP.

$$\Delta GDP = multiplier \cdot \Delta T \cdot MPC \cdot (-1) \quad (6)$$
$$\Delta GDP = 2 \cdot (-\$60\ billion) \cdot 0.9 \cdot (-1) = \$108\ billion$$

Households must spend this money to increase GDP. If households had saved this money, then GDP would not have changed. Unfortunately, this became a likely scenario because the 2008 financial crisis prompted everyone to save as much of their income as possible. If everyone saves their money, the multiplier effect equals zero because the savers have removed the injection from the economy.

Method 3: If a government operates a ***budget surplus***, 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 provides the government with extra funds in its accounts. Hence, ***contractionary fiscal policy*** increases taxes and/or decreases government spending to slow

down the economy and reduce inflation. For example, the economy grows rapidly, leading to inflation, as depicted in Figure 2. A government uses contractionary fiscal policy to decrease spending by shifting the AD leftward by the multiplier times the decrease in government spending. Thus, the economy slows down until it reaches full employment.

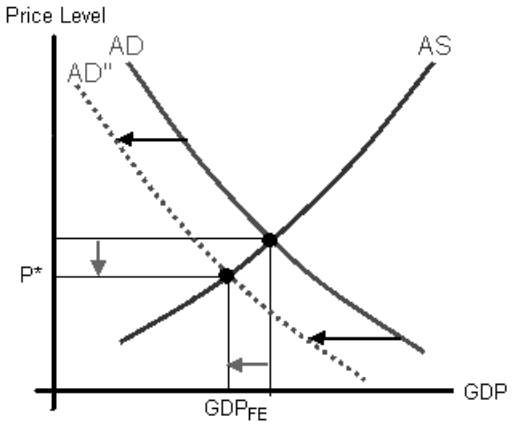


Figure 2. Contractionary fiscal policy

The economy, for example, 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 calculate that the GDP falls by \$450 billion, as shown in Equation 7. Remember, government spending is negative because the government reduces spending.

$$\Delta GDP = multiplier \cdot \Delta G = 1.5(-\$300\ billion) = -\$450\ billion \tag{7}$$

We present another example of the Keynesian multiplier's impact on the economy. A government that increases taxes shifts the AD leftward by the amount of the multiplier times the MPC and the tax increase. Thus, households pay for the tax increases by drawing on their savings and reducing consumption. Households reducing their spending decrease economic growth, which is why the MPC appears in the multiplier. Using the same example, the President hikes taxes by \$300 billion instead of reducing government spending. If the MPC equals 0.9, we calculate that GDP falls by \$405 billion, as shown in Equation 8.

$$\begin{aligned} \Delta GDP &= multiplier \cdot \Delta T \cdot MPC \cdot (-1) \\ \Delta GDP &= 1.5 \cdot (\$300\ billion) \cdot 0.9 \cdot (-1) = -\$405\ billion \end{aligned} \tag{8}$$

Automatic Stabilizers

Several government programs and tax systems are ***countercyclical***, meaning these programs and systems move in the opposite direction of the economy. Programs and systems slow the

economy when it grows too swiftly and expand the 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 systems are self-regulating, a phenomenon that economists refer to as ***automatic stabilizers***. They automatically induce an expansionary fiscal policy as an economy slows down. Then they implement a contractionary fiscal policy as the economy expands rapidly. One benefit of automatic stabilizers is that government officials do not need to change or implement actions and policies.

The U.S. economy has the following three automatic stabilizers:

Unemployment compensation: Unemployed workers receive temporary income from the government. During a recession, employers lay off more workers, and a greater number of people receive unemployment compensation. Thus, government spending increases to provide temporary income to unemployed workers, while income taxes automatically decrease for those with lower incomes. Furthermore, unprofitable firms may go bankrupt or lay off their workforce, resulting in the 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 paying less unemployment compensation, thereby reducing government spending.

Corporate taxes: Corporations pay taxes on their profits, while investors pay taxes on their dividends. During a recession, corporations typically earn smaller profits or incur losses, which reduces the taxes they pay. For example, New York State received roughly 25% of its income taxes from Wall Street before the 2008 Financial Crisis. With many financial institutions facing bankruptcy, New York State collected less tax revenue, resulting in 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 are pushed into higher tax brackets. Thus, families pay a larger portion of their income in taxes to the government. During a recession, families pay lower average tax rates as the households' incomes drop. Consequently, they pay a smaller proportion of their incomes to the government as taxes. Hence, a progressive tax system slows growth in consumption during high growth while countering economic declines.

Problems of Fiscal Policy

Classical economists believe that the government should not interfere with the economy. Subsequently, many economists revised their views during the Great Depression after Maynard Keynes wrote and advocated for using fiscal policy to intervene in the economy. 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 is an economic condition characterized by both high inflation and high unemployment rates. Consequently, stagflation led economists to develop various schools of thought to explain macroeconomics.

Several schools strongly support monetary policy, but economists disagree widely on fiscal policy. Classical economists believe the government should minimize interference with the economy because an economy is inherently stable. Keynesians believe the government should utilize its powers to sustain a growing economy. Unfortunately, government leaders usually support Keynesian Economics. Since the 1960s, the U.S. government has been plagued by budget deficits during periods of economic expansion and recession. 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 three time lags when it stimulates the economy. First, the ***recognition lag*** (or ***information lag***) reflects the time it takes for government officials to collect data. The 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 the government would need at least nine months to determine whether the economy has entered a recession. Second, the ***administrative lag*** (or ***legislative lag***) is when the government requires time to make decisions. Congress and the President must agree to changes in taxes or government spending. Congress and the President could agree quickly or take months or years to devise and implement a fiscal policy. Finally, the ***impact lag*** refers to the fact that fiscal policy takes time to affect the economy. Fiscal stimulus can take six to twelve months to have an impact on an economy. Unfortunately, the time lags could make an economy more unstable. For example, if a fiscal policy takes a year to impact an economy, and the recession is short-lived, then an expansionary fiscal policy would lead to more inflation. As the economy recovers from the recession, fiscal policy takes effect and further expands the economy, fueling additional growth and inflation.

Problem 2: The 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, politicians typically enact fiscal policies that are popular with the public in the lead-up to elections, such as lowering taxes and increasing government social programs. These policies stimulate the economy in the lead-up to the election, resulting in economic growth and inflation. Once elected, the politicians remove the fiscal stimulus until the next election.

Problem 3: Political leaders may reverse or approve a temporary budgetary policy. A temporary fiscal policy may not be sufficient to expand the economy. For example, the U.S. economy entered a recession in 2007. Subsequently, President Bush approved an economic stimulus package that provided every household with a tax refund ranging from $300 to $600. President Bush wanted families to spend this money, but many households saved during the 2008 financial crisis as foreclosures rose, corporate layoffs were rampant, and unemployment spiked. People usually save more during economic downturns. Lastly, the tax refund was temporary and not permanent. Thus, the spending did not change the public's behavior.

Problem 4: State and local governments can nullify the federal 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, more tax revenues flow into the coffers of state and local governments. 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 revenue. However, they must pay more for unemployment and welfare. Then state and local governments raise taxes to balance their budgets. Consequently, the higher taxes drag the economy and nullify the federal government's expansionary fiscal policy. It is common for state and municipal governments to face budget crises during recessions and usually raise taxes.

Problem 5: Investors invest in the government because it is considered a low-risk investment. A government can increase taxes and/or print money to cover loans and interest payments. The U.S. government also has never defaulted on its debts. However, businesses do not possess these powers. They can go bankrupt, forcing their investors to incur investment losses; consequently, government deficits and debt crowd out private investment in two ways via the ***Crowding Out Effect.***

- First, a government borrowing money from the public competes with private companies for loans. Investors buying U.S. government debt cannot simultaneously buy corporate stocks or bonds with the same money. If businesses invest less in buildings, machines, and equipment, low investment rates can result in slower economic growth. Usually, a government finances current consumption while investing a small portion in buildings, machines, and equipment.

- Second, if a market has limited funds, a large budget deficit and debt tend to raise interest rates. The private sector borrows less money because of the higher interest rates.

Problem 6: The 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 purchase more foreign-made products, thereby boosting imports, while businesses sell fewer products to foreigners, resulting in reduced exports. This is because imports are relatively cheaper compared to exports, which are relatively more expensive. 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 hits its borrowing limit. If a government uses Keynesian economics effectively, it should have budget surpluses during times of economic expansion and budget deficits during recessions. Budget surpluses enable a government to reduce its debt during periods of economic prosperity. 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, including Greece, Italy, and Spain, reached their debt limits in 2012 because investors had refused to purchase their bonds. Consequently, these European countries enacted austerity measures. Governments that reduce spending and increase taxes can exacerbate a recession and hinder economic growth. Unfortunately, their economies have been in

a perpetual state of recession for many years, until investors restore their confidence in government bonds.

Problem 8: Unfortunately, large budget deficits lead to a larger government. The 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: The government's use of 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 construct the new homes. However, they spend money slowly and carefully while adhering to complex rules and regulations. The U.S. federal government imposes strict environmental regulations and laws. The U.S. government has numerous laws governing rental properties for low-income families, promoting racial equality, regulating workers' wages, and overseeing complex government contracts. If a government agency or organization violates a rule, the government may impose fines and penalties on the organization. Consequently, organizations spend the money slowly and carefully, while government spending trickles into the economy.

High Government Debt

Public debt is the total amount a government owes, the sum of all budget deficits and surpluses during a government's lifetime. For instance, the U.S. government's debt exceeded $37 trillion in 2025. The U.S. government has accumulated an enormous debt to finance wars and inject trillions into the economy during the 2020 COVID Pandemic. Congress and the President cannot control their spending because they continually spend more than they collect in taxes. It's the old joke – Washington politicians spend money like drunken sailors.

The federal government exacerbated the situation by spending the Social Security surpluses. Social Security is the mandatory government retirement system for retired American workers. Although Social Security had surplus funds in its accounts until 2020, the U.S. government spent these funds and replaced them with U.S. government securities. The U.S. government can no longer use Social Security as a free source of funding. As Americans age and begin to retire, the federal government is expected to start paying its surplus to retirees around 2020. Consequently, the government must either reduce its retirement benefits, cut other government programs, or increase taxes to replenish the Social Security fund.

Is it possible for a government's debt to become large enough to bankrupt a government? A government usually does not go bankrupt because it has more options than a business. A government has the power to tax and print money. Furthermore, a government can refinance the debt. As old debt matures, the U.S. Treasury issues new debt to replace it. The U.S. Department of the Treasury offers four securities, where investors and savers lend to the government.

- ***U.S. Treasury Bills*** are security bills with a maturity of less than a year.

- ***U.S. Treasury Notes*** are a type of security with a maturity ranging from 1 to 10 years.
- ***U.S. Treasury Bonds*** are a security with a maturity exceeding 10 years.
- ***U.S. Savings Bonds*** are long-term, non-marketable bonds. Typically, investors purchase them from banks.

A large, growing debt creates the following problems for society:

Problem 1: As the level of debt increases, the U.S. government pays more interest on that debt. Currently, interest is the third-largest item in the budget. If interest becomes the largest item in the budget, the government must subsequently reduce the budgets for other programs, such as the military, infrastructure, or social programs. The interest is roughly a trillion dollars in 2025.

Problem 2: Future generations inherit this debt. 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: High debt can lead to higher taxes. Unfortunately, the government lacks certainty about the amount of tax revenue it will collect. For instance, a growing economy leads to growing incomes, while 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 tend to stagnate or grow slowly, while a government becomes trapped in a financial pit.

Problem 4: Many foreigners invest in U.S. government securities. The foreigners transfer the interest to their home country as they earn it. If foreigners decide to liquidate their investments in government securities, they will transfer money outside the United States. For example, the Japanese economy has stagnated since the 1990s but has accumulated roughly a trillion dollars in U.S. government securities. The Japanese are liquidating their U.S. Treasury holdings in 2025 because the Japanese government needs these funds to support its ailing economy. The Chinese government is similarly liquidating its U.S. Treasury holdings, possibly due to its strained relations with the United States. The Chinese hold about a trillion dollars in U.S. securities.

Problem 5: A government could print money to cover deficit problems if it cannot find investors to buy the government's securities. However, printing money always leads to inflation. Every hyperinflation episode resulted from a central bank printing money too rapidly to cover its government's financial problems. Although the Federal Reserve is not required to buy U.S. securities, investors' appetite for U.S. government bonds is weakening in 2025. Consequently, the Federal Reserve is purchasing U.S. government bonds, despite the U.S. economy still struggling with high inflation.

Problem 6: A large government debt can trigger a financial crisis. Some debt becomes due daily, and the government rolls over the expiring debt by issuing new debt to replace it. If investors lose faith in the government's ability to repay the debt, the investors stop buying the debt, triggering a financial crisis. This scenario has become likely in 2025 for both Japan and the United States. Although the Japanese central bank holds most of Japan's government securities, investors are leery about investing anymore. This phenomenon also occurs with the U.S. government debt.

U.S. public debt exceeded $37 trillion in 2025. U.S. government agencies hold approximately 21% of the debt. Social Security and federal employees' retirement plans used their surpluses to purchase U.S. government bonds. We exclude 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 approximately $5 trillion, or 14%, of the debt. Furthermore, foreigners hold roughly $ 8.5 trillion, or 24%, of the total debt. Unfortunately, the U.S. government must cater to foreigners and accept their demands. The U.S. government can experience financial hardship if foreigners liquidate their U.S. government bonds, which the Chinese and Japanese are doing in 2025.

Many economists argue that the dollar amount of the U.S. debt is irrelevant. The U.S. debt-to-GDP ratio matters because GDP represents the economy's tax base. It is similar to comparing a household's debt to its household income. A household with a higher income can support and finance a higher debt. We depict the U.S. debt-to-GDP ratio in Figure 3. The U.S. debt-to-GDP ratio soared as the federal government bailed out large banks and corporations during the 2008 financial crisis, financed the 2020 COVID-19 pandemic, and funded the wars in Afghanistan and Iraq, in addition to uncontrolled spending by Congress and the President.

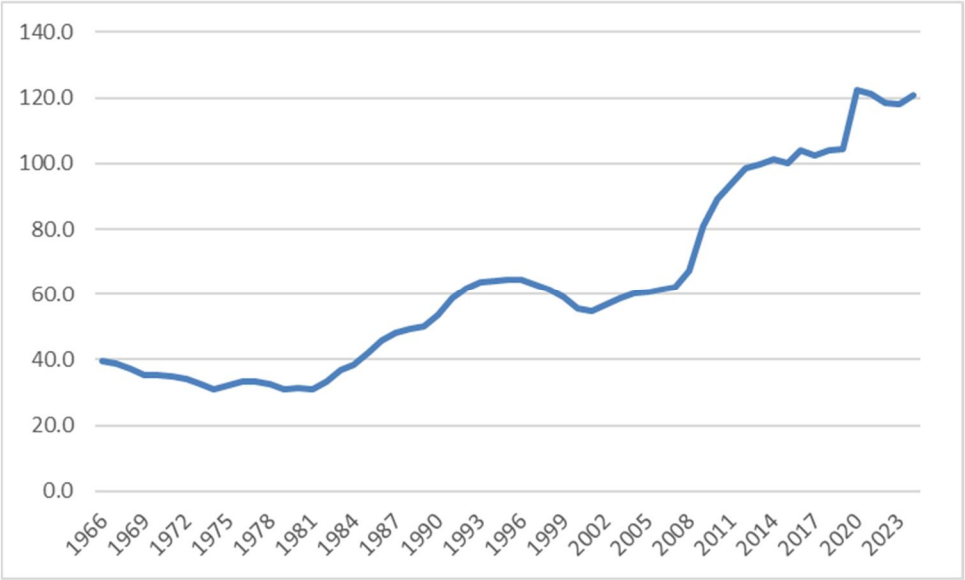


Figure 3. The U.S. debt to GDP ratio since 1966

International investors stop buying government debt when the debt-to-GDP ratio exceeds a certain threshold. For example, investors stopped buying Greek government bonds after its debt-to-GDP ratio had attained 140%. Investors became worried that the Greek government would 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. Greece uses the euro, which is controlled by the European Central Bank. Regrettably, Greece's austerity measures are devastating its economy. The Greek government is raising taxes and reducing government spending, yet its economy remains stuck in a depression. The Greek government should do the

opposite to strengthen the economy. We list the debt-to-GDP ratios for several countries in Table 3. Sudan has the highest debt-to-GDP ratio, followed by Japan. Finally, economists ranked Singapore fourth. However, some believe that the U.S. government will reach a peak in its debt-to-GDP ratio in 2025, as investors are wary of investing in U.S. government securities.

Table 3. Debt-to-GDP Ratio for Several Countries at the end of 2024

Country	Debt to GDP (%)	Absolute Debt ($ trillion)	Rank
Sudan	272%	$0.375	1
Japan	237%	$8.67	2
Singapore	174%	$0.9265	3
Venezuela	164%	NA	4
Lebanon	164%	$101.8	5
The United States	121%	$35.46	10

Key Terms

Index of Leading Economic Indicators
multiplier effect
marginal propensity to consume (MPC)
marginal propensity to save (MPS)
injection
leakage
Say's Law
fiscal policy
budget deficit
expansionary fiscal policy
budget surplus
contractionary fiscal policy
countercyclical
unemployment compensation
automatic stabilizers
recognition lag (information lag)
administrative lag (legislative lag)
impact lag
political business cycle
crowding out effect
public debt
U.S. Treasury Bills
U.S. Treasury Notes
U.S. Treasury Bonds
U.S. Savings Bonds

Chapter Questions

1. Is a growing GDP per capita good for a society's well-being?

2. A local government wants to create jobs in its community. The government found a company willing to invest in a new facility. However, the company wants a tax break. The government will grant a $1 million tax break if the firm invests $15 million. If the multiplier equals two, should the government approve the tax break to encourage a company to relocate there?

3. The local government does not know the multiplier. However, the government recorded a $5 million increase in local investment while local households and businesses earned $20 million

more. Calculate the local income multiplier.

4. The economy has entered a recession. The federal government estimates that GDP is $2 trillion below the full-employment level. If the multiplier equals 3, how much does the government boost spending to push the economy to the full-employment level again?

5. The economy grows rapidly, creating inflation. The federal government increases households' taxes by $500 billion. If the MPC equals 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 one?

7. If fiscal policy creates more problems than it solves, why do government leaders continually use it?

8. If a large government debt imposes many societal problems, why does the 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 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 an influential person in an economy. In this chapter, we build upon the aggregate demand and aggregate supply analysis to explain how changes in the money supply affect interest rates, inflation, and gross domestic product. Students need a firm grasp of aggregate demand and supply functions before tackling this chapter.

Demand and Supply of Money

Money has its market. On the one hand, the central bank supplies money, while people have a ***demand for money*** for three reasons. First, people have a ***transaction demand*** for money because they need it to make transactions, purchase groceries, pay rent, or settle credit card bills. Second, people have a ***precautionary demand*** for money; people hold money to deal with uncertainty, such as medical emergencies, or to post bail for a relative who is in jail. Finally, people hold onto cash 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 require more money to purchase additional goods and services. Thus, the demand for money is proportional to nominal GDP. Furthermore, both inflation and a growing economy contribute to an increase in 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 cost for people who hold money, as they do not earn interest by holding cash. 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%, 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, debit cards, or scan QR codes linked to their bank accounts instead of carrying cash. Thus, people reduce their demand for money.

We illustrate the demand for money (D) in Figure 1, which reflects the relationship between the real interest rate and the money supply. We represent the quantity of cash by M while the real interest rate is r. The demand for money has a negative slope because the interest rate represents an opportunity cost. As the real interest rate rises, people hold less cash. They deposit their money into banks to earn interest. One must be careful because the real interest rate removes the impact of inflation. We assume the nominal interest rate does not affect businesses and people. However, we could debate this assumption because hyperinflation often leads to the collapse of a society. Thus, the nominal interest rate becomes vital during periods of high inflation rates.

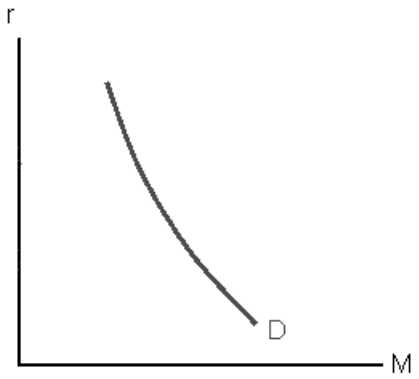


Figure 1. The demand for money

We depict a central bank supplying money in Figure 2, which we call the ***supply of money*** (S). The supply function is vertical because a central bank increases or decreases the money supply, independent of the interest rate.

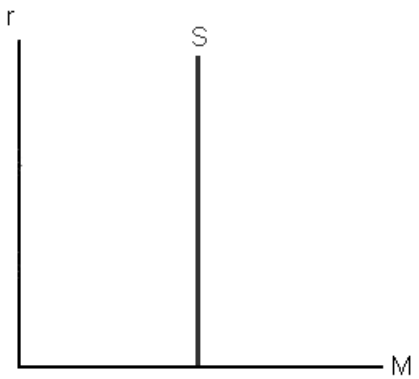


Figure 2. The supply of money

We show the supply and demand for money in Figure 3. The 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, the borrowers pay more to borrow; thus, the borrowers' cost for loans increases. Borrowers include consumers, businesses, and the government. Consumers use loans to purchase homes, cars, or appliances, while companies borrow to invest in machinery, equipment, and infrastructure. Lastly, a government borrows money to operate with a budget deficit. A budget deficit is when the government spends more than it collects in taxes. Thus, the government borrows to cover the shortfall.

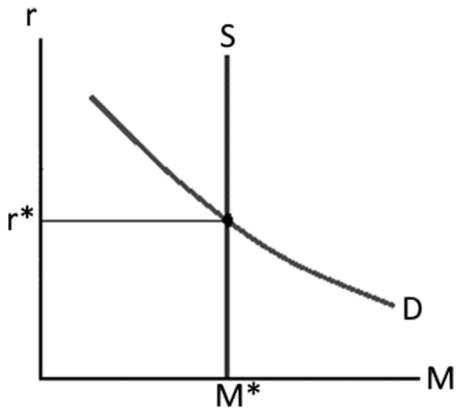


Figure 3. The demand and supply for money

Savings are on the other side of borrowing. For example, if the real interest rate increases, savers earn more on their investments. Furthermore, savers have various investment options; they can deposit their savings at banks, purchase corporate bonds and stocks, or invest in 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 by which a borrower must make 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 an annual interest rate of 15%. 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 $1,000 for interest. Hence, the business pays 10% interest (=$1,000 / $10,000).

Example 3: The U.S. government issues Treasury Bills, which are 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 less than their face value. This difference becomes the interest that investors earn.

For example, an investor pays $9,000 for a $10,000 Treasury bill. The market price of the bill is $9,000, and the investor earns $1,000 in 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, they earn $500 in interest or 5%. Consequently, we illustrate an essential result with this simple example. As market interest rates increase, bond prices decrease, and vice versa.

Monetary Policy

A central bank uses ***expansionary monetary policy*** to spur economic growth. (The Federal Reserve calls this ***quantitative easing***, as it made large-scale purchases after the 2008 financial crisis to inject trillions of dollars into the banking system.) Figure 4 depicts a central bank expanding the money supply by injecting reserves into 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 various interest rates, all interest rates would decrease. However, an expansionary monetary policy affects short-term interest rates more quickly than long-term interest rates.

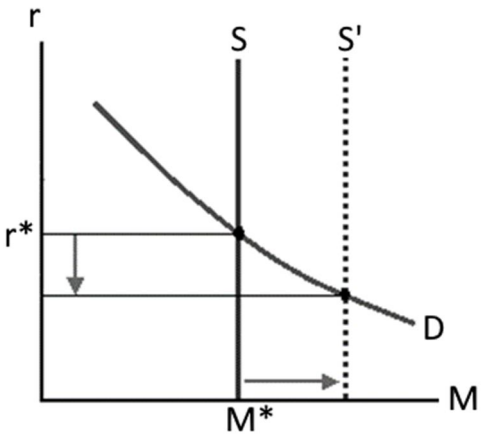


Figure 4. The impact of expansionary monetary policy on interest rates

We show in Figure 5 how expansionary monetary policy causes economic growth. The aggregate demand function increases and shifts to the right because businesses and individuals spend more as the Federal Reserve (Fed) injects more money into the economy. A lower real interest rate causes firms 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 foreigners buy cheaper domestic products. Finally, a lower interest rate increases the prices of stocks and bonds, 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 kept interest rates extremely low between 2000 and 2007, which inflated the real estate bubble by raising housing prices. As people borrowed from banks to buy land and houses, their strong demand caused housing prices to appreciate rapidly, and the U.S. economy experienced strong growth. Unfortunately, the housing bubble collapsed in 2007. Property values are falling, and people, businesses, and government will feel the bubble's effect for a decade. The government is involved because local governments collect property taxes, and the government ties the taxes to a property's value. Thus, local governments experienced budget

shortfalls and crises as they collect less property taxes. Some claim the Federal Reserve should have slowed down this bubble by raising interest rates, which would have slowed the rapidly growing housing prices.

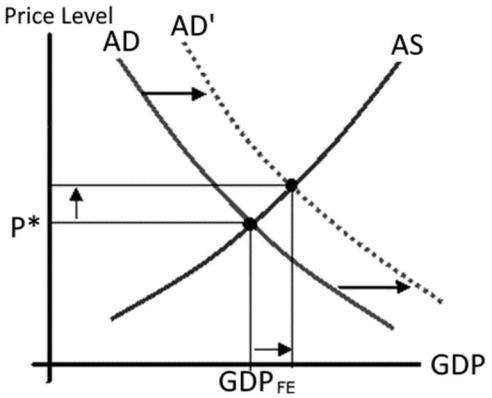


Figure 5. The impact of expansionary monetary policy on aggregate demand and supply

A ***contractionary monetary policy*** is a central bank policy that decreases the money supply, as depicted in Figure 6. The Federal Reserve refers to this as ***quantitative tightening***. Thus, the real interest rate rises while the central bank removes money from the economy. Central banks contract the money supply by removing reserves from the banking system, and the banks grant fewer loans. Consequently, the higher real interest rate causes businesses to invest less, while households may cut back on lending and credit. In 2025, the Fed needs to raise interest rates to tackle and eliminate the high inflation rate. However, the President, voters, and banks want the Fed to lower interest rates, which will likely continue to fuel the high inflation rate.

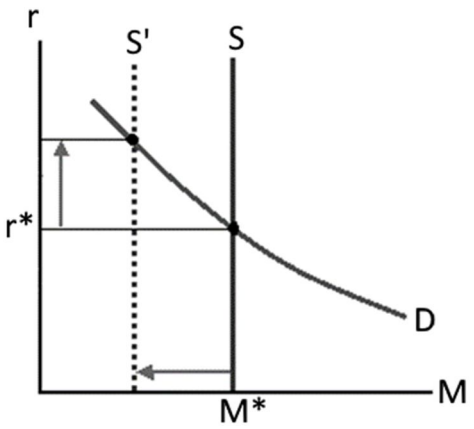


Figure 6. The impact of contractionary monetary policy on interest rates

We show in Figure 7 how contractionary monetary policy slows economic growth. The aggregate demand function shifts to the left, resulting in a decrease in GDP and the price level. The economy's impact depends on whether prices are rigid or flexible. A high real interest rate reduces investment and decreases bond and stock prices, lowering the wealth effect. Furthermore, foreign investors are attracted to the higher interest rates that strengthen a nation's currency. Unfortunately, the export industries sell fewer products to foreigners, which further contracts the economy. Finally, a strong currency encourages consumers to buy more imports because they are relatively cheaper. If prices are flexible, the economy slows until Q_1. However, rigid prices cause a larger drop in GDP at Q_2.

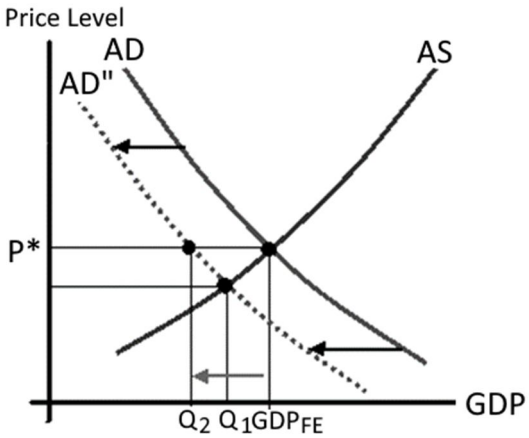


Figure 7. The impact of contractionary monetary policy on aggregate demand and supply

A central bank uses contractionary monetary policy to reduce inflation. Unfortunately, a central bank's attempt to stomp on the brakes for inflation can push an economy into a recession. Consequently, a central bank rarely uses contractionary monetary policy. In 2025, the Fed must raise interest rates to curb inflation; nevertheless, the President, businesspeople, and others disagree and want the Fed to lower interest rates, despite inflation not yet being under control.

Monetary Policy Tools

The Federal Reserve employs three primary tools to adjust monetary policy. First, the Fed's most important tool is Open Market Operations. ***Open Market Operations*** involve the Fed buying or selling assets, typically U.S. Treasury Securities. However, the Fed can buy any asset. The Fed uses this tool for monetary policy because it is very flexible. For example, if the Fed buys too many U.S. securities, it can turn around and sell them. If the Fed pursues an expansionary monetary policy, it purchases U.S. government securities, thereby injecting 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 a contractionary monetary policy, it sells U.S. government securities, thereby removing money from the banking system. In turn, banks have fewer reserves and grant fewer loans. Hence, the banking system removes cash from the economy.

The Fed can buy any asset, but usually buys U.S. government securities. The Fed buys U.S. securities from the private market because it wants to remain independent of the U.S. Treasury. If the Fed bought directly from the U.S. Treasury, then the Fed would be too close to the Treasury Department. Moreover, the Fed has no limit on its asset purchases. The Fed writes a Fed check. After the person deposits the check in a commercial bank, the bank sends the check to the Federal Reserve for payment. Consequently, the Fed raises the bank's reserves by the check amount. Theoretically, a central bank has no bounds when buying assets.

The Fed uses the Discount Rate as the second tool. The ***Discount Rate*** is the Fed's interest rate for loans to financial institutions. For example, a bank experiences a financial crisis and requests a loan from the Federal Reserve. Typically, the bank provides collateral for the Fed loan. If the Fed raises the discount rate, banks borrow less, which is a contractionary monetary policy. If the Fed reduces the discount rate, banks borrow more, which is an expansionary monetary policy.

The Discount Rate has one benefit. The Fed is the "Lender of the last resort." This was why Congress and the President established the Fed in 1914. If a bank is experiencing financial trouble and needs cash or reserves, the Fed is not the last place to go to ask for a loan. For example, the Fed extended credit to financial institutions during the 1987 stock market crash, preventing a recession. Lastly, the Fed has extended $2 trillion in loans to financial institutions during the 2008 Financial Crisis, while the Fed gears up to bail out the banks in 2025 as the United States enters a recession.

The 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 then lends out loans at higher interest rates. However, borrowing from the Fed is a privilege, not a right. The European Central Bank 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 lowering the emergency loans to banks experiencing financial hardship.

The Fed uses reserve requirements as the last tool. The ***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 for every $100 in checking accounts a bank has, the bank must hold $5 as vault cash or deposits at the Federal Reserve. The Fed rarely changes the reserve requirement because even small changes can have a significant and disruptive impact on the banking system. If the Fed pursues a contractionary monetary policy, 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 textbook on money and banking for more information.) If the Fed pursues an expansionary monetary policy, it lowers the reserve requirement. Hence, banks hold fewer reserves and can lend more, injecting this money into the economy.

The Effectiveness of Monetary Policy

The 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***): The Federal Reserve needs time to collect data. For the government to recognize that the economy has entered a recession, economists must report two consecutive quarters of negative growth in real GDP. If the government takes three months to collect data, then it needs nine months to determine 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 typically takes 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 will have already recovered from the recession. However, the monetary policy impacts the economy, the economy is growing, and consequently, the monetary policy amplifies that growth, creating inflation.

Another problem is that monetary policy can become ineffective. For instance, Japan entered a perpetual recession in the early 1990s. Businesses and consumers were very pessimistic. When the Japanese central bank, the Bank of Japan, lowered its interest rate to zero in 1999, it had a minimal impact on the economy. The Bank of Japan maintained the interest rate at zero or even negative until 2024, which led to a small crisis as global investors had to unwind their investments. Investors would borrow from Japan at very low rates and invest in international investments, but this came to an end when the Bank of Japan raised interest rates for the first time in over a decade.

Economists use the concept of cyclical asymmetry to explain Japan's economic problems. ***Cyclical asymmetry*** refers to a contractionary monetary policy that is consistently effective, whereas expansionary monetary policy can sometimes become ineffective. Thus, low interest rates do not change behavior, but high interest rates do. Some experts believe that a central bank should pursue only one target: inflation. Consequently, a central bank should focus on maintaining a low inflation rate rather than promoting economic growth. For example, the central banks in Canada, the Eurozone, New Zealand, Sweden, and the United Kingdom have maintained low inflation rates, thereby strengthening their currencies over time. If an economy experiences an inflation rate of 10% or higher, it is likely that a central bank is rapidly expanding the money supply. Lastly, countries that maintain their central banks' independence from government tend to have lower inflation rates because central bankers can focus on achieving low inflation and other objectives, rather than helping governments finance budget deficits.

The Liquidity Trap

Maynard Keynes explained why monetary policy becomes ineffective during a severe economic downturn, which he referred to as the ***Liquidity Trap***. Traditionally, a central bank buys bonds from the private market, injecting cash into the banking system. 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, bond prices become equivalent to cash, a liquid asset; hence, the term "Liquidity Trap." If a central bank buys bonds to expand the money supply, the interest rate decreases slightly, which has a minimal impact on the economy.

We can view the Liquidity Trap from a different angle. Lower interest rates should encourage businesses to invest in machines and equipment while consumers invest in new homes, cars, and appliances. However, people, banks, and companies hoard the cash and do 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 States 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 the effectiveness of monetary policy.

1) When a central bank buys assets from private banks or individuals, it receives the asset and deposits its check into the banking system. During regular times, banks lend funds, but during severe contractions, they 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. Families may not want to buy assets that drop in value, especially houses and condominiums. On the other hand, banks may be reluctant to lend for assets with falling property values, particularly if borrowers use the property as collateral for the loan.

3) Businesses reduce investment during economic downturns 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 short-term interest rates toward zero, the funds remain trapped within the banking system. Consequently, expansionary monetary policy becomes ineffective.

Key Terms

demand for money
transaction demand
precautionary demand
store of value
quantitative tightening
open market operations
discount rate
reserve requirements

interest rate
supply of money
maturity
expansionary monetary policy
quantitative easing
contractionary monetary policy
recognition (or information) lag
administrative lag
impact lag
liquidity trap
cyclical asymmetry

Chapter Questions

1. Appraise the change in the demand for money if a new technology like debit cards, credit cards, and QR codes causes people to carry less cash.

2. If the interest rate rises, what happens to bond prices in the market?

3. The 2007 Great Recession was severe. 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, while the stock and real estate prices soar?

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 the government?

16. Regulation of 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 it into financial institutions. In turn, the financial institutions lend to businesses and families. Companies invest in machines, equipment, and buildings, while consumers buy homes, cars, and appliances. Suppose companies and households have no faith in the financial institutions and save their money by hiding it in a safe or under a mattress. In that case, they do not reinvest this money into the economy. The banks would not have funds to lend to borrowers. Consequently, an economy needs well-functioning financial markets and institutions to create wealth. The banking industry is a vital financial institution, and the U.S. federal and state governments have a long history of heavily regulating it.

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 many banks to form with small asset sizes compared to other industrialized countries. The government has five reasons to regulate the banking system, which include the following:

Reason 1: The United States government wants a stable financial system. A wave of bank failures could disrupt the economy as it enters 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: The central bank regulates the banks to achieve national economic goals and helps control the money supply. The central bank aims for a growing economy that generates jobs and wealth.

Reason 3: The U.S. government wants to promote efficiency in the financial intermediation process. ***Financial intermediation*** is when borrowers save money by depositing it in financial institutions. Then financial institutions lend money to businesses, which in turn invest in buildings, machinery, and equipment. Consequently, the investment enables companies to expand their production.

Reason 4: The 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 exacerbated the collapse of the U.S. housing bubble in 2007, which triggered the 2008 Financial Crisis.

Reason 5: The U.S. government wants to protect consumers. Financial systems, such as banks, can be complicated because many depositors may not fully understand the financial instruments. Therefore, they cannot assess the institution's financial soundness or make rational decisions. For example, consumers can evaluate and compare products in competitive markets for TVs, smartphones, and computers. However, depositors may not understand complex financial instruments.

The United States banking system differs from other industrialized countries. The U.S. government passed the ***McFadden Act***, prohibiting any commercial bank from opening 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, resulting in the U.S. having more banks per capita. U.S. banks have smaller assets compared to those in other industrialized countries. Consequently, the United States has the largest number of banks globally, with 9,459 in 2010. The U.S. banking industry continues to consolidate, with the total number of banks decreasing to 3,928 as of 2024.

The United States has a ***dual banking system***. A bank chooses a charter from a state government or the U.S. federal government. A 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, it is referred to as a ***national bank***. If a bank receives a state government charter, it is referred to as a ***state bank***.

If a bank receives a charter from the federal government, then that bank is subject to three federal regulatory agencies, which include the following:

The ***Comptroller of the Currency*** is an office in the U.S. Treasury Department that regulates national banks. The office grants charters on behalf of the U.S. federal government and requires national banks to become members of the Federal Reserve and the Federal Deposit Insurance Corporation. As of 2024, the United States had 1,036 national banks with total assets of $16 trillion, accounting for 66% of the country's total bank assets.

The ***Federal Deposit Insurance Corporation (FDIC)*** insures deposits at banks. If this agency insures, then it also regulates. FDIC is a public corporation that receives funding by assessing bank insurance fees. The FDIC insured 3,928 member banks in 2024.

The ***Federal Reserve System (Fed)*** is the central bank of the United States. The Fed is a ***lender of the last resort***. When a bank experiences financial difficulties and cannot obtain a loan from another financial institution, it can request a loan from the Fed. Of course, the Fed also regulates banks.

A state-chartered bank has fewer regulations. A state government agency regulates state banks, and state banks can join the Fed and/or the FDIC. Thus, 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

The United States government enacted numerous laws during the Great Depression, expanding the federal government's regulatory powers. One law, the ***Glass-Steagall Banking Act*** of 1933, imposed significant changes in the U.S. financial markets. The Glass-Steagall Banking Act divided the functions of investment banking and commercial banking. An ***investment bank*** serves as a marketing agent for selling new stocks and bonds, whereas a ***commercial bank*** is a financial institution 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 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 have underwritten new securities.

The Glass-Steagall Banking Act established the Federal Deposit Insurance Corporation (FDIC). The U.S. government created the FDIC to lower the rate of bank failures by preventing bank runs. A ***bank run*** occurs when depositors believe their bank is experiencing financial difficulties. Consequently, everyone runs to the bank to withdraw their deposits. A bank holds merely a fraction of the total deposits because it grants loans, and banks cannot easily convert these loans into cash. Thus, only some depositors will get their money back. A bank will close its doors after customers drain all the cash from the vault. Unfortunately, a bank can be financially healthy, but rumors that it is experiencing financial trouble can trigger a bank run, ultimately leading to a bank failure.

A bank run on one bank can lead to bank runs on other banks, a phenomenon known as ***contagion***. As depositors line up at one bank to withdraw their accounts, few will receive their money back. Then the depositors tell friends and family, and they begin to question the financial health of their banks. Many people struggle to assess the economic health of banks. Subsequently, friends and family start withdrawing their funds from their banks, triggering further bank runs. As the contagion spreads, it triggers a wave of severe bank runs known as financial panics. ***Financial panics*** can cause the economy to enter a recession or even a depression.

The FDIC was very successful in preventing bank runs. Between 1934 and 1981, the average number of bank failures per year was 10. Before the U.S. government created the FDIC, bank failures had averaged 2,000 per year during the Great Depression.

Member banks are required to pay insurance premiums to the FDIC, which amounts to approximately $100,000 per year. Unfortunately, the insurance rates doubled in 2009 because 140 banks failed in 2009 after the 2008 financial crisis. The FDIC assesses deposit insurance using a formula that includes the probability 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 up to $250,000. For example, if we deposit $150,000 in our checking account and $150,000 in certificates of deposit, the FDIC only insures up to $250,000 in total. If our bank fails, the FDIC guarantees that we will receive at least $250,000, potentially losing up to $50,000. In some cases, the FDIC has insured all deposits for amounts exceeding $250,000; in other cases, it has not. It depends on how the FDIC handles a bank failure.

The FDIC uses two methods to handle bank failures.

The First Method: The 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 the FDIC does not receive enough money to pay all depositors from selling the bank's assets, then the FDIC pays the difference from its funds. Hence, the FDIC does not often use the first method.

The Second Method: The 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, it can offer additional incentives, such as low-interest-rate loans, or buy the bad loans from the failed bank's portfolio.

The federal government has circumvented its law. The U.S. government passed the McFadden Act, which prohibited banks from crossing state lines and opening branches in another

state. However, the FDIC permits a bank located in one state to acquire 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 the brink of bankruptcy during the 2008 Financial Crisis, the federal government encouraged investment and commercial banks to merge. The Federal Reserve and the FDIC were unable to cover the losses of the investment banks. The FDIC took control of billions of dollars in non-performing loans as an incentive for banks to acquire failed banks, while the Federal Reserve granted $2 trillion in emergency loans.

Circumventing Bank Regulations

U.S. and state governments have 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 bypass a country's rules and regulations using six methods.

The First Method: Banks formed bank holding companies to circumvent banking regulations. A ***bank holding company*** is a corporation that obtains ownership or control of two or more independent banks. A bank holding company can do three things.

- First, a 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. The majority 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 acquire other nonbank companies and enter into various spheres of economic activity, such as data processing, investment advice, and insurance. ***Universal banking*** is a government that allows banks to participate in non-financial activities.

- Third, a bank holding company can raise non-deposit funds. For example, a bank holding company controls one bank, which in turn requires funds. The holding company issues financial securities and diverts the funds to the bank. For example, before the 1970s, banking regulations imposed numerous restrictions on the interest rates that banks could pay on deposits. Consequently, bank holding companies circumvented these restrictions.

The Second Method: Financial institutions created ***nonbank banks*** to circumvent federal and state regulations. The 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, allowing it to circumvent the extensive banking regulations.

The Third Method: Financial institutions created new financial securities to circumvent federal regulations. Before the 1970s, banks were not allowed to pay interest on checking accounts.

Thus, the banks created mutual funds that circumvented this restriction. A ***mutual fund*** pools money from many investors into a single fund, and the fund manager invests the fund's assets in various stocks. Consequently, investors have reduced risk by diversifying their stock holdings. For example, we started our mutual fund and bought 30 corporate stocks. Coca-Cola stock rises one day while IBM stock falls. The average of the fund's 30 stocks will earn a return. Then we sell shares of our mutual fund to friends and family.

Nonbank financial institutions introduced ***Money Market Mutual Funds (MMMFs)***. MMMFs are similar to mutual funds, but the fund managers invest only in money market securities. ***Money market securities*** have a maturity of less than a year, such as U.S. Treasury Bills and certificates of deposit (CDs). A CD is similar to a savings account. However, a depositor cannot withdraw these funds until maturity. If this person withdraws early, then they forfeit the interest. Money markets exclude stocks and corporate bonds because they are long-term securities. Lastly, 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 it in MMMFs. Consequently, banks created their equivalent, the ***Money Market Deposit Accounts (MMDC)***. MMDA and MMMF are the same, except that commercial banks offer MMDAs, which the FDIC insures. Therefore, banks could now pay interest on checking accounts through MMDAs.

The Fourth Method: Banks could circumvent regulations by using ***automated teller machines (ATMs)***. Modern computer technology enables customers to access banking services through computer terminals located in banks, stores, and shopping malls. Customers can deposit or withdraw funds, as well as conduct credit-card transactions. Technically, ATMs are not bank branches and are not subject to branch banking restrictions. Therefore, banks typically locate ATMs a distance away from their main bank locations. Many banks have created networks that allow customers to access their accounts worldwide, using any bank's ATM, including ATMs from different banks. Cirrus and Star are the two largest networks allowing consumers to use ATMs worldwide.

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 knows the customer's bank will pay the funds once the transaction is completed. Lastly, banks introduced QR code payments, which allow customers to scan a QR code at a seller or vendor using their smartphones to transfer bank funds.

The Fifth Method: Businesses and individuals can move money outside their country to avoid their government's regulations. ***Globalization*** refers to the process by which countries facilitate the free flow of products, services, and capital across international borders. Globalization rapidly increased after World War II, driven by three primary 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 require financing to conduct business in foreign countries and thus work with global banks.

The Sixth Method: Some countries have few 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 individuals open accounts 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 faces difficulties in regulating activities outside the country or gathering information about a bank's activities abroad. After the September 11, 2001, terrorist attacks on the United States, many countries cracked down on offshore banking because they wanted to identify and seize funding for terrorist activities. However, governments have broadened their power to seize funds from any activity.

The political climate in the United States is changing. 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, and offer investment advice and brokerage services. The banking industry will experience two trends. First, banks will acquire other banks, resulting in a reduction in the number of banks in the United States. Second, as banks merge, they become larger due to the growth in their asset size. Consequently, U.S. banks will approach the size of Japanese and German banks, which have traditionally been significantly larger.

The 2008 Financial Crisis caused many commercial and investment banks to teeter on the brink of bankruptcy. The U.S. federal government bailed out the banks and corporations by purchasing 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. The 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. The trend is that 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. The central bank in the United States is the Federal Reserve System, commonly referred to as the "Fed." A central bank could provide 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. The 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 the percentage of deposits that a commercial bank must hold as cash or as a deposit at the Federal Reserve. Thus, banks have money when depositors come to the bank to withdraw their funds.

Function 6: A central bank prevents financial panics. The Federal Reserve is a "lender of the last resort." A bank experiencing financial trouble can request a temporary emergency loan from the Fed. 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 the same amount. We refer to the difference as the ***discount***, which reflects the interest rate that the Fed charges for the loan. The Fed can adjust the interest rate on its loans, which is referred to as the ***discount rate***.

The U.S. government did not create the Fed to alter the money supply, manipulate interest rates, or influence currency exchange rates or financial markets to achieve economic goals. The 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, it also indirectly influences the financial markets and the entire economy. Thus, the Fed's goal is to increase society's well-being as measured by the gross domestic product. Consequently, a growing society produces more goods and services, which in turn creates more jobs and wealth.

We refer to this as ***monetary policy*** whenever the Fed uses its powers to influence the economy. The Fed employs ***expansionary monetary policy*** to increase the money supply, while ***contractionary monetary policy*** reduces it. We list the impact of monetary policy on an economy in Table 1. Therefore, the Fed indirectly influences the financial markets, interest rates, exchange rates, inflation, the growth rate of the U.S. economy, and unemployment.

Table 1. How Monetary Policy Impacts an Economy

	Expansionary Monetary Policy	Contractionary Monetary Policy
Money supply	Increases	Decreases
Interest rates	Decreases	Increases
Prices of stocks and bonds	Increase	Decrease
Inflation	Increase	Decrease
Exchange rate (U.S. dollar)	Weakens	Strengthens
GDP growth with low inflation	Increases	Decreases
Unemployment rate with low inflation	Decreases	Increases

The Board of Governors manages the Fed, and the chairperson serves as its leader. Consequently, the chairperson of the Federal Reserve is an influential person. The chairperson can advise the President, inform Congress of the Fed's actions, and be a spokesperson for the Federal Reserve System. When he speaks, the financial markets listen. The current chairperson is Jerome Powell, whom many consider the second most powerful man in the United States, next to the U.S. president. Many people, including President Trump, are not happy with the chairman in 2025. The Fed chair is attempting to address the high inflation plaguing the U.S. economy by

raising interest rates, which may, in turn, lower economic growth. Meanwhile, everyone wants lower interest rates to stimulate the stagnant economy, potentially fueling the inflation rate.

A central bank uses monetary policy to influence six critical economic variables. We list the variables:

Variable 1: The Fed maintains stable prices by ensuring ***price stability***, as prices convey information to households and businesses. Households determine how many goods to buy, while businesses determine how many goods to produce. ***Inflation*** is a continual rise in the 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's injection of cash into the economy causes the economy to grow quickly and lowers unemployment. If the inflation rate exceeds 100% per year, people stop accepting money, leading to societal breakdown. Unfortunately, as the inflation rate becomes higher, it becomes more variable. Variability causes businesses, consumers, and workers to become uncertain about the future, leading them to change their behavior and decisions, which in turn lowers economic activity.

Variable 2: ***Economic growth*** occurs when an economy produces more goods and services, thereby increasing the real GDP. A high real GDP growth rate reduces unemployment as producers earn profits and hire workers. Moreover, businesses invest in capital that fuels higher production of goods and services. Another significant benefit is that the local, state, and federal governments collect more tax revenues as people and businesses earn higher incomes. Consequently, the Fed employs expansionary monetary policy to foster robust economic growth.

Variable 3: The Fed and the federal government want ***low 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 fails to utilize all its resources, the economy's GDP grows slowly or contracts. Less activity means the government collects fewer tax revenues. Unfortunately, the government cannot lower the unemployment rate to zero. Unemployment results from workers who quit their jobs and seek new ones, or from students who graduate and enter the labor market. Every economy will have unemployment that economists refer to as the natural rate of unemployment. The Fed tries to reduce the unemployment rate to the natural rate of unemployment. Economists currently estimate the natural unemployment rate in the United States to be 4.4%. If the Fed strives for an unemployment rate of less than 4.4%, its monetary policy can lead to inflation.

Variable 4: ***Financial market and institution stability:*** The Fed stabilizes the financial system by lending funds to financial markets during financial panics. Financial panics, bank runs, stock market crashes, or the bankruptcy of large financial institutions can trigger a chain reaction that causes other financial institutions to fail. Unfortunately, a financial panic severes the link between savers and investors. Consequently, businesses will not receive the loans they need to invest, while customers are unable to borrow to buy homes, cars, and other assets. If the financial market and institutions collapse, the economy enters a recession, which fuels high unemployment and negative GDP growth rates. If the Fed lends to banks, it uses expansionary monetary policy, indirectly increasing the money supply. On the other hand, the Fed reduces its loans using contractionary monetary policy, shrinking the money supply.

Variable 5: ***Interest rate stability*** occurs when the Fed stabilizes interest rates, as fluctuating rates create economic uncertainty, making it difficult for people and businesses to plan for the future. Businesses become uncertain about investing in new buildings, machines, and equipment, while consumers are unsure about long-term investments, such as buying a house or car. Some investors may have variable-rate loans where monthly payments change as the market interest rate changes. Interest rate stability is closely tied to the stability of financial markets. Large swings in interest rates cause significant capital gains and losses in the financial markets. Some investors will earn profits, while others will incur losses. Thus, expansionary monetary policy lowers the interest rates, while contractionary monetary policy increases them.

Variable 6: ***Foreign-exchange market stability*** is when 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 purchasing cheaper foreign products boost imports, while U.S. businesses sell fewer products abroad, resulting in a decrease in 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 maintain stability through expansionary monetary policy, which injects more dollars into the economy and the global financial system. If the world has more U.S. dollars relative to other currencies, then people value dollars less because they are less scarce and weaken 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 an expansionary monetary policy to increase the national output and reduce unemployment, it could create inflation and weaken the U.S. dollar on the foreign 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 run
contagion
Money Market Mutual Funds (MMMF)
money market securities
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

financial panics
bank holding companies
universal banking
nonbank bank
mutual fund
low unemployment
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 the 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 market attracted significant funds, contributing to the expansion of the U.S. housing bubble. Where did the banks get this money?

6. The Internet is another financial innovation. How could people and businesses use the Internet to circumvent regulations?

7. Housing prices soared in the United States, creating the U.S. housing bubble that burst in 2007. Some blame the Fed because it kept interest rates low. Could the Fed have prevented the housing bubble?

8. The Federal Reserve wants to strengthen the U.S. dollar. Which monetary policy should the Fed use? Does the Fed have any consequences for using 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 typically do not directly involve themselves in the tourism industry. Private businesses own the tourist industry, while supply and demand determine market prices and quantity. Consequently, the tourist industry is highly competitive in developed countries, creating seasonal jobs with low salaries and high turnover rates. Many people consider these jobs to have low status, often involving menial work. Furthermore, developed countries offer alternative employment with better pay and benefits. Lastly, local governments become involved in the tourist industry because tourism boosts spending in the local economy.

On the other hand, national governments in developing countries take an active role in tourism and economic development. Tourism increases incomes, creates jobs, increases the tax base, and becomes an essential source of foreign currency earnings for a country. Consequently, a national government in a developing country may intervene heavily in the tourism industry to maximize the benefits from tourism and prevent exploitation and waste. Thus, many consider tourism an industry without smokestacks. Hence, this chapter provides an overview of tourism and its relationship with economic development.

The Government's Role in Tourism

An important step that many overlook is that a tourist destination must have something to attract international tourists. For example, Thailand has beautiful sandy beaches, Switzerland has tall, majestic mountains, and Italy and Greece have ancient sites, ruins, and cultures that attract tourists. Other attractions include health tourism. Tourists flee expensive healthcare costs in the United States and head to China, India, and Malaysia for cheaper healthcare or visit doctors who perform experimental, unapproved surgeries and treatments. Finally, tourism, by definition, is a hedonistic activity where tourists want pleasure and satisfaction. Consequently, some tourist destinations have thriving black markets filled with drug dealers and prostitutes.

A government faces a high risk of developing a new tourist destination because the tourist industry is competitive. 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 laid off over 40,000 autoworkers during the 1980s. The city government tried to revive the local economy by developing a tourist industry. The 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 went bankrupt. On the other hand, some risks paid off. Dubai's government attracts millions of tourists annually 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 significant concerns for international tourists. International tourists come from high-income countries, such as Australia, Canada, Europe, and the United States, because tourists must have leisure time and the financial resources to pay the traveling costs to another country. Consequently, international tourists visit politically stable areas and

avoid countries with coups, protests, violence, and terrorist activities. Thus, the government must protect the public safety of the tourists. The government also institutes regulations to safeguard tourists and enhance their travel experiences. Accordingly, a government implements consumer protection laws and rules, hotel fire safety laws, health and food-safety regulations for restaurants, and licenses for persons and businesses, such as tour operators, travel agencies, hotels, restaurants, and others.

The government pays many costs to use tourism for economic development. First, it must improve the infrastructure and facilities. The government is usually the lead developer and controls the development of a new tourist destination because the private sector may not have the financial resources. Furthermore, the government controls zoning laws and building safety codes. It invests in an international airport, builds new roads and highways, and installs a network of pipes for drinking water and wastewater. A government passes new laws and regulations to protect the environment and natural and cultural resources. It may invest in national parks, market the country and tourist destinations to the world, and subsidize education and training for workers in the tourist industry. Lastly, many universities offer degrees and training in hospitality and tourism.

Tourism development imposes high ***opportunity costs*** upon a government. A government invests in the infrastructure and controls and monitors the border. The government enforces customs 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 in tourist destinations. Consequently, a government may reduce programs for its citizens, such as education and health programs. These opportunity costs are not necessarily bad. Although a government may invest heavily in 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 of tourist sites. Books, magazines, newspapers, satellite, and cable links influence tourists and where they visit. Usually, tourists do not see 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 in Yugoslavia lost over one million bookings in 1991. Two years after the War, Slovenian tourism was still below pre-war figures. As another example, the Maoist terrorist group, the Shining Path, attacked the Peruvian government during the 1980s. Tourists avoided Peru as the number of 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 the president of 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 about the risks of traveling to specific destinations. Tourists usually listen to the warnings and avoid countries with warning advisories. Consequently, governments could apply political pressure to promote or sanction particular countries. A ***sanction*** is when one country punishes another country, such as advising its citizens not to visit a country, creating economic hardship for a nation.

Economic Impact of Tourism

Tourism is a strong potential 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 industry. Every year, consumers buy goods and services, which we denote by consumption, C. Businesses invest in buildings, machines, and equipment, which we represent by gross investment, Ig. Gross investment includes all investments, including businesses replacing worn-out, outdated machines and equipment. Furthermore, the government funds 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 (Xn) is exports (X) minus imports (M). A positive trade balance indicates that a country exports more goods and services than it imports, causing a net inflow of foreign currencies into the country. A negative trade balance occurs when a country imports more goods and services than it exports, leading to a net outflow of its currency.

$$GDP = C + I_g + G + X_n \quad (1)$$

Tourism can increase GDP because the government views international tourists as invisible exports. Tourists bring their foreign currencies to 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 toward positive or significantly reduce negative net exports. Furthermore, businesses may invest in and build new hotels, restaurants, and entertainment facilities. Finally, the government spends more because it maintains and updates the infrastructure at the tourist destination.

Tourism creates a ***Keynesian multiplier effect***. As tourists buy goods and services at a tourist destination, they inject spending into the economy, creating jobs and boosting residents' incomes. We derive the multiplier in the last section of this chapter.

A developing country relies on international investment from developed countries. Tourism fosters an awareness of a market economy, which causes a government to establish a pro-business environment while encouraging global business investment. Hence, foreign investment creates many benefits for developing countries. First, foreign investment still has a Keynesian multiplier effect on the economy. Second, the foreign companies bring technology and expertise to the tourist destination. Third, foreign companies improve the quality, sell products and services at 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 foreign companies that have significant investments in know-how and technology. Local companies may lack this know-how or technology. Second, substantial foreign investment may increase investment costs, placing local

companies at a disadvantage. For example, foreign companies buy properties along a beach, raising real estate prices for coastal properties. Then the local businesses cannot afford the beach properties. For example, foreign tourists have driven up prices in Phuket, Thailand, forcing Thais to relocate outside the area because of the high living costs within the city. Third, foreign companies hire expatriates, especially high-level managers and technicians. Thus, they send most of their salaries to their home country. Fourth, foreign companies may not buy from 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*** comprising between 40 and 50% of the labor force. The 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. Some tourist business owners do not pay taxes or follow all the rules and regulations. Consequently, their economic contribution is not included in GDP, while the government has problems regulating the informal sector.

The 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, and tour guides; they rely on local resources and suppliers. Furthermore, the tourist industry is labor-intensive, and they acquire skills outside formal schooling. Although the informal sector may be large, a symbiotic relationship between the formal and informal sectors could exist. The informal sector depends on the formal sector to supply specific inputs. In contrast, the formal sector depends on the informal sector for low-cost labor, products, and services.

Workers usually earn greater wages in the informal sector than in 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. The informal workers are exposed to foreign lifestyles, languages, and materialism and may emulate the tourists. Tour guides are popular in developing countries, where they are considered to have 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 because 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, offset manufacturing declines, or revitalize urban areas. Moreover, countries with few natural resources or a lack of export industries can benefit from tourism. Third, tourism is essential for investment, especially in 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 low-income 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, creating income and employment opportunities for the local population. Although tourist jobs are seasonal or part-time, they reduce the ranks of the unemployed. 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 more than the agriculture and fishing industries. Lastly, tourism creates opportunities for students and women, raising their standard of living.

The Tourist Industry in Bali, Indonesia

Bali, Indonesia, has a thriving tourist industry that helps the country overcome obstacles to economic development. Most of the population has a primary education, and some parts of Indonesia may lack even that. Then the artisans who create trinkets, knick-knacks, 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 government licenses or evade taxes. Nevertheless, the workers in the informal sector are not marginalized. They are independent entrepreneurs who speak one or more foreign languages. Thus, the formal sector does not dominate the economy because workers in the informal sector earn more than the minimum wage.

Poor males migrate to Bali from the depressed areas of Indonesia. Migrants work 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. The ***caste system*** is a society that conforms to a strict hierarchy of social classes and comes from the Hindu heritage. The bottom social class is the poor, and it is also 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 into an economic class system. The public views the hotel employees, tour guides, and owners of a kiosk or tourist business favorably, as they hold high positions in the new caste system while earning foreign currencies.

People in developing countries view tourist jobs favorably, and the tourist industry can be vital for employment in some countries. For instance, about 25% of Cyprus's population is employed in its tourist industry. Furthermore, developing countries have formal schools to train workers for the hospitality industry, so they provide better service and experience for tourists. Finally, a country may have unique traditions and cultures to share. Tourism can lead to a better understanding between different civilizations.

Problems of Tourism

Tourism brings many problems that counter economic development. For instance, international tourists pay higher prices than domestic tourists, which creates ***inflation***. Tourism creates greater demand for land, property, goods, and services, boosting market prices. Unfortunately, the price increases are usually permanent, and the cost of living rises for the residents, even those not involved or employed in the tourist industry. Suppose the prices rise too much at the tourist destination. In that case, residents may not enjoy or visit the recreational areas and facilities, which is why foreigners are displacing the Thais in Phuket, Thailand.

Tourism imposes high opportunity costs upon the government. If the government invests in a tourist facility, program, or service, it cannot use the funding for something that benefits its citizens directly. Consequently, the government should use cost-benefit analysis to determine if its investment and commitment create a tourist destination efficiently. A ***cost-benefit analysis*** itemizes all the benefits and costs of 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, negatively affecting the destination. For example, approximately 22.4 million tourists visited Malaysia in 2010, and 13.0 million came from Singapore. In this case, we calculate the ***dependency ratio*** from the equation below, which equals 58%. If Singaporeans decide not to visit Malaysia, Malaysia's economy will be devastated as the tourism industry contracts.

$$dependency\ ratio = \frac{tourist\ arrivals\ from\ primary\ market}{total\ tourists} \cdot 100\%$$

$$dependency\ ratio = \frac{13.0\ million}{22.4\ million} \cdot 100\% = 58\%$$

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. Lastly, Ryo Tatsuki wrote a comic book, *The Future I Saw*, in which she predicted a massive earthquake to hit Japan on July 5, 2025. Tourism took a nose dive several months before July because several of her predictions, such as the 2011 Tohoku Tsunami, came true. July 5, 2025, has come and gone without a major earthquake.

A tourist destination may have one or two peak seasons. Tourist businesses could 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 are rarely union members. Some businesses, such as hotels and restaurants, shut down for part of the year. Thus, a tourist destination with 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 in a tourist destination has social consequences. 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. Residents in poor regions of the country will migrate to the tourist site, encouraging urbanization and overcrowding. Unfortunately, large cities suffer from overcrowding, traffic jams, and severe congestion. Consequently, the 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 about their horrible vacation at a particular tourist destination. Word-of-mouth advertising may harm future tourist arrivals.

A tourist industry may damage family structures. Women earning high salaries in the tourist industry may fight with their husbands and parents. For instance, Mexico has more female heads of households living in tourist destinations. Tourism may decrease morality, while the poor beg and harass the visitors. In addition, a tourist destination can experience an increase in crime, particularly crimes against visitors, as locals often view them as targets of opportunity due to their wealth. Unfortunately, drug users and prostitutes thrive at tourist destinations as they sell their services to anyone. 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 earn profits. 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 international tourists damage their destinations, they travel to new, pristine destinations.

The tourist industry, especially in developing countries, has a high leakage of tourist earnings. For example, visitors prefer an airline from their home country rather than an airline from the destination country. Consequently, 80% of travelers' expenditures go to airlines, hotels, and other international companies. Some tourists may prefer imported food, goods, and services, which causes more foreign currency to leak from a country. Unfortunately, the local businesses and workers do not share the revenue generated from tourist activities.

The Derivation of the Tourist Multiplier

International tourists create a ***Keynesian multiplier effect*** that boosts GDP, creates jobs, and increases the tourist destination's tax base. 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, hotels, restaurants, and entertainment. The ***direct effect*** is the first line of businesses that cater to tourists and receive their money.

Effect 2: Tourist spending creates ***indirect effects*** because hotels, restaurants, transportation, and entertainment companies earn greater revenues from tourists. Consequently, the tourist

businesses purchase supplies and use local services, hiring more workers and/or raising workers' salaries. They inject tourist spending into the economy.

Effect 3: Tourist spending creates ***induced effects***. Residents have higher incomes and spend more, creating 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 that one dollar in tourist spending could boost income by more than one dollar at the tourist destination.

We derive the tourism multiplier, starting with the aggregate expenditures in Equation 2. Aggregate expenditures (AE) sum all expenditures in society by sectors, i.e., consumers, businesses, government, and the international sector. Consumers have a total consumption level of C; businesses invest a total gross investment of Ig; government spending is G, while the global industry is total exports (X) minus total imports (M):

$$AE = C + Ig + G + X - M \tag{2}$$

The second equation is the equilibrium condition, AE = GDP. Aggregate expenditures are the total spending on 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, that economy produces more than what it consumes. Thus, businesses accumulate unwanted inventories, which causes them to decrease their production until GDP = AE again. If GDP is lower than aggregate expenditures, 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, such as savings, taxes, and imports. Imports are a leakage because money leaves the country. On the other hand, an ***injection*** pumps money into an economy, spurring economic growth. Injections include government spending, investment, and exports. Consequently, the injections equal the leakages. For example, investment matches 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 more money into an economy than what they remove. Aggregate expenditures must exceed aggregate GDP, causing economic growth. Of course, the opposite could occur. If total leakages exceed the injections, the economy must contract as the 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 independent of income, which we call the autonomous level of expenditure, A, in the consumption function. ***Marginal propensity to consume (MPC)*** is the slope of the consumption function. For every dollar of after-tax income a consumer earns, he or she saves a

portion, which is the ***marginal propensity to save (MPS)***. He or she spends the remaining proportion, which is the marginal propensity to consume. Lastly, the intercept, A, is usually positive. At zero income, consumers still have to consume, i.e., they still need food and shelter to survive.

$$C = A + MPC \cdot GDP \tag{3}$$

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 increases by one dollar. For example, if MPM = 0.5, a one-dollar increase in GDP leads to a 50-cent increase in imports.

$$M = MPM \cdot GDP \tag{4}$$

The marginal propensity to import could be high for a tourist destination because it has high import leakages. Small developing countries may leak 40 to 50% of their 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 the 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 sectors that 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 destination. If local people owned more tourist businesses, such as hotels, then the money would remain inside the country. Moreover, 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 of the goods and services tourists consume.

A tourist destination may experience a high leakage of tax revenue flowing out of the tourist region, or the workers in the tourist industry are phenomenal savers. Currently, we have excluded taxes in the analysis. However, if workers are high savers, 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. Lastly, the expatriates hold high managerial positions and 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, which yields Equation 5.

$$AE = GDP = C + Ig + G + X - M \quad (5)$$

We substitute the consumption function and the total import equation into Equation 5, which yields Equation 6.

$$GDP = A + MPC \cdot GDP + Ig + G + X - MPM \cdot GDP \quad (6)$$

Collect and move all the GDP terms to the left-hand side of the equation, yielding Equation 7:

$$GDP - MPC \cdot GDP + MPM \cdot GDP = A + Ig + G + X \quad (7)$$

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:

$$GDP = \frac{1}{1-MPC+MPM}[A + Ig + G + X] \quad (8)$$

Then we solve the following equation, MPC + MPS = 1, for MPS and substitute it into Equation 8. The equation, MPC + MPS =1, is true by definition. If a consumer receives one more dollar in income after paying taxes, they have two choices: save or spend it. We can calculate the GDP in Equation 9.

$$GDP = \frac{1}{MPS+MPM}[A + Ig + G + X] \quad (9)$$

Consequently, the Keynesian multiplier equals $1/_{MPS + MPM}$. Since we are interested in changes in GDP, we manipulate the equation, yielding Equation 10. Delta, Δ, represents a change in a variable. Thus, ΔX means exports could increase (or decrease).

$$\Delta GDP = \frac{1}{MPS+MPM}\Delta X = multiplier \cdot \Delta X \quad (10)$$

Since we consider tourists the invisible export (X), each dollar of tourists' spending increases the GDP of the tourist destination by the multiplier. For example, the Thai people save 60 cents from 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 0.77. Every dollar a tourist spends creates an additional income of $0.77 at the destination.

Developed countries usually have income multipliers of around two. Unfortunately, small islands and developing countries have small multipliers because of the high foreign currency leakage. Consequently, the developing countries want economic development from the tourist industry. However, they obtain the least benefits from tourism.

We have a great example to show the impact of tourism on an economy. President Trump raised entry barriers with a high risk of detainment and deportation of foreign tourists in 2025. Thus, international tourists travel to other countries and avoid the United States. What is the impact? The U.S. tourism industry was $210 billion in 2024, which dropped to $169 billion by midyear. The U.S. probably will lose 2 x 2 x (210 – 169) =$164 billion. The first two is the multiplier, while the second two reflect the midyear drop or half a year.

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 wealthy, developed countries. What would happen to the tourist market if the world economy entered a recession in 2025?

2. Could a developing country reduce its informal sector by hiring more enforcement officers and tax inspectors to monitor its labor force and businesses?

3. Identify the three ways tourist spending leaks from a tourist destination, especially 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 an invisible export?

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 from the United States in 2018.

8. Calculate the tourist multiplier if a developed country has a marginal propensity to import 0.2 and a marginal propensity to save 0.1.

9. Compute the income increase 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 we 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. Natural resources include energy, water, forests, wildlife, and fisheries. Furthermore, a country with economic growth or a growing population tends to consume more resources. Thus, the government imposes regulations and policies to conserve resources or slow consumption. Consumption and prices of natural resources depend on the market structure, the type of ownership, the type of resource, and the rate at which nature can replenish the resource.

An Overview of Natural Resources

Economists classify natural resources into exhaustible and renewable resources. An ***exhaustible resource*** is a resource that cannot be consumed in the future if it is consumed today. For example, petroleum, natural gas, and coal are exhaustible resources because once they are consumed, they are gone. 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 over time and include fish, wildlife, and forests.

Natural resources are one of three types: common property, open resources, or privately owned. Ownership type determines how people treat or mistreat the resource. ***Common property*** is a group of individuals who hold the property, and the group can exclude outsiders. A small community may manage its resources well. However, as a community grows, 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, which decreases fish populations to a low level that harms future fishing. Another example is dumping waste 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 owned 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 water, energy, fish, and other resources. Thus, they consume the resources, especially the non-renewable ones, faster. 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 their populations. Cities require fresh water and energy; they collect and treat wastewater and dispose of waste. 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. Nevertheless, GDP excludes sales of intermediate goods and services. Furthermore, GDP does not include degradation of the environment or depletion of resources. For example, a country's GDP experiences strong growth as it cuts down its trees or extracts petroleum. However, after a country has depleted its resources, its GDP grows more slowly or contracts.

Rapid consumption of natural resources leads to ***Malthusian economics***. Mathis, a priest, 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 excess population. Mathis assumed that the population grew geometrically while the food supply grew arithmetically. However, he excluded the role of 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 humankind.

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 resources, 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 the market quantity falls. At time 2, the supply function decreases and shifts leftward as society depletes more resources. The market price continually increases over time while the quantity decreases. Thus, natural resource prices perpetually increase until society consumes all the resources.

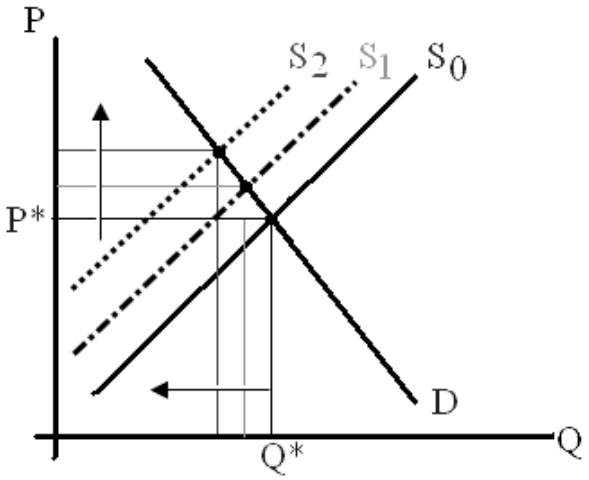


Figure 1. Hotelling's Prices

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 price of resources increases, society conserves more of them. However, firms that mine exhaustible resources accrue economic rents. ***Economic rent*** is the 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 dollars per unit. The firms still earn rent even if a competitive industry extracts a resource.

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 at a lower price. Second, Hotelling's Prices depend on producers knowing where the locations and size of the petroleum reserves are. Natural resource companies do not know the location of all reserves and deposits. However, when resource prices are high, petroleum companies are incentivized 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 resource as the market price increases because high prices cause consumers to reduce their demand, i.e., the Law of Supply and Demand. Over time, consumers buy more fuel-efficient cars, or they move closer to work. Thus, consumers significantly reduce their consumption of fossil fuels when market prices are high in the long run.

M. King Hubbert, a petroleum engineer, devised a better hypothesis called ***Hubbert's Life Cycle Hypothesis*** or ***Peak Oil***. He hypothesized that the petroleum industry was young and expanding its infrastructure; the petroleum companies discovered and developed new large petroleum fields. Thus, market prices decreased over time as producers drilled and pumped more oil out of their fields. As discoveries become rarer and smaller, and petroleum depletion causes (marginal) extraction costs to increase, producers extract less petroleum, boosting market prices. Thus, petroleum production should be parabola-shaped. We depict the U.S. petroleum production in Figure 2, which matches his description until 2008. Petroleum prices should show a "U-shape" over time, but petroleum production started increasing again in the United States.

Hubbert underestimated the U.S. oil production peak by 10 years because technological advances extended the extraction time. Companies use technology to extract more oil, drill deeper wells, and 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 it peaked in 2005. Out of the largest 21 petroleum fields, at least nine are declining. Saudi Arabia admitted that its mature fields were declining at 8% annually. Lastly, Kuwait has the second-largest oil field in the world, the Burgan field, which has declined since November 2005. However, the U.S. petroleum industry started "fracking" in the 2000s, a new method to raise petroleum extraction, as shown in Figure 2. Thus, new technology allows companies to extract more of the natural resource.

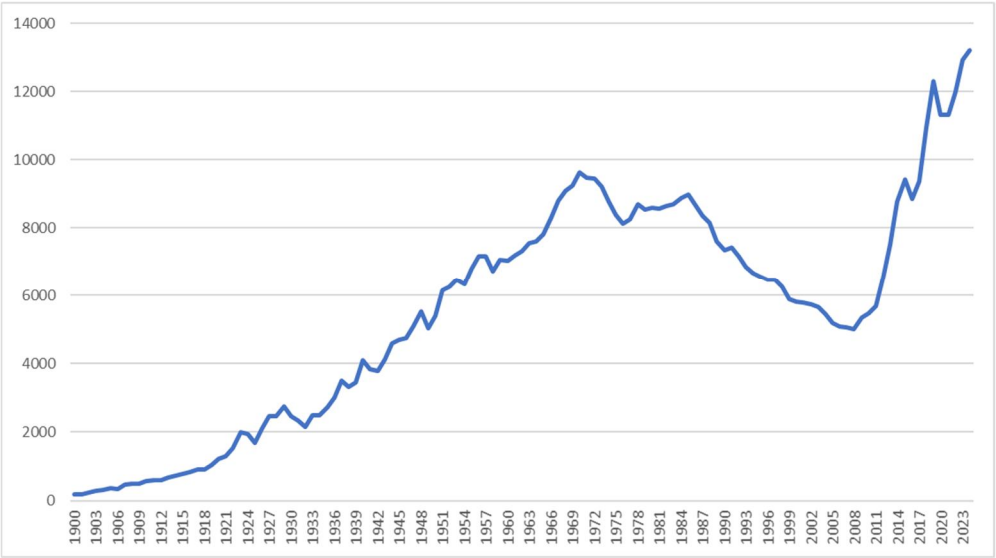


Figure 2. U.S. aggregate petroleum production

Economists use Malthusian economics to predict disasters related to petroleum depletion. However, Malthusian economics ignores the role of high prices that spur innovation or backstop technology. ***Backstop technology*** is a resource that becomes a perfect substitute for another natural resource at a higher price. 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, someone invents new technology that allows companies to extract oil 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 coal reserves to produce gasoline and diesel.

The government can implement the following four policies for exhaustible resources:

Policy 1: Exhaustible resources generate economic rent, even for competitive industries. Thus, the government can tax the rent. Taxes raise market prices and lower extraction rates, conserving natural resources. Then the government receives tax revenue.

Policy 2: Governments usually nationalize their exhaustible resource industries, like petroleum and natural gas. For instance, the Organization of Petroleum Exporting Countries (OPEC) members own their petroleum resources. Consequently, the government slows the extraction rate and uses petroleum profits for investment.

Policy 3: A government allows a monopoly to control the exhaustible resource. In this case, a monopoly provides economic benefits. A monopolist reduces production and increases the market price. Thus, consumers decrease their consumption because of the higher market price. A monopoly raises market prices that result from the monopoly rent and user costs. Therefore, these high prices cause consumers to conserve exhaustible resources! Moreover, the government could also tax the monopolist's profits.

Policy 4: The government funds research and development. Then scientists and researchers develop new backstop technologies that supplant the diminishing natural resources. For example, many European countries and the United States push for more renewable energy, such as wind and solar power or biofuels from agricultural sources.

Renewable Resources – Fisheries

Renewable resources, such as fisheries and forests, are natural resources that grow and replenish over time. Renewable resources have two features. First, the biological growth and harvest rates determine the resource amount. Second, the market structure influences the level at which 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 coupled with a competitive market, suppliers can overharvest the resource, lowering fish stocks, or some species become extinct.

Renewable resources have one unique feature: the supply functions could bend backward. For example, we show a fish market in Figure 3. The demand function represents consumers who eat fish, and the supply function represents the fishermen. The supply function is normal if the market prices are low for fish. Hence, a higher price for fish causes fishermen to catch more fish. If the market price becomes too high, fishermen overharvest the fish, decreasing fish populations. Consequently, the quantity supplied begins to decline as the market price increases. Unfortunately, a high market price causes a species' extinction.

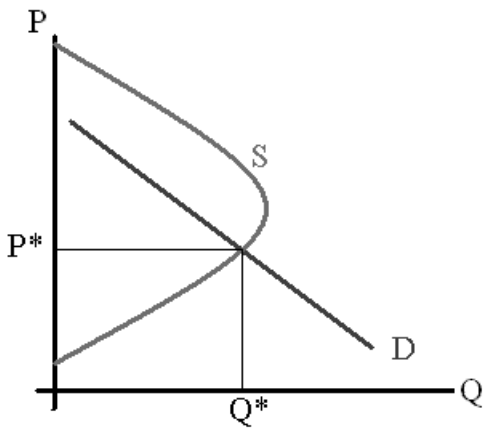


Figure 3. Backwards bending supply function for a renewable resource

The government can correct the over-harvesting by creating property rights for renewable resources. The government estimates the population growth rate and sets the harvest rate at an optimal level, ensuring the fish and animal populations grow. The government creates a number of permits based on the optimal harvest rate. The government either gives the permits freely or auctions them to the fishermen. Thus, the licenses limit fishermen’s catch because one permit equals one fish. Consequently, fishermen can sell or buy permits. We call these permits

individually transferable quotas (ITQs). 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 possible. With ITQs, the fishing season lasts eight months.

ITQs have many benefits. First, the fish becomes a property right, and fishermen are incentivized to take care of and manage this resource. Fishermen monitor their area and report poachers and illegal fishermen to the 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 rent, they sell fresher fish, and the fish population stays healthy, which future generations can enjoy.

ITQs have several problems. First, the government has difficulty applying the ITQs in international waters. Second, how does the government allocate the ITQs? Should the government give the ITQs freely to the fishermen or distribute them equally? Finally, the fishermen earn economic rent. Hence, the government helps the fishermen gain market power.

One solution is for the government to impose a quota. A ***quota*** limits the amount of fish that all producers can harvest. The quota applies to the whole market and differs from an ITQ. The problem is the economic incentive. For instance, producers race to harvest as much fish as possible to satisfy the quota. After the producers had met the quota, nobody else could harvest anymore. Quotas are on a first-come, first-served basis. Consequently, the quota is not a property right, and the government may have trouble enforcing it.

Another solution is for the government to impose taxes on the amount harvested. Thus, a tax decreases a firm's revenue, reducing a firm's harvest rate. The government could also tax efforts. ***Effort*** is the number of man-hours and capital needed for the harvest. Consequently, the tax increases costs, reducing the amount harvested. Unfortunately, the government may have problems enforcing the taxes.

The government can impose other policies to stop over-harvesting and declining fish and animal populations. Several policies include the following:

Policy 1: The 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. The owner becomes a monopolist and protects his private property. Then the owner could charge a fee to fish.

Policy 2: The government prohibits catching, fishing, or hunting during mating season, allowing the species to procreate and replenish the stocks.

Policy 3: The government restricts technology. Then fishermen have more difficulty catching fish. Unfortunately, the government may have problems restricting technology in international waters.

Policy 4: The 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 as many fish as possible.

Policy 5: The government prohibits and outlaws catching, fishing, and hunting. For example, some species of whales were becoming extinct, and many nations banned whale hunting. Subsequently, 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 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 loggers know where the trees are. If a logger cuts down a tree today, he could sell lumber to earn revenue or let the tree grow another year. Then the tree becomes larger and yields more lumber the following year. A problem arises when a country allows large-scale tree harvesting, leading to deforestation. ***Deforestation*** occurs when people and communities clear the land by burning trees or selling timber.

Deforestation causes four problems. First, trees prevent soil erosion. Tree roots hold the soil together. If the land becomes bare, then rainwater easily washes away the soil. Second, the land can become more arid. Trees provide surface cover that reduces evaporation, while 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 encourage biodiversity and sustain animal habitats; 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 solving problems such as biodiversity or global warming.

Deforestation has the following five sources:

Source 1: People earn money from selling the timber. The government or the people cut down the trees to export timber products as a source of income. Therefore, low-income 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 have little incentive to preserve it. Some people illegally cut down and sell the trees to earn a profit. Illegal logging costs governments approximately $10 billion in 2024.

Source 4: A growing population and human settlements encroach on forests. Furthermore, people cut down trees for fuel if they lack energy supplies.

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 while attacking U.S. soldiers.

The government has the following three policies to correct deforestation.

Policy 1: The government creates a permit system for trees on public lands. Subsequently, the government auctions the permits or gives them freely to the lumber companies. Lastly, the government can mark which trees the loggers can cut down.

Policy 2: The government encourages people and businesses to plant and maintain trees.

Policy 3: If private property rights are lacking, the government converts the forests into private property rights. If the government ignores property rights and the forest is an open-access resource, the government must monitor the resource to prevent people and communities from harvesting it.

Water Resources

Experts predict global water needs will increase by 2025 as society's demand for freshwater has tripled over the last 60 years. The world's population grew from 2.5 to 8.1 billion during this period. Cities will require 40% more water, while agriculture will need another 20%. According to the 2030 United Nations Educational, Scientific, and Cultural Organization (UNESCO) estimates, global demand for freshwater will exceed the supply, which will have potentially disastrous consequences.

Water is abundant in the world. Nevertheless, people need freshwater, comprising roughly 0.5% of the world's water supply, while the remaining is saltwater. Agricultural producers consume about 69% of freshwater as they sprinkle and disperse water onto the crops. Some of the water evaporates or runs off the fields. Water runoff is harmful because it carries fertilizers and pesticides with it. In addition, communities can suffer extreme circumstances if people's water usage exceeds nature's supply. One extreme case was the Soviet Union diverting river water to irrigate the cotton fields in Uzbekistan. This river recharges the Aral Sea, which is drying up, losing half its original size.

Heavy industry uses approximately 15% of the usable fresh water. Power plants use water for cooling. Please note that hydroelectric plants use water to generate electricity, but they do not consume the water. Furthermore, 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 as the water 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. The government requires drinkable water to have a quality standard, which it pumps to households and industries. The last demand for water is for recreation and environmental activities. People do not consume water for some activities because they swim, boat, or fish. Other activities consume water, such as golf courses. People play golf, and the golf courses use massive amounts of water to maintain healthy, green grass. Finally, the government may build an artificial lake to help an endangered species thrive and grow.

The demand for fresh water in some areas exceeds nature's regenerating ability. The water scarcity has led to new forms of technology. For example, farmers use drip irrigation. ***Drip irrigation*** is when thin pipes with holes are laid 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. As another example, governments use brown water, especially in dry regions. ***Brown water*** is already-used water from households and businesses, which the government minimally cleans and then ships to agricultural producers. The farmers can utilize brown water for irrigation. Although brown water requires more infrastructure and separate water lines, the government charges a lower price.

Water companies can use technologies to convert salt water into fresh water. For instance, ***desalination*** is when producers convert seawater into freshwater through distillation and reverse osmosis. ***Distillation*** is when the producers use heat to evaporate the water, then cool the water vapor, converting it to a liquid while leaving the salts behind. Evaporation is expensive because producers use heat to evaporate the water. The Middle East and the resorts in Western Mexico use distillation to purify water. Their climates are arid, as they have to pay for cleaning water. On the other hand, ***reverse osmosis*** passes water through a permeable membrane. The membrane allows water to pass but prevents the salts, minerals, and microorganisms from passing through. Some cities, like Singapore, use reverse osmosis to purify their brown water and wastewater, creating pure water. Nevertheless, the public is afraid to drink recycled water, and Singapore sells the reclaimed water to its industrial customers.

Hotelling's prices may apply to water as it can act as a depletable resource. The government pumps more water out of the ground in many places than nature can replenish. Over time, water prices and extraction costs should rise. Governments must drill deeper wells and install more wells farther from the city. Then they pump the water to the town. For example, Florida has further complications from pumping water from the ground because saltwater surrounds the state. As the government and people pump fresh water out of the ground, the saltwater from the Gulf of Mexico and the Atlantic Ocean seeps into the freshwater wells. Only the rain and storms replenish the groundwater in Florida.

The key to Hotelling's Prices is how fast nature replenishes the fresh water. If nature replenishes the water quicker than the amount a society uses, 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 depleted.

Local government typically owns the infrastructure for fresh water and wastewater, as it must install an extensive system. The government installs pipes for fresh water, brown water, and wastewater, and adds more pipes for different types of water. Furthermore, the government builds plants to purify drinking water and facilities to treat sewage. Thus, customers usually pay a small portion of the costs. The government uses other tax revenue sources to subsidize this extensive infrastructure. In other cases, the city water department may be the city's cash cow since every household and business consume water.

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 household's water consumption. Some local governments maintain low prices for water usage, even in dry, arid places, such as Southern California, the Midwest, and Florida, where consumers pay a low market price. The government can force people to conserve by increasing the cost of fresh water.

Unfortunately, some local governments resorted to complicated rules and fined violators for violating the rules. For example, local governments impose rules and regulations for special days to wash cars or water landscaping at night to reduce evaporation. Of course, the government could raise water rates. Higher market prices always cause consumers to conserve resources and use less water.

Waste Disposal and Recycling

Solid waste disposal costs and regulatory requirements are rising, while landfill capacity in the United States is decreasing. Municipal governments usually finance and manage landfills. Unfortunately, two problems confound waste disposal. First, large household sizes or high-income families create more waste. Second, municipal governments usually charge every household and business a flat fee (i.e., price) for garbage pickup. It does not matter if a family disposes of 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 households and businesses to pay more if the government collects more garbage. Block pricing encourages households and businesses to reduce waste and increase recycling. However, block pricing may increase littering and illegal dumping as some violators refuse to pay more to dispose of their trash.

The city of Portland, Oregon, uses block pricing. The city government charges a flat fee for the first garbage bin and additional costs for additional bins. The more garbage a family creates, the more they pay to dispose of 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 as they sell recycled materials to manufacturers. Consequently, producers can use recycled materials and use fewer virgin materials.

The government can impose several policies to encourage recycling.

First Policy: The government or the public installs the infrastructure for recycling. The 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 waste and let the disposal companies collect and recycle it. They process the materials and sell them to the companies that use them to make products. The public must be aware of recycling and want to participate.

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. The deposit applies to all soda and beer containers. These containers have an economic value. 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 to collect the deposits. Unfortunately, some people also bring in cans and bottles from other states to receive deposits. Finally, some automobile parts stores charge deposits on car batteries, brake parts, and alternators. Then mechanics return the used parts to the stores, which can then recycle them into new products.

Third Policy: The government bans waste. Some states prohibit people and businesses from disposing of old batteries, worn-out tires, ancient paints, and garden wastes. These states require consumers to return those items to collection centers. Unfortunately, the prohibitions and bans could encourage people to dump their waste illegally.

Fourth Policy: The government mandates (requires) manufacturing to include a minimum percentage of recycled materials. Producers incur higher costs due to the need to collect documents tracking the recycled material's destination, and they also face increased processing costs. Lastly, recycled materials may entail higher costs than virgin materials.

Fifth Policy: The government requires producers to list recycling information on product labels. Environmentally conscious consumers can check labels and buy products that use recycled materials. Finally, the government is a large consumer of products and services. It can use its purchasing power to purchase products made with recycled materials.

Resource Sustainability

Sustainability economics ensures that future generations are no worse off than today. 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 it. Consequently, it is unfair to future generations who want to consume oil. The government could impose the following policies that protect the welfare of future generations (Daley 1995).

The government can use the following policies:

Policy 1: Renewable resources should be sustainable. The rate of harvest should not exceed the rate of regeneration. For fisheries, the producers set the harvest rate below the net birth rate, boosting fish populations.

Policy 2: The 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 an investment stream. Society uses the income stream for current consumption and the investment stream to invest in substitute technologies. For example, electric cars replace fossil fuel cars as drivers use ethanol and biodiesel made from agricultural sources to replace fossil fuels.

Policy 3: The government should set degradable pollution levels and waste generation below the environment’s assimilative capacity. The ***assimilative capacity*** is the amount of waste and pollution the environment can absorb without 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, the government should set the emissions to zero. Some examples include radioactive waste and pollution, such as 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
distillation
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 the government underestimated the optimal growth rate of a particular species? For example, the government initially thought the optimal harvest rate was a million fish per year, but it was half a million.

6. The government bans the catching and harvesting of a particular fish species. Evaluate a government's total cost of enforcement.

7. Why do developing countries have a higher deforestation rate than developed countries?

8. The European Union created a permit system for carbon dioxide. Heavy industry must buy carbon permits because it emits large amounts of carbon dioxide. Should producers include deforestation in a permit system?

9. What would happen if the government charged everyone the same monthly fee, regardless of

household 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 the government ban the dumping of used car oil?

12. Greenhouse gases cause global warming, while 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

The government imposes environmental regulations to reduce pollution and protect the environment. Scientists know that pollution can cause problems, such as the burning of coal to generate electricity. Coal contains trace amounts of sulfur that are released into the atmosphere. The sun converts sulfur into acid rain, which dissolves minerals in the soil and carries them away. The plants and trees die from mineral deficiencies. Furthermore, coal releases mercury that, in large concentrations, kills all life forms. Lastly, burning fossil fuels release carbon dioxide, which is a greenhouse gas. Greenhouse gases absorb more of the sun's radiation and contribute to global warming. Future generations of people, animals, and habitats are affected by the higher global temperatures.

The government imposes numerous regulations to protect the environment. However, many businesses in developed countries believe the government overburdens them with regulatory costs, while government and environmental groups strive for stronger environmental regulations. Therefore, governments in developing countries often encourage businesses to relocate there because they have lax or no environmental regulations while producing and exporting manufactured products.

Point Source Pollution

Point source pollution is the government's ability to identify and monitor the sources of pollution easily. For example, electric power plants emit pollution into the atmosphere using smokestacks. The United States has approximately 204 coal-burning electric power plants that the government can easily monitor. Furthermore, pollution is a negative externality. A firm emits pollution that impacts or harms others and the environment. Consequently, the firm treats the environment as a common property and freely pollutes the environment without paying a price. Unfortunately, pollution harms other parties that use the environment. Thus, property rights are poorly defined because polluting firms do not pay for the right to pollute the environment.

The government has three tools to enforce environmental regulations upon polluting industries: command-and-control regulations, lawsuits, and market incentives. ***Command-and-control regulations*** are laws and regulations the government uses to inform which standards and technology firms must use to reduce pollution. They are a form of unfunded mandates. Moreover, the government could impose technology and machines on an industry, along with fines and penalties, to punish 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 that the government efficiently 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 them to produce inefficiently.

The United States has many laws that allow people to sue firms and companies that pollute. Hence, lawsuits have two benefits. First, polluting firms are punished and will most likely pay large damage awards if they lose their court case. Second, companies take a proactive approach

to 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 hefty legal fees and damage awards that may exceed the actual 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 include pollution taxes, while quantity incentives are tradable pollution permits. Consequently, market incentives give firms more flexibility to meet pollution objectives with lower costs. However, market incentives raise a government's enforcement costs.

The government could impose a ***Pigouvian tax*** on pollution as the first market incentive. If a government imposes a tax on anything other than pollution, then the government can create perverse incentives. For example, an electric power plant burns coal to produce electricity. If the government taxed the amount of coal an electric power plant burns, then power plants could lower costs by buying "dirtier" coal. Consequently, the government must tax emissions and not a resource input.

We show a market in Figure 1, where the price equals P* while the quantity is Q*. Firms freely pollute, representing the supply function, while the consumers form the demand function. The government imposes a tax on pollution, forcing companies to pay for it. Polluting firms reduce their supply, and the supply function shifts leftward by the amount of the tax. The pollution tax raises the market price and reduces market quantity. From Chapter 4, we learned that taxes are inefficient because they reduce a society's social welfare; however, a Pigouvian Tax is efficient! The pollution tax causes firms to internalize the externality because firms pay all costs, including pollution costs. Consequently, firms still pollute, but they pollute less.

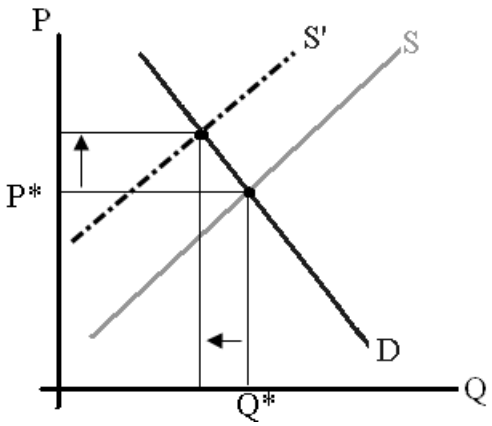


Figure 1. A Pigouvian Tax on polluting firms

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 it implements new technology to reduce pollution. Second, the government collects tax revenue. Thus, the

government could reduce other taxes, reducing distortions in other markets. Nevertheless, a Pigouvian Tax has a problem. They require the government to collect massive amounts of information to implement the tax correctly.

Tradable emission permits are another market incentive to mitigate pollution. The government sets the maximum pollution or concentration level limit that any firm can discharge into the environment. The government gives companies transferable emission permits. Consequently, each permit sets the maximum amount of pollution the holder can emit. Transferable emission permits are similar to individually transferable quotas used in renewable resources in Chapter 18.

The government distributes permits among producers in a region. The government has two methods to distribute permits. First, the government could auction the licenses, which would generate revenue. Second, the government offers permits freely to firms (called ***grandfathering***). Although a government does not receive revenue, the firms may accept the restrictions as they implement a permit system if the government gives those permits freely.

A pollution permit creates two things. First, firms can buy or sell licenses 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 for firms and traders to buy and sell. Divisible is a company that can split a permit into smaller units. The U.S. government created tradable pollution permits for the electric power industry because they emit sulfur dioxide and mercury. Theoretically, the emissions permit has the same impact as a Pigouvian Tax if a government has designed the market correctly.

The theory behind pollution permits is simple. Permits cause some firms to invest in pollution reduction technology. If these firms have permits, they can sell them because they lower their pollution emissions, so the permits are not required. Other firms that do not invest in technology could increase pollution by buying permits in the market. Thus, a government converts a resource such as air into a property right. Lastly, environmental groups could buy those permits and retire them. Hence, environmentalists never use these permits as they force the industry to mitigate pollution further.

Tradable pollution permits have problems. First, regulators must have sufficient knowledge to design the market, and the government must monitor pollution levels. Moreover, the government must implement a legal system to ensure well-defined property rights. Second, the pollution permit market may be small, so one or several firms could dominate the market.

The government may not need to intervene in all cases. Polluting firms and people harmed by the pollution may negotiate among themselves to reduce pollution, which we call the Coase Theorem. Economists named the ***Coase Theorem*** after the Nobel laureate Ronald Coase (1960), who stated that disputing parties would work out an efficient, private agreement that does not depend on 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 would negotiate and pay the fishermen 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.

The Coase Theorem could work for a small group of people. One benefit is that private parties can solve a pollution problem without the government's help. However, the Coase Theorem has several issues. 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 grants the right to pollute the lake to a firm and this right increases the firm's wealth, then fishermen must pay greater compensation, regardless of whether the government initially granted the right to the fishermen.

Countries with strict environmental regulations can create leakages. A ***leakage*** is when companies relocate to countries with lax environmental laws, thus increasing their pollution emissions. For example, the U.S. federal government has passed stricter environmental regulations, 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. Subsequently, the pollution can drift north, affecting the United States.

Nonpoint Source and Transboundary Pollution

Nonpoint source pollution is pollution emitted from many sources. Consequently, the government cannot identify and monitor the pollution sources. Several examples include soil erosion, fertilizer, chemical runoffs from agricultural fields, and automobile pollution emissions. These pollution forms have so many sources that the government cannot monitor and regulate them. Unfortunately, nonpoint source pollution causes an asymmetric information problem. Polluters have more information than the government and the 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 a government dictates 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 largest source of air pollution. Thus, all residents must have certified technicians at service stations check their cars' emission levels yearly. 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 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 omit the emissions test. Finally, people could bribe the technicians to pass them or drive without the inspection sticker, hoping the police would never pull them over.

The government could prohibit an activity. ***Prohibition*** is when the government makes a particular activity illegal. For example, many large cities and counties banned the burning of

garbage. Consequently, all households and businesses must dispose of their waste through a city's disposal system. Furthermore, many cities and counties prohibit firms and people from disposing of used car oil or old batteries. Residents and businesses must take their waste to collection centers. Thus, local governments assess hefty fines when they find violators of the prohibition.

Transboundary pollution occurs when one country emits pollution that drifts to other countries without causing pollution problems. Transboundary pollution could be a point source or a nonpoint source. For example, U.S. electric power companies emit sulfur dioxide as a point source of emissions. Unfortunately, sulfur dioxide drifts north to Canada, forming an acid in the clouds. When it rains, the slightly acidic rain accumulates in lakes, killing the fish or the forests. The acid reacts with minerals, causing rainwater to dissolve minerals and carry them away. Thus, Canada suffers from acid rain damage. As 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 of pollution. Scientists believe global warming is caused by 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 warmer temperatures melt the ice and snow at the South and North Poles. Then coastal cities will disappear under the rising oceans. Lastly, various species may become extinct, and humans may 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, atmospheric carbon dioxide builds up, trapping more heat. It makes no difference where the carbon dioxide is emitted. At last, 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 are uncertain whether the Earth is experiencing a warming trend as part of one of its natural cycles or if greenhouse gases are causing global warming. 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. The U.S. Congress is discussing and debating a permit system for greenhouse gases, and governments at all levels in the 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. The Montreal Protocol successfully eliminated CFCs because several companies produced CFCs, and these companies discovered a substitute refrigerant. Usually, these bans are

ineffective because some countries will violate the prohibition, but the CFC manufacturers were few and easy to regulate.

The Kyoto Protocol is another international agreement. The ***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 that did not join international agencies pollute at higher levels. For instance, the United States signed the Kyoto Protocol but failed to implement it. The United States is one of the world's most significant sources of greenhouse gas emissions. Lastly, China did not sign the Kyoto Protocol as its economy rapidly caught up with the United States and became a significant greenhouse gas emitter.

Water Pollution

Water is essential because humans, animals, and plants require water. Unfortunately, humans dump waste or chemicals into water, polluting it and harming the life that needs it. Pollution could be a point source or a nonpoint source. A point source of water pollution has an identifiable source, whereas a nonpoint source does not. Polluted water has four sources, which we identify as the following:

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 waste. 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 it over land, incinerates it, or dumps it in the sea. Usually, a water treatment plant cannot handle industrial wastes because they contain heavy metals.

Source 2: A factory discharges wastewater into a river, lake, or ocean. Governments in developed countries require factories to discharge their waste to a water treatment plant or treat their waste if a local treatment plant cannot handle it. In developing countries, factories dump waste into ponds, lakes, rivers, or oceans.

Source 3: A city's storm drainage system creates polluted water. When rain falls on a city, the city has a system that collects the rainfall. Unfortunately, the rainwater picks up chemicals, oils, and wastes and carries them in the water. In developed countries, treatment plants treat both storm drain water and wastewater. However, a government allows companies to discharge 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 collects the water and converts it into a point source.

Source 4: Farmers raise livestock and poultry that create animal waste. Farmers in developed countries collect the runoff from animal waste and put it into lagoons. Then the farmers mix the animal wastes with water, creating a slurry. Subsequently, they spray the slurry onto the grasslands or mix the waste with straw. After the wastes are decomposed, the farmers sell the organic material to gardeners and farmers as compost. If the runoff from animal 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.

The government has only two policies to address water pollution: The prohibition of pollution and command-and-control regulations. For example, the government imposes command-and-control rules that require local governments to treat their wastewater in wastewater treatment plants. Since they are a government institution, they can be bureaucratic, inefficient, and corrupt. Privatization could be as problematic as it 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 the government does not have the resources to treat the waste. In developed countries, local governments collect a variety of taxes that they can use to subsidize the infrastructure. Thus, in developed countries, water companies charge low prices for fresh water and wastewater treatment.

The government can enforce a regulation that forces farmers to collect animal waste in lagoons, and then the farmers will dispose of their waste properly. Furthermore, the U.S.'s local and state governments have created a water permit system and the right to discharge wastes into water. However, companies rarely use permits, while they remain unpopular.

Water pollution is usually a nonpoint source of pollution because its sources are so numerous that the government cannot monitor them or identify the source. Common nonpoint pollution is water runoff from farmers' fields. Unfortunately, rainwater carries wastes, pesticides, and chemicals, such as nitrogen from manure, phosphorus from fertilizers, and animal wastes. Both algae and bacteria thrive in these wastes. If algae grow thickly on top of the water, the sunlight cannot penetrate the bottom of the lake, ocean, or river. Thus, the underwater plant life dies off, which harms the ecosystem. Lastly, bacteria consume the oxygen in the water, suffocating and killing the fish.

Animal wastes, for example, create dead spots in the Gulf of Mexico called the ***Red Tide***. Farms scattered throughout the Midwest create animal wastes, and 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. Thus, the wildlife in the Red Tide dies. Unfortunately, the Gulf of Mexico has large dead spots in the ocean, while the bacteria give the water a reddish hue.

The government's policies to correct nonpoint source water are similar to point source: command-and-control regulations or prohibition. For example, the government prohibits people, businesses, or governments from dumping sewage, sludge, garbage, and even toxic pollutants into water. Furthermore, governments require farmers to build riparian buffers that reduce water runoff from the fields. A ***riparian buffer*** is when 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 the government would have difficulties monitoring this system.

The Porter Hypothesis

The ***Porter Hypothesis*** is that environmental regulations can spur innovation, increasing a firm's competitiveness. Although an environmental regulation imposes costs, an innovation may

offset these costs by increasing product quality or decreasing other production costs. For example, Robbins Company manufactures jewelry. The 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, 40 times purer than water purchased from the city government. Consequently, the company produced higher-quality jewelry and rejected fewer products. Lastly, the innovation allowed the company to purchase less water because it recycled it. 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 the government. Consequently, a company learns about its pollution level and production inefficiencies. Then a company knows where to focus on technological improvements.

Benefit 2: A regulation creates pressure to encourage firms to innovate and create new technology.

Benefit 3: A regulation levels the playing field because all companies must comply with the same regulations.

Benefit 4: Even if firms do not innovate, the government imposes regulations to improve the environment.

Some economists criticized the Porter Hypothesis. They admit that firms can theoretically innovate to reduce regulation costs, but innovations are uncommon (Palmer, Oates, & Portney, 1995). Regulations raise costs because firms pay more to comply with the regulations, as a business hires compliance specialists, invests in new machines and equipment, and sends lengthy reports to the government. Lastly, companies constantly search for technologies and innovations that reduce costs and increase profits. If scientists and engineers discovered a better way to produce something, companies would already use it.

The Environmental Kuznets Curve

The ***Environmental Kuznets Curve*** is a relationship between environmental degradation and a country's income per capita. It has an upside-down U-shape, as shown 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:

Stage 1: An agricultural society transforms into a heavy industrial society. An industrial society pollutes more. Over time, services and light industries replace heavy industries that generate less pollution.

Stage 2: Environmental regulations can strengthen over time as a country develops. A more developed country collects 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 Kuznets 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 income to buy more cars, increasing

pollution. Furthermore, some countries do not exhibit the Kuznets Curve, but the relationship could be obscured. As developed countries develop pollution abatement technologies, developing countries implement these technologies faster, obscuring the Kuznets curve. Consequently, the developing countries quickly learn from the developed countries, skipping stages in transition.

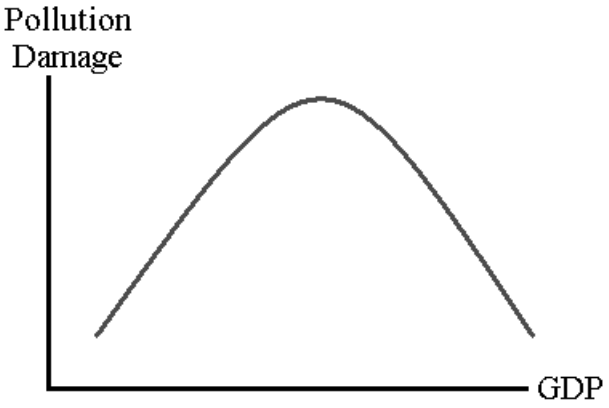


Figure 2. The Environmental Kuznets Curve

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 dislike permit systems because they believe they reward polluters for harming the environment. Do we agree with this statement?

3. Appraise whether lawsuits are effective in reducing nonpoint source pollution.

4. What percentage of dry air is composed of carbon dioxide?

5. How can the government correct the problem with the Red Tide in the Gulf of Mexico?

6. San Diego, California, is located in a dry region with few 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 Kuznets Curve exists. Could developing countries learn and adopt new technologies quickly, thus obscuring the relationship of the Kuznets Curve?

20. Game Theory

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 it introduces a new product, pricing strategy, or service. Furthermore, political leaders must consider how the public would respond if they had passed a new regulation or tax. 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. We then introduce examples where the government becomes one of the players or both.

Introduction to Game Theory

Games have rules that set the game's structure. Games have various forms and rules, with some of the rules as follows:

- Games vary in the number of players. For this chapter, we study games involving two players.

- Games have different timings and limit a player's moves. A ***simultaneous game*** is where both players move simultaneously, while a ***sequential game*** is when 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 an ***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 an equilibrium.

- Players take action by selecting strategies and choices. After each player moves, each player receives a payoff. The ***payoff*** can be a benefit or a punishment. We assume the players are rational because they maximize positive payoffs and minimize negative payoffs. Consequently, players strategize to maximize their gains from the game.

- Players have access to different levels of information. If players have ***perfect information***, they know the entire game's history when it is time for a player to move. Games can have ***complete information*** when the players know their payoffs and the payoffs of their rivals. Therefore, players can predict actions from others. Finally, some games contain ***incomplete information***, such as when players know their payoffs but not their rivals' 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 an 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.

	C1	C2	C3
R1	10, 3	7, 10	5, 7
R2	20, 7	15, 12	10, 6
R3	7, 7	6, 14	9, 5

Figure 1: Row and Column Players

The numbers in each cell are the payoffs. The first number in each cell is the Row player's payoff, while the second is the column player's payoff. 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. The bottom right cell has a 9 and 5. If the Row player selects strategy R3 while the Column Player selects C3, the Row player gets a 9 payoff while the Column player receives a 5 payoff.

A ***dominant strategy*** is that a player can maximize his payoff, regardless of the other player. For example, if Column players choose C1, they may receive a 3, 7, or 7, depending on the Row Player. If the Column players choose C2, they may receive a 10, 12, or 14. Have we noticed column players earn greater payoffs if they always select 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. Again, Column players always choose C2 relative to C1 and C3 because the player receives a greater payoff. Consequently, the Column player has C2 as a dominant strategy and would never choose C1 or C3.

Do Row players have a dominant strategy? If Row players select strategy R1, they receive 10, 7, or 5, depending on which strategy the Column player selects. If Row players selected R2, they 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; finally, 10 is better than 5. However, we are not finished. Does strategy R2 dominate R3? Comparing the payoffs piecewise, R2 dominates R3. Consequently, the Row player has a dominant strategy, R2.

We know the solution to the game. Row players always choose R2, while Column players always choose C2. Therefore, Row players earn a payoff of 15, while Column players receive 12. Many games do not have dominant strategies, but we first search for one.

The ***Prisoner's Dilemma*** is the most common example in game theory. Economists apply the prisoner's Dilemma to many situations across many disciplines in economics. The original Prisoner's Dilemma is when two criminals commit a crime together, and the police arrest both simultaneously. The police separate the criminals into separate interrogation rooms. Criminals face the payoff in Figure 2. Payoffs are negative because the criminals receive punishment and want to spend the least time in prison.

	Criminal 2	
Criminal 1	Rat	Clam
Rat	-2, -2	-0.5, -5
Clam	-5, -0.5	-1, -1

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.

Both criminals have an incentive to rat on each other. Criminal 2 has a dominant strategy to rat on his partner. If he rats, he spends either 2 years or half a 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. The mafia imposes a strict code: Death to all rats! We have the new payoff in Figure 3.

	Criminal 2	
Criminal 1	Rat	Clam
Rat	death, death	death, -5
Clam	-5, death	-1, -1

Figure 3. Criminals are members of a mafia

Criminals prefer life to death, and they would never rat on their partner. Their dominant strategy is to clam up and remain quiet. Consequently, both partners clam up and serve one year in prison.

Players may not have dominant strategies in many games, so we introduce a method to solve for these games' equilibria. We call it the ***Nash Equilibrium*** when every player's strategy responds best to the other player's strategies. The 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 or half a year. If Prisoner 2 claims he is innocent, he may serve five years or no time in prison. The prisoner views two years as better than five years for the rat strategy. However, the prisoner views the zero-to-half-year imprisonment as a strategic move. Thus, Criminal 2 has no dominant strategy. Similarly, Criminal 1 does not have a dominant strategy either. Note that we can have games where one player has a dominant strategy while the other 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 would rather serve two years in prison than five years. Have we noticed that Criminal 1 and Criminal 2 selected the same cell? Thus, a Nash Equilibrium is Rat-Rat. We would not have a Nash Equilibrium if both chosen criminals had different cells.

	Criminal 2	
Criminal 1	Rat	Clam
Rat	-2, -2	-0.5, -5
Clam	-5, -0.5	0, 0

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, one would select "Clam" because he would rather serve zero years in prison than half a year.

Part 2: Since Criminal 1 chooses "Clam," what should Criminal 2 select? Criminal 2 would choose "Clam" because he would rather serve zero years in prison than half a 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 equilibria. A natural question arises – do players prefer one Nash Equilibrium over the others? Yes, the criminals would prefer the Clam-Clam strategy for this game because they would serve zero years in prison.

We show a game of male-female dating in Figure 5. A couple plans a dating activity and receives a payoff in utility. Analyzing the game, the man and woman have no dominant strategies. Hence, we search for a Nash Equilibrium.

	Woman	
Man	Football	Ballet
Football	10, 1	0, 0
Ballet	0, 0	1, 10

Figure 5. The game of male-female dating

We start with the woman. If she chooses football, what is the man's best strategy? The man chooses football because he enjoys watching football with her more than ballet alone. He gets 10 utils as opposed to 0. If the man decides on football, what is the woman's best strategy? A woman chooses football because she receives a greater utility watching football with a man than watching ballet alone. She gets 1 util. 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? The man chooses ballet because he receives more utility watching ballet with the woman than watching football alone. If the man decides on ballet, what is the woman's best strategy? Hence, she chooses ballet because she receives a greater utility in watching ballet with a man than watching football alone. Thus, this game bears a Nash Equilibrium of Ballet-Ballet.

We can ask the following question: Do the players have a preferred equilibrium? We cannot add utilities together because a utility reflects a person's preferences. For the Football-Football Equilibrium, the man receives 10 utility units while the woman gets one. The woman receives 10 utility units for the Ballet-Ballet Equilibrium, while the man gets one. Consequently, both players do not prefer the same equilibrium unless we want to argue that one person's utility is more important than another's.

Some games can be zero-sum games, where one player gains while the other loses. We depict a ***zero-sum game*** in Figure 6. Have we noticed 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 zero for a zero-sum game. At last, these games include players who steal or gamble because one player takes something away from the other.

	Column Player	
Row Player	A	B
A	-1, 1	3, -3
B	0, 0	-2, 2

Figure 6. A zero-sum game

Players rarely have dominant strategies for zero-sum games, and these games never bear a Nash Equilibrium. Solving for the Nash Equilibrium, what should the Row Player choose if the Column Player selects A? The Row Player selects B. If the Row Player selects B, what should the Column Player do? The 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 equilibria. We analyze the game in four parts.

Part 1: What would the Row Player choose if the Column Player selects C1? 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: What would the Row Player choose if the Column Player selects C2? 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.

	C1	C2	C3	C4
R1	3, 5	3, 10	1, 3	10, 7
R2	0, 0	5, 2	5, 6	4, 1
R3	5, 8	20, 19	4, 5	3, 4
R4	10, 9	4, 3	2, 0	9, 6

Figure 7. Complicated game with several strategies

Part 3: What would the Row Player choose if the Column Player selects C3? 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: What would the Row Player choose if the Column Player selects C4? 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.

The game has three Nash Equilibria. However, 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 choose 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 or low prices. Payoffs are profits. Neither player has a dominant strategy, and the game has no pure Nash Equilibrium.

	Burger King	
McDonald's	High Price	Low Price
High Price	40, 30	30, 35
Low Price	35, 25	32, 20

Figure 8. A 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 that 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 an option with a probability between zero and one. Consequently, all probabilities must sum to one, so the game accounts for all players' choices.

$$\text{payoff} = 30 \times P_M + 25 \times (1 - P_M) \tag{1}$$

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.

$$\text{payoff} = 35 \times P_M + 20 \times (1 - P_M) \tag{2}$$

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. Thus, Burger King should charge a high price for half the time and a low price for the other half.

$$30 \times P_M + 25 \times (1 - P_M) = 35 \times P_M + 20 \times (1 - P_M) \tag{3}$$
$$P_M = 0.5$$

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 $1 - P_B$.

$$\text{payoff} = 40 \times P_B + 30 \times (1 - P_B) \tag{4}$$

If McDonald's chooses the low price, it receives the expected payoff in Equation 5, given that Burger King has the probability of selecting a low price.

$$\text{payoff} = 35 \times P_B + 32 \times (1 - P_B) \tag{5}$$

We set the payoffs equal to each other in Equation 6 and solve for P_B. The probability that Burger King chooses the high price is P_B. Consequently, McDonald's should charge high prices 0.286 of the time and low prices 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 using a pure strategy.

$$40 \times P_B + 30 \times (1 - P_B) = 35 \times P_B + 32 \times (1 - P_B) \tag{6}$$
$$P_B = 0.286$$

Sequential Games

In a sequential game, 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***, starting at the last match and working backward to the first game. For the second method, we can sometimes convert a sequential game into a simultaneous game.

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 or Jerry's Profit. Moreover, Ben has a 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.

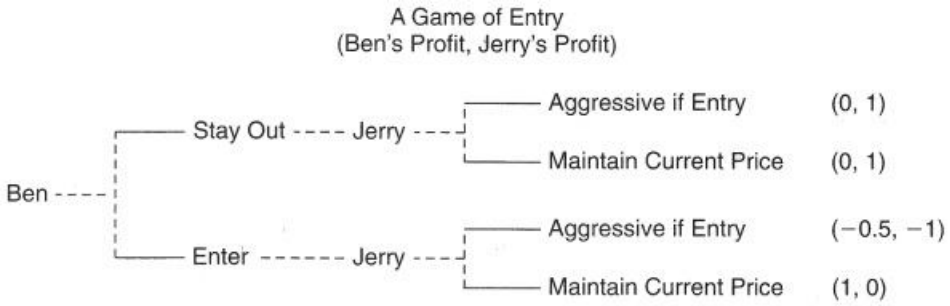


Figure 9. A sequential game between Ben and Jerry

We iterate through the tree to determine if we have a 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. Furthermore, 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, Ben subsequently 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 0 profit, which is better than a -1. Ben enters the market if Jerry chooses to maintain the current price. Ben earns one unit of profit, which is better than zero profit. The strategies, Enter and Maintain Current Price, are a Nash Equilibrium.

We can convert this sequential game into a simultaneous match, shown in Figure 10. Ben and Jerry do not have a dominant strategy, and the game bears two Nash Equilibria: Stay out-Aggressive and Enter-Maintain Current Price.

We change the game in Figure 11. Have we noticed one player is missing a choice? This new game is between a firm that wants to enter a market (E) and an incumbent firm (I) that has been in the market for a while. They earn payoffs as profits in the millions that we write as (Entrant's profit and Incumbent's profit). We use backward induction to solve this game.

	Jerry	
Ben	Aggressive	Maintain Current Price
Stay out	0, 1	0, 1
Enter	-0.5, -1	1, 0

Figure 10. A simultaneous game between Ben and Jerry

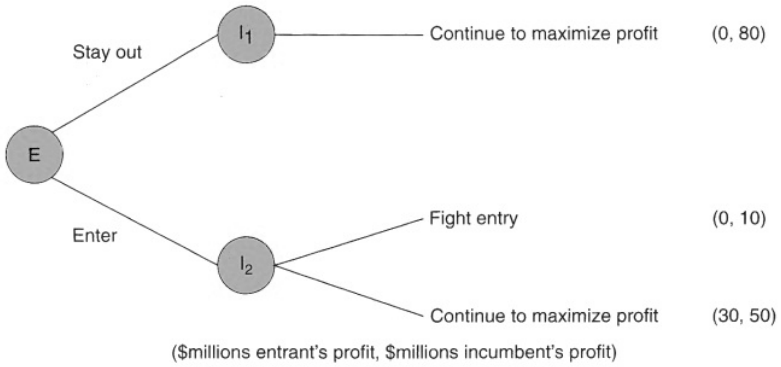


Figure 11. A simultaneous game between an entrant firm and incumbent firm

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 earns $80 million. Since the incumbent firm maximizes profits, the entrant enters the market. Thus, this combination of choices does not yield 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 maximizes profit, the entry firm enters the market. Thus, "Enter" and "Continue to maximize profit" strategies yield a Nash Equilibrium.

We can convert this sequential game into a simultaneous match in Figure 12. What makes this game odd is the missing cell, which we shaded gray. Have we noticed that each player has a dominant strategy? Incumbent firms always choose to continue maximizing profits, while the entrant firm always enters the market. Thus, the Nash Equilibrium is when the entrant firm enters the market, and the incumbent firm maximizes profit.

	Incumbent Firm	
Entrant Firm	Fight entry	Continue to max profit
Stay out		0, 80
Enter	0, 10	30, 50

Figure 12. A sequential game between an entrant firm and incumbent firm

We show the last sequential game in Figure 13, and every worker and manager play this game every day. A worker moves first, and then the manager moves. The employee has a choice to arrive at work on time or arrive late, while the manager chooses to fire or not fire the employee. They both receive a payoff in utility, which we define as the worker's and the manager's utility.

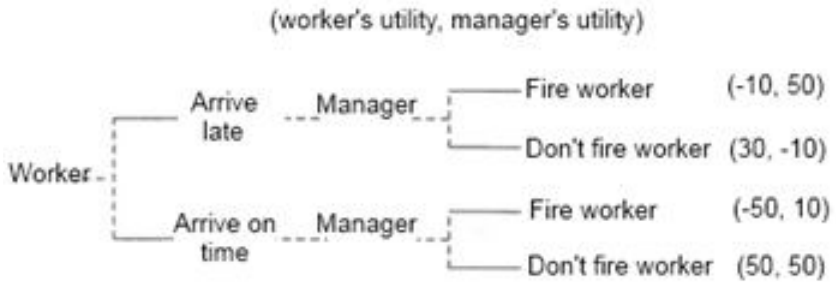


Figure 13. A sequential game between a worker and manager

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, the worker receives a greater utility when arriving late. The worker gets -10 units of pleasure to arrive late rather than -50 units to arrive on time. A 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. The manager receives 50 units of pleasure if the worker is not fired and 10 units if the worker is fired. If the manager does not fire the worker, the worker gets greater utility for arriving on time. A combination of strategies, arriving on time and not firing the worker, yields a Nash Equilibrium. Lastly, the players would prefer the strategies that 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 to one where the government becomes one or both players. For example, we illustrate the problem a government has when it provides a public good. The 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 simultaneously in a simultaneous game.

- The 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 the public good, and we show the payoffs in Figure 14.

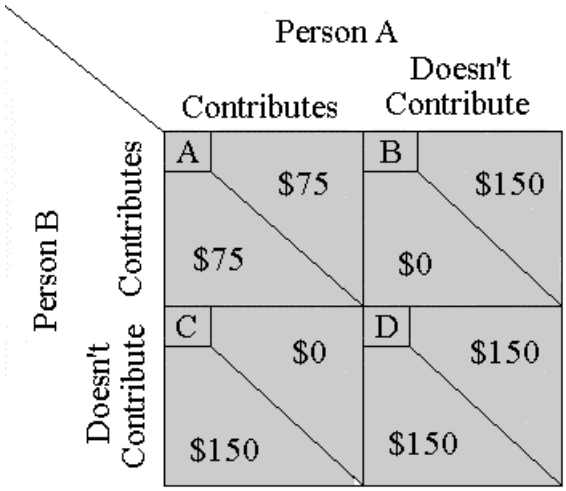


Figure 14: The government supplies a public good

Each person has a dominant strategy – they do not contribute to the public good. If Person A contributes, they keep $75 or $0. However, if that person does not contribute, they keep the whole $150 regardless of Player B's choice. Similarly, Player B has an identical dominant strategy. Hence, the Nash equilibrium is Cell D, where both players do not contribute. People want benefits from their government but 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 strict environmental laws, their GDP will grow slowly by 1% per year.

- Industries with weak laws have a cost advantage if one country imposes weak environmental statutes and the other imposes strict rules. They produce more output, increasing GDP to 6%, while the country with rigorous environmental laws grows slowly at 1% per year.

- If both countries pass soft environmental laws, their GDPs will grow at 5% per year.

We can solve the Nash Equilibrium easily and show the payouts in Figure 15. A higher GDP growth rate is preferable to a slower GDP growth because both governments aim to boost their economies, thereby creating jobs, increasing wealth, and enhancing tax revenues. If the United States government enforced strict environmental laws, its economy would grow at 1% per year

regardless of what Canada does. If the United States imposes soft environmental laws, its economy will grow by 5 or 6%. Thus, the United States always chooses lax environmental regulations, a dominant strategy. Similarly, Canada has the same dominant strategy in imposing soft environmental regulations. Consequently, the Nash Equilibrium is Cell D, where both countries impose lax environmental regulations.

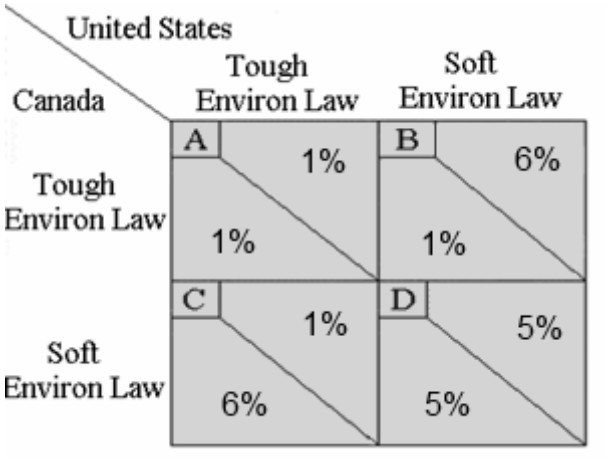


Figure 15: The United States and Canada agree to lower their pollution levels

Cell A could never be a Nash Equilibrium. If both countries impose strict environmental regulations, one country is incentivized to deregulate, promoting economic growth, job creation, and wealth building. Then the other country follows until we finish in Cell D.

We base the next game on a real example in March 2013. Many foreigners, including the British and Russians, deposited their money in Cyprus banks, but the banks experienced financial hardship. The Cyprus government asked the European Union (EU) to bail out the Cyprus banks, but the EU would agree to a bailout if the Cyprus 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:

- The Cyprus government wants to tax bank deposits to pay for the EU bailout package. The Cypress government has the discretion to tax or not tax bank deposits.

- Depositors can withdraw their deposits or keep funds at their banks in Cyprus.

Players receive the payoffs in millions of euros, which we define as (government tax revenue and depositors' wealth), as shown in Figure 16.

The government moves first and taxes bank deposits because it would gain either 10 million or 50 million in tax revenue. Depositors can choose to withdraw funds or not. They would withdraw funds because they lost 10 million instead of 50 million. We end up at Cell (10, -10).

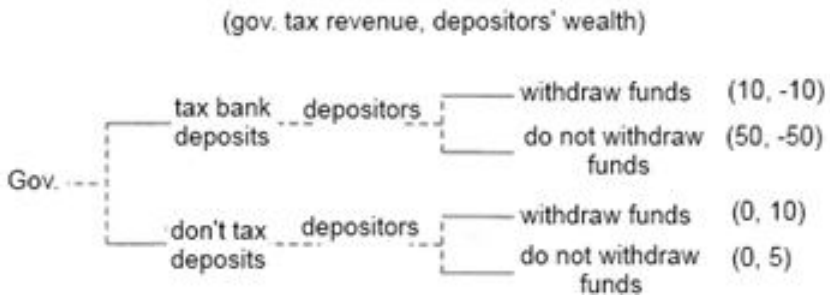


Figure 16: A sequential Game between Cypress Government and Foreign Depositors

Now, we let the depositors move first. If depositors withdraw funds, they receive either a -10 million or a 10 million. If they do not withdraw their funds, their payoffs are minus 50 million or 5 million. Thus, they withdraw funds because the payoff is greater. If the government taxes deposits, it gains 10 million. If it does not tax bank deposits, it obtains zero tax revenue. Thus, the government taxes bank deposits. We end up at Cell (10, -10) again. Consequently, the Nash Equilibrium is the government tax on bank deposits, and the depositors withdraw their bank funds from Cyprus.

We check the other government's decisions. The government moves first, and it does not tax bank deposits. Thus, it gains zero tax revenue. Then the depositors can choose to withdraw funds or not. They would withdraw funds because they would earn 10 million instead of 5 million. Hence, we end up at cell (0, 10). Now, we let the depositors move first. If depositors withdraw funds, they receive either a -10 million or a 10 million. If they do not withdraw their funds, their payoffs are -50 million or 5 million. Thus, they withdraw funds because their payoff is greater. If the government taxes deposits, it gains 10 million. If it does not tax bank deposits, it obtains zero tax revenue. Thus, the government taxes bank deposits, and we end up at Cell (10, -10), which differs from the government's first move. Consequently, the government's decision not to tax deposits does not yield a Nash equilibrium.

Another sequential game was 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 by high unemployment. The Greek government experienced a budget deficit of 9% as the government collected less tax revenue while government spending 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. The Greek government has forced its bondholders to take a 50% loss on their bonds, and investors no longer lend to the Greek government. The Greek government went to the EU and asked for a bailout. The Greek government and EU choices or strategies are:

- The Greek government can 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.

- The 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 and the EU's GDP) and are shown in Figure 17.

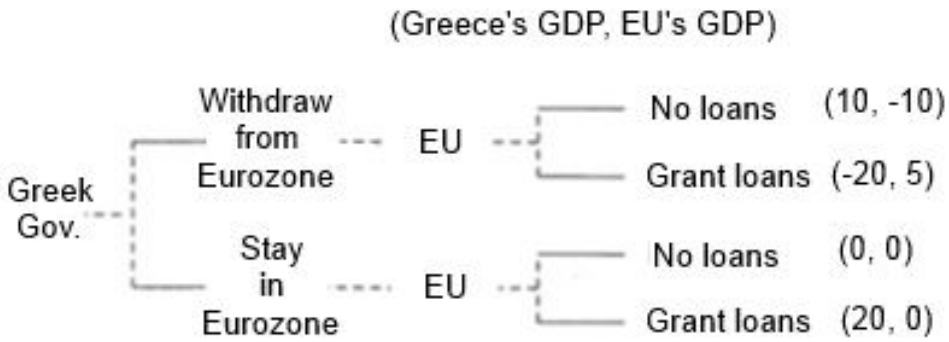


Figure 17: A sequential game between the EU and Greek governments

We solve for the Nash Equilibrium. We examine the Greek government's initial decision to withdraw from the EU. The EU has a choice to grant a loan or not grant a loan. The EU's economy plunges by -10 million euros if it does not grant a loan. 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, and let the EU grant a loan. Greece can either remain in the EU or withdraw if the EU grants a loan. If Greece withdraws from the EU, its economy will plunge by 20 million euros. If Greece remains in the EU, its economy grows by 20 million euros, so it chooses to stay in the Eurozone. Thus, Greece's choice to withdraw from the EU and the EU's decision to grant a loan do not yield a Nash Equilibrium.

We check Greece's decision to stay in the Eurozone. The EU has a choice to grant a loan or not grant a loan. The EU would be indifferent because neither change would impact the EU's GDP. If the EU does not grant a loan, the Greek government will withdraw from the Eurozone because Greece's GDP will grow by 10 million euros. This is not a Nash Equilibrium. However, the Greek government would remain in the Eurozone if the EU grants a loan. Consequently, the Nash Equilibrium is that Greece remains in the EU while the EU grants a loan.

We show the last sequential game in Figure 18, which 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 the 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 members' GDP).

Figure 18: A sequential game between North Korea and the United Nations

We solve for the Nash Equilibrium. If North Korea develops nuclear weapons, then the United Nations will not impose sanctions because the world's GDP will be greater for this choice. If the United Nations does not impose sanctions on North Korea, North Korea will receive the same payoff for both options. However, combining strategies, such as developing nuclear weapons and not imposing 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 than the UN's choice. If the United Nations does not impose sanctions, North Korea will not develop nuclear weapons. Thus, this combination yields a Nash Equilibrium.

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. The police captured two criminals, and they convinced one prisoner to confess. The prisoners receive the payoffs, which are the time they spend in prison. Thus, the lower the payoff, the better it is for the criminals. The rules are:

    - If both prisoners confess, then they each spend 5 years in prison.

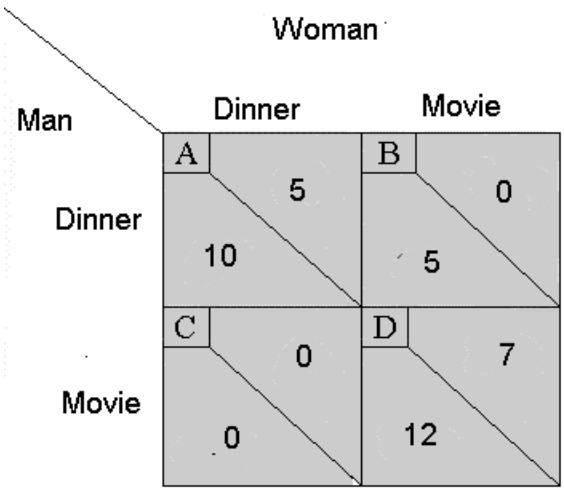
- If one prisoner confesses, he stays one year in prison while the other prisoner spends 10 years in prison.
- If neither criminal confesses, they spend one year in prison.
- The payoff matrix is (Criminal 1, Criminal 2). Be careful! Remember, lower numbers are better than higher numbers because higher numbers mean more prison time.

Identify the dominant, Nash equilibrium, and best strategies for both criminals.

	Criminal 2	
Criminal 1	Confess	Don't confess
Confess	5, 5	1, 10
Don't confess	10, 1	1, 1

2. We have a game where a man and a woman are dating. They both select a dating activity. Payoffs are the utility for each person. Did we notice that men get a utility of 5 when eating alone because they love to eat?

Identify any dominant strategies, the Nash equilibria, if any, and the preferred Nash Equilibrium.



3. We have the game below: Identify the dominant strategy, the Nash equilibria, if any, and the preferred Nash equilibrium.

	C1	C2	C3	C4
R1	5, 9	2, 3	2, 1	5, 5
R2	6, 6	3, 8	8, 3	4, 3
R3	7, 9	5, 8	7, 7	3, 3
R4	12, 12	4,13	0, 5	6, 14

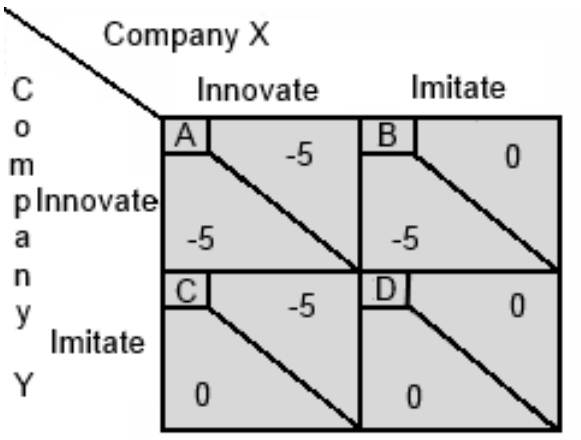
4. We have the simultaneous game below with a row and column player. The game is rock, scissors, and paper. Players receive their payoff after each match. Identify if any player has a dominant strategy, a Nash equilibrium, if any, and the preferred Nash equilibrium.

	Column Player		
Row Player	Rock	Scissor	Paper
Rock	0, 0	1, -1	-1, 1
Scissor	-1, 1	0, 0	1, -1
Paper	1, -1	-1, 1	0, 0

5. We have two pharmaceutical companies, Company X and Company Y, and they participate in a simultaneous game. They have the following strategies:

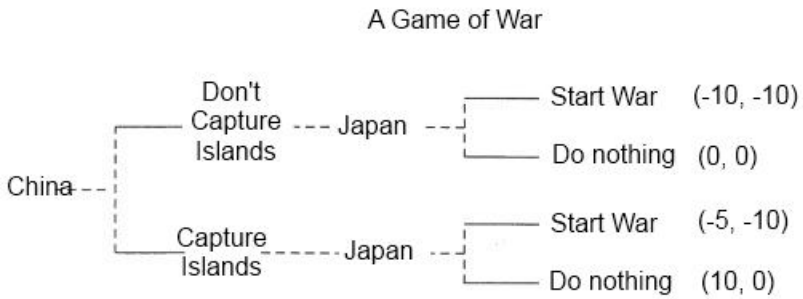
   - Innovate: A company pays 5 units to develop a new drug.
   - Imitate: One company pays zero units to reverse engineer the other company's new breakthrough drug.
   - Players pay a cost, which is a payout shown in the matrix below.

Identify whether a player has a dominant strategy, a Nash Equilibrium, if any, and the preferred Nash Equilibrium. If the government imposed a patent system that prevented a company from imitating 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 in 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 and Japan's GDP).

   Identify the Nash Equilibria, if any.



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. Several 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. It is common for governments to go through cycles of control and freedom.

3. At the beginning of the lease, people would treat the property as if they were owners and take care of it. At the end of the lease, owners would extract as much value as possible from the land. For example, if the land is a rental property, the owners stop investing in 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 before the land is returned to the government.

4. We aim to charge a high price for our phone, maximizing our profits. We are a monopolist using a patent as protection.

5. We mow a neighbor's lawn, and the neighbor fixes our car. We and our neighbor do not exchange money, but mutually benefit from this arrangement.

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, the government is not entirely in the hands of the capitalists. In 2025, a large industry of special interest groups evolved to funnel campaign contributions for passing specific laws. It appears businesses and government are sleeping in the same bed.

7. The cost-benefit analysis involves an extended period for public projects. A new highway can benefit society for generations, encouraging new growth and development. In the long run, society may benefit from this highway, while it would be inefficient to construct it in the short run.

8. No, we have no free lunch. Society still produces the same level of goods and services. If the government injects more money into this society, all prices will increase. When prices rise in society, economists call this inflation.

9. Answers will vary. The government tries to reduce drug abuse by imposing hefty fines or prison sentences for anyone caught with illegal drugs.

10. Answers will vary. The government forces drivers to purchase car insurance as a condition to

drive a vehicle on a public road or highway.

Answers to Chapter 2 Questions

1. Controls and regulations are interrelated. Control can be either quantity or quality control, as the government limits pollution emissions (quantity) or improves vehicle quality. Furthermore, pollution is a negative externality, but the definition of social regulation works well here, too.

2. We have an asymmetric information problem. The car dealers have more information than the consumers. Car buyers could check the used-car dealer's rating at the Better Business Bureau or search for online complaints. 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 applies because government agencies' budgets continuously increase. Principal Agent View also applies because the California State legislature has problems balancing budgets, making it dysfunctional.

4. Capture Theory explains this behavior well.

5. First, the government cannot collect tax revenue from this market. However, 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, the government must raise taxes to expand 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 for coffee.

2. Students see college tuition as a price. Given that many students transferred due to the tuition hike, private education must be elastic, as students are sensitive to price increases.

3. We must be careful. Lower-income consumers 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. The government helped these businesses by boosting the number of consumers. These businesses should see more consumers buying their products and services as the traffic density

increases.

5. Scientific study changes people's tastes and preferences. Thus, the consumers reduce their demand for aspartame, shifting the demand leftward. Both market price and quantity decrease.

6. Consoles and games are complements. A cheaper console means consumers will buy more games for this console, increasing the demand and shifting it to the right.

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, significantly increasing production. Thus, the supply elasticity is more elastic in the long run.

9. The soybean supply function will decrease and shift leftward. Farmers will start growing corn because of the higher corn prices and substitute away from soybeans.

10. Free health care is not free. Since the businesses and producers must pay for it, they pay higher costs. Thus, the supply function for many goods and services will decrease, shifting leftward.

11. Genetic engineering is a technology, so the supply of corn increases and shifts to the right.

12. The supply function for cigarettes decreases and shifts leftward.

13. No, the key is that markets are free from government interference. In socialist countries, the government sets the market prices. 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 reduces the demand for auto workers. Hence, the market wages (i.e., price) and quantity of labor employed fall.

16. Demand for coffee shifts leftward and decreases because consumers switch to cheaper tea. Therefore, both the market price and quantity of coffee decreased.

17. Producers earn profits on LCD and plasma TVs but also lose money on tube TVs. Thus, producers will expand production for LCD and plasma TVs and close down production for tube TVs.

Answers to Chapter 4 Questions

1. The price ceiling causes a shortage of medical insurance. The consequence is that the insurance company will closely screen the applicants. Medical insurance companies offer insurance to applicants with the best health and the fewest health problems. Individuals with preexisting conditions often face significant challenges in obtaining health insurance.

2. The price floor has no impact on the market for computer programmers. Their salaries already exceed the government's minimum.

3. The price floor creates a surplus of corn in the market. The 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. The government believes yacht owners will get $1 billion in tax revenue. However, taxes raise the market price, so some people will sell their yachts. Furthermore, some yacht owners may evade the tax; thus, the 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. The problem with Social Security taxes is that the government stops collecting the tax as income exceeds $176,100 annually. If we earned one million dollars in income, we would pay $10,918.20 in taxes on the first $176,100, or 6.2% of $176,100. However, we spent 1.1% of our income on Social Security. If we earned exactly $176,100, we paid 6.2% of our income for this tax. Thus, rich people pay a smaller proportion of their incomes to this tax, making it regressive.

7. Many professionals, such as attorneys, accountants, and tax software programmers, depend on a complicated tax code. If the federal government significantly reduced the tax code's complexity, these professionals would lose their jobs. They would also have a reason not to contribute to politicians' campaign contributions.

8. A head tax is a highly regressive tax. Homeless people with no income would still pay the same tax as wealthy people. Thus, the rich may not notice the head tax, which would create a severe burden on low-income and homeless people.

9. The subsidy lowers the price of oranges and products like orange juice. Florida orange growers expand their orange production, while the government pays for the subsidy by extending 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. The problem is that more people may smoke marijuana, and users may suffer from more medical issues. Moreover, society suffers from the deadweight loss of taxation. However, the 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, marijuana prices may fall as producers may supply more. Quality can improve. Finally, the state government collects more tax revenue, contributing to the government's budget.

Answers to Chapter 5 Questions

1. The DeBeers Corporation was horizontally integrated or multiplant.

2. The children should form a partnership.

3. It is an explicit cost because the business must pay 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. Intel should produce millions (or billions) of microprocessors to decrease its average total costs.

7. MC is increasing. Furthermore, MC > AVC and MC < ATC. Production level Q lies between the minimums of AVC and ATC.

8. This fixed cost 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, raising 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. Competitors can easily enter the market if the fruit stand owners earn economic profit.

3. Yes, a new firm entering the market will finance this advertising cost and inform the customers about their product. Advertising creates an entry barrier.

4. It should expand production by one more unit. Its profit rises by $20 - $15 = $5.

5. The firm earns profits if the market price exceeds $75. The firm breaks even at $75 and earns losses if the price falls below $75. The firm still operates if the market price lies between $50 and $75, but shuts down if the price drops 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. The cell phone industry is a decreasing-cost industry. As the industry expands, the long-run prices fall.

8. The demand for cars decreases. After the long-run adjustments, the market price for vehicles 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 has contracted and makes and sells fewer cars.

9. No, the monopoly is both allocatively and productively inefficient. Allocative inefficiency is due to the market price, P* > ATC. Meanwhile, P* does not equal the minimum on the ATC because a monopoly sells for a higher price and earns economic profit.

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, the company must invest over $1 billion.

3. A 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 among the first investors.

5. The housing agency suffers from a lack of competition, x-inefficiency, and rent-seeking behavior. X-inefficiency occurs when an agency employs too many workers, and rent-seeking behavior is characterized by political connections. However, we do not know if it is allocatively inefficient because the government agency provides free assistance. The disadvantaged or poor cannot pay for this service. This becomes a form of a public good.

6. The Concentration Ratio equals 93, while the Herfindahl Index equals 4,038.

7. This is Ramsey Pricing because the water company charges a fixed price and a variable 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. The operating system and office software are complements. We need one to run the other. A breakup would be ineffective, and the policy takes one monopoly and splits it into two smaller monopolies.

9. A fair return is when 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. They can discuss prices over a round of golf at the country club and then shake hands.

2. This country can cheat and secretly sell its petroleum on the markets.

3. Theme parks use two strategies. First, they offer various discounts. For example, theme park owners print and distribute multiple 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 prices 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. A potential problem is that the software company prevents students from reselling the software at a higher price. For example, a student could buy discounted software and sell it on eBay. Software companies need a strong licensing system to prevent this, such as matching the name to the serial number.

5. Yes, this is a problem. Higher taxes, higher rates for deposit insurance, and more regulations

force banks to pay greater costs and earn lower profits, assuming the bank's revenue does not change. Consequently, the government helps and hurts the banks simultaneously with the bailout.

6. That country loses international investors because they shy away from investment if they believe the government will seize their property and not compensate them.

7. The government should organize the Florida orange growers as a cooperative.

8. The strategy is quite simple. The government reduces the concentration of power, imposes regulations, breaks up monopolies, or exposes monopolies to competition through international trade. The government also reduces the size of government, reduces taxes, eliminates subsidies, and simplifies bureaucratic red tape. Of course, this reduces politicians' power, and they rarely use these methods. Instead, they increase regulations, taxes, and subsidies, indirectly boosting their power.

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 college to avoid high tuition fees, colleges see a drop in tuition and often turn to the state government for additional 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. The government raised wage levels and hired more TSA agents, which the 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. The Kazakh government should set up joint ventures between the Kazakh government, a Kazakh company, and a Western company. The Kazakh government would be the majority shareholder, and Kazakhstan did do this.

5. The Kazakh government should give its citizens vouchers. Then the state property will be auctioned to the public. Of course, Kazakhstan 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 know what markets are and embrace them quickly.

8. No, a small country could not rely on its internal markets for growth. Monopolies would dominate the heavy industry, 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 it over again? A government oscillating with its policy creates uncertainty. Citizens and companies will ask how long markets will last this time, and investment will suffer.

Answers to Chapter 10 Questions

1. Answers vary because it depends on where we live. For example, the United States exports corn and soybeans. Thus, exports benefit these states. However, some states, such as Michigan, are harmed when the United States imports manufactured goods from Asia, as Michigan used to mass-produce cars and trucks.

2. Answers vary.

3. A straight-line PPC indicates that producers can move resources from one industry to another without losses. A curved PPC is more realistic. This means that resources are not identical, and producers moving resources from one sector 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 on the economic growth in the United States. The PPC for the U.S. could expand and shift outward, but the economic growth would be lower. The PPC could even shift inward as the U.S. economy stagnates from the bad legal system.

6. We must calculate the opportunity cost. China must give up two computer chips because it produces one more bushel of soybeans. As the United States makes 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 has 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 quantities, 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.

10. Pepsi costs 2.25 dirhams.

11. The 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 create a supply in another as people exchange currencies. Note that the central bank could also expand the supply of U.S. dollars.

12. Americans buy less Mexican-made goods. Thus, consumers' demand for pesos falls and shifts leftward. The peso depreciates while the U.S. dollar appreciates.

13. The Federal Reserve must reduce the supply of U.S. dollars. It could trade euros for U.S. dollars, appreciating the U.S. dollar and depreciating the euro. 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. U.S. policies may cause economic growth in the short run. However, the government is following the opposite policies of the Asian Tigers. Furthermore, a stronger U.S. dollar boosts imports and reduces exports. Thus, the U.S. economy may grow over the next decade, or it may not grow at all.

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 quotas lead to higher car prices and lower U.S. imports. Furthermore, the Japanese car companies collect economic rent from higher car prices and export their best luxury cars. The U.S. government does not receive this rent as tariff revenue. Finally, Japanese car manufacturers could bypass the trade restrictions by manufacturing their vehicles within the United States.

4. The retaliating government also imposes more "red tape" and regulations against its trading partner.

5. Answers vary; it depends on where we 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. The 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. The 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 a dirty float.

9. Believe it or not, a central bank or government can weaken a currency easily. If the currency always appreciates, 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 constantly depreciates, the central bank must use its cache of currencies to intervene in the market. Thus, the central bank would buy its currency with hard currencies, reducing the supply of its currency on the foreign exchange markets. Eventually, the central bank will run out of foreign currencies.

Answers to Chapter 12 Questions

1. Yes, a country uses mercantilism to create a trade surplus. An export growth strategy focuses on exports, whereas traditional mercantilism focuses on import restrictions. The 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. The United States will lose its hegemony. Countries would stop accepting U.S. dollars, and world trade would halt unless countries found another currency to replace the U.S. dollar. International investors would stop investing in the U.S. debt if the U.S. dollar collapses in value.

4. Theoretically, China could collapse the U.S. dollar by dumping its U.S. investments onto the markets. However, China would lose approximately $1 trillion in investment. Thus, China has a strong financial incentive to maintain the system as long as possible and gradually cash out

over time, which it appears China has done in 2025.

5. Many times, the government does not use economic reasoning in making decisions. When the government imposes a trade sanction, the press reports the government's decision, which forces a country to do something.

6. This is a market failure. Knowledge and technology are both positive externalities and public goods. After an inventor or scientist has developed new technology, free riders benefit from the technology without paying (i.e., a public good). Since the country developing the latest technology is not being paid, countries are incentivized to undersupply knowledge and technology (i.e., positive externality), which could be good because a military uses technology to kill 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. Some politicians have tried to reform public programs and institutions; however, lawsuits have blocked the reform.

8. This is hard to say. Large conglomerates can monopolize a market, increasing market prices and earning substantial profits. However, the bank can help if the conglomerate modernizes its production and invests in new machines and equipment. Russia also experienced large GDP growth rates, as 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 grow and shift rightward.

4. The government taxes production, raising business costs. Thus, the aggregate supply function shifts leftward and decreases.

5. If immigrants work, their wages are usually lower than those of legal labor. Hence, the firms' labor costs rise as the government deportes illegal immigrants. Therefore, the aggregate supply function decreases and shifts leftward. The deportation of the illicit labor in 2025 is another source of inflation, as firms must pay higher wages to citizens.

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 to the right.

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 falls as the economy experiences inflation due to price level increases.

8. Productivity gains mean workers can produce more with the same resources. Thus, the aggregate supply function increases and shifts rightward. Although GDP rises, the inflation rate becomes ambiguous. If prices are flexible, the economy deflates as the price level falls. If prices remain rigid, the economy will have no inflation or deflation; however, GDP skyrockets.

9. Consumers boosting their spending increases the aggregate demand function, shifting it to the right. Thus, the GDP rises, while the economy experiences inflation.

Answers to Chapter 14 Questions

1. It may not be a good measure, but it is our best. For example, GDP per capita is growing, and a dictator rules this country. The well-being of society does not increase if the dictator consumes all the goods and services for himself. As another example, a country with a high GDP growth rate is consuming its resources quickly or creating massive amounts of pollution. The GDP excludes resource depletion or environmental damage.

2. The company's investment contributes $30 million to the local 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, the local government should approve the tax break.

3. The multiplier equals the change in GDP divided by the change in investment, which equals 4.

4. Solve for ΔG, 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 the MPC. Remember that households pay for part of the increased taxes from savings, which is why the MPC appears in the numerator. Change in GDP equals the following:

$$\Delta GDP = \frac{\Delta T \cdot MPC}{1 - MPC} = \frac{-\$500\,billion \cdot 0.95}{1 - 0.95} = -\$9.500\,trillion$$

6. A flat tax is a proportional tax system. The government takes the same percentage from income, whether high or low. Thus, a flat tax does not slow down spending when incomes grow. Lastly, 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 since they can rationalize their rampant spending.

8. Again, this is Parkinson's Law from Chapter 2. Government leaders continually expand the 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 has grown at a quicker pace, especially after the 2020 COVID-19 pandemic.

Answers to Chapter 15 Questions

1. People need and demand less money. Of course, the demand for cash 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. Investors can earn a significant profit if they can predict a central bank's actions.

3. The Federal Reserve should use an expansionary monetary policy (i.e., quantitative easing) that lowers interest rates and raises GDP. The lower interest rates cause businesses to invest in buildings, machines, and equipment, and households to finance the purchases of homes, cars, and appliances using credit.

4. Theoretically, a central bank should use contractionary monetary policy (i.e., quantitative tightening) to slow the economy. However, this economic policy could trigger a recession as GDP slows down. This policy is rarely used. In 2025, the Fed chair, Jerome Powell, raised interest rates to lower inflation. However, President Trump, the public, and business people complain about the high rates and how the Fed is hurting the U.S. economy.

5. A central bank uses expansionary monetary policy because a lower interest rate encourages more banks to grant more loans. The Fed loans inject more money into the economy via the banking system.

6. A central bank uses contractionary monetary policy by selling securities, thereby removing reserves from the banking system and reducing the money supply.

7. Low interest rates had little impact on the United States between 2008 and 2009 because Americans had too much debt. Americans were paying down their debt and are not interested in new loans, even loans with low interest rates. Furthermore, asset prices were declining in

the United States, and banks were reluctant to lend on assets that lost value.

8. Many governments perpetually maintain budget deficits. Thus, the 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 that the federal and state governments looked the other way. For example, 30 years ago, banks imposed stringent loan requirements. Borrowers needed a stable work history, paid a substantial down payment on their house, etc. At the height of the housing bubble, banks approved anyone for a mortgage loan. The financial industry needed mortgages to create their new exotic securities. These exotic securities are collateralized debt obligations (CDOs) and credit default swaps (CDSs).

3. The 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. Commercial banks could encourage their 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 guarantee.

5. Commercial and investment banks created new financial instruments. These financial instruments are similar to mutual funds. Banks combine mortgages into a fund and sell shares to investors. Many investors were foreigners.

6. The 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. The Fed could raise interest rates by using contractionary monetary policy, which would slow 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. Then Ben Bernanke took his place, who is an expert on the Great

Depression.

8. The 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. The Federal Reserve uses an expansionary monetary policy. This policy weakens the U.S. dollar. 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, tourists experience tough economic times and take fewer vacations. Places that depend on tourism dollars may suffer from financial difficulties.

2. The informal sector comprises 40 to 50% of a developing country's economy. If the 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 most significant expenses are airline tickets and hotels. Tourists usually fly on airlines and stay at hotel chains from developed countries. Thus, tourists' spending leaks into the airlines' and hotels' home countries. Lastly, the tourist may consume food and drinks that a destination imports.

4. A small economy does not have backward linkages. Thus, a small economy lacks the industries to produce tourist products and services. Consequently, businesses must import goods and services, causing a high leakage of tourists' dollars.

5. International tourists bring foreign currencies to the destination to buy goods and services. It is similar to an export industry without the smokestacks.

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 in a neighboring community with few tourists. Prices, in general, tend to be higher at tourist destinations.

7. The dependency ratio equals 66.8%, which is quite high. Some U.S. tourists are scared to visit Mexico because of the massacres, shootings, and drug wars occurring along the U.S.-Mexican border.

8. The tourist multiplier equals 3.33. If a tourist spends one more dollar at the destination, that one dollar creates $3.33 in income.

9. Tourists' spending creates $45 million (= 1.5 x $30 m) in income at the tourist destination.

10. Using algebra, the multiplier equals $1/(1-(1-t)\cdot MPC+MPM)$. If one substitutes the equation, MPC + MPS =1, into the multiplier, then the multiplier becomes $1/(t+(1-t)\cdot MPS+MPM)$, 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 use electricity. In the United States, electric power plants generate most electricity from coal, another exhaustible resource. In this scenario, we substitute petroleum for coal, one fossil fuel for another.

4. It depends. If a government extracts and sells petroleum in the international markets, then the government may earn substantial revenues. Society becomes affluent if a government keeps taxes low and maintains a pro-capitalistic system. If a country like Venezuela uses petroleum revenues to finance a socialist country, the country may be doomed; 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. The government has several costs. First, the government hires inspectors to monitor the species. Second, the government pays agencies to arrest, prosecute, and incarcerate violators. Of course, these costs could be high, and the government collects fines and fees to pay these high costs.

7. Developed countries are wealthier. Thus, rich countries have more options. First, the government creates a bureaucracy to monitor the resources. Second, more affluent households can use alternatives, such as natural gas, to heat, cook, and construct new homes using metal beams. Finally, the 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 on people cutting down trees. Furthermore, a permit becomes a subsidy if people plant and maintain trees. 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. The water usage rate should reflect water scarcity. If the locality has plenty of water, water prices would be low. Water prices would be high if the locality is located in a dry region with little fresh water. High market price forces households to conserve that resource.

11. No! Used car oil is a waste product from cars. As long as society uses gasoline engines, society will always create used oil as a waste product. The government can open a recycling center and take all the oil for free. Furthermore, the government could pay $1 per gallon of oil. Thus, used oil has a price, and some people will sell their oil to a government recycling facility.

12. The government could ban all cars and trucks, even electric cars. Electric vehicles 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, the government could rely on the tax revenue. Then the government could increase the tax rate if companies discovered new technology to lower pollution and reduce their taxes. Finally, pollution involves a large number of people and businesses. Thus, the Coase Theorem would not work.

2. Remember, the only way to stop pollution is for the government to shut down all pollution sources. Since a government would never do that, the best method is to encourage businesses to minimize their pollution at the lowest cost. Thus, a government creates a well-defined permit system.

3. No, because of the definition of nonpoint source pollution. There are so many pollution sources that bringing all participants to court would be impossible. 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. The government could impose command and control regulations. The government must ensure all farmers build riparian buffers around their fields and collect animal waste 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, its benefits must exceed its costs. For communities with plentiful water, companies can discharge minimally treated wastewater into the environment, which 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. The 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 to learn new technology. (Stick around the office when the computer specialists upgrade all the computer software.) Thus, the Porter Hypothesis does have some validity. An environmental regulation may force an institution or business to implement change and come up with new ideas.

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 Equilibria are Confess-Confess and Don’t Confess-Don’t Confess. Criminals would prefer Don’t Confess-Don’t Confess because they would spend the least time in prison.

2. Neither player has a dominant strategy. Nash Equilibria are Dinner-Dinner and Movie-Movie. The couple would prefer the Movie-Movie because they both receive a greater utility.

3. Neither player has 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 we surprised this game has a Mixed Strategy, where each player chooses one strategy 1/3 of the time?

5. Both companies use their dominant strategy to imitate. The 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. The game has a Nash Equilibrium - China captures the islands while Japan does nothing.

References

Becker, Gary S. 1983. “A Theory of Competition among Pressure Groups for Political Influence.” *The Quarterly Journal of Economics.* 98(3): 371-400.

Becsi, Zsolt. 2000. “The Shifty Laffer Curve.” *Economic Review – Federal Reserve Bank of Atlanta* 85(3): 53- 64.

Bernanke, Ben and Martin Parkinson. 1989. “Unemployment, Inflation, and Wages in the American Depression.” *The American Economic Review* 79(2): 210-214.

Besanko, David A. 1987. “Performance versus Design Standards in the Regulation of Pollution.” *Journal of Public Economics* 34(1):19-44.

Bialer, Seweryn. 1988. “Gorbachev’s Program of Change: Sources, Significance, Prospects.” *Political Science Quarterly* 103(3): 403-460.

Brada, Josef C. 1996. “Privatization is Transition – Or is it?” *The Journal of Economic Perspectives* 10(2): 67-86.

Coase, Ronald H. 1960. “The Problem of Social Cost.” *Journal of Law and Economics* 3:1-44.

Conybeare, John A. 1982. “The Rent-Seeking State and Revenue Diversification.” *World Politics* 35(1): 25-42.

Daly, Herman E. 1995. “On Wilfred Beckerman’s Critique of Sustainable Development.” *Environmental Values* 4: 49–55.

Diamond, Jared. 2005. *Collapse - How Societies Choose to Fail or Succeed*. New York: Viking. 358 – 416.

Dobel. J. Patrick. 1978. “The Corruption of a State.” *The American Political Science Review* 72(3): 958-973

Dollar, David. 1992. “Outward-Oriented Developing Economies Really Do Grow More Rapidly: Evidence from 95 LDCs, 1976-1985.” *Economic Development and Cultural Change* 40(3): 523-44.

Drug Policy Alliance. 2008. “Drugs, Policy, and the Law – Tulia, Texas.” Available at http://www.drugpolicy.org/law/police/tulia/index.cfm (access date: 02/05/08).

Farzin, Y. H. July 2001. "The Impact of Oil Price on Additions to U.S. Proven Reserves." *Resource and Energy Economics* 23(3):271-91.

Fishelson, Gideon. July 1983. "Hoteling Rule, Economics Responses and Oil Prices." *Energy Economics* 5(3):153-6.

Frank, Isaiah. 1968. "The Role of Trade in Economic Development." *International Organization* 22(1): 44-71.

Fraser Institute. NA. *Economic Freedom from Around the World.* Available from http://www.freetheworld.com/ (access date: 01/26/2010).

Gazprom. Year unknown. *List of Major Companies with Gazprom Shareholding*. Available at http://www.gazprom.com/eng/articles/article8526.shtml (8/7/06).

_____. 2005. *Gazprom in Questions and Answers.* Available at http://eng.gazpromquestions.ru/page4.shtml (access date: 8/7/06).

Gerring, John and Strom C. Thacker. 2005. Do Neoliberal Polices Deter Political Corruption? *International Organization* 56(1): 233-254

Goldsmith, Arthur A. 1999. "Africa's Overgrown State Reconsidered: Bureaucracy and Economic Growth." *World Politics* 51(4): 520-546.

Goodstein, Eban. 2003. "The Death of the Pigovian Tax? Policy Implications from the Double-Dividend Debate." *Land Economics* 79(3):402-414.

Gwartney, James and Robert Lawson. 2003. "Concept and measurement of economic freedom." *European Journal of Political Economy* 19:405-430.

Heritage Foundation. 2010. *2010 Index of Economic Freedom*. Available from http://www.heritage.org/index (access date: 01/26/2010).

Hotelling, Harold. 1931. "The Economics of Exhaustible Resources." *The Journal of Political Economy* 39(2):137-175.

Hubbert, M. King. March 17, 1959. "Techniques of Prediction with Application to the Petroleum Industry." Presented at American Association of Petroleum Geologists, Dallas, TX, 17 March. Available at http://www.hubbertpeak.com/hubbert/Bibliography.htm (access date: 8/24/06).

Ioan, Mutascu Mihai. 2009. “The Effect of the Government Intervention in Economy on Corruption.” *Eurasian Journal of Business and Economics* 2(3): 55-71.

Katsenelinboigen, Aron and Herbert S. Levine. 1977. “The Soviet Case.” *American Economic Review* 67(1): 61-66.

Kiser, Edgar and Joshua Kane. 2001. “Revolution and State Structure: The Bureaucratization of Tax Administration in Early Modern England and France.” *The American Journal of Sociology* 107(1): 183-223

Laffer, Arthur B. June 1, 2004. “The Laffer Curve: Past, Present, and Future.” *The Heritage Foundation*. Available at www.heritage.org (access date: 3/23/07).

Leibenstein, Harvey. 1966. “Allocative Efficiency and X-Efficiency.” *The American Economic Review*. 56: 392-415.

Lim, David. 1994. “Explaining the Growth Performances of Asian Developing Economies.” *Economic Development and Cultural Change* 42(4): 829-44.

Mancur Olson. *The Rise and Decline of Nations*. New Haven, CT: Yale University Press, 1982.

McCarthy, Stephen. 2000. “Ten Years of Chaos in Burma: Foreign Investment and Economic Liberation under the SLORE-SODC, 1988 to 1998.” *Pacific Affairs* 73(2): 233-262.

Microsoft Encarta 98 Encyclopedia. 1998. “Cooperatives.” Microsoft Corporation

Morrison, Michael B. October 1987. “The Price of Oil, Lower and Upper Bounds.” *Energy Policy* 15(5):399-407.

Neuman, Johanna. February 10, 2006. “The Land of 10,770 Empty FEMA Trailers.” *The Los Angeles Times.*

Norgaard, Richard B. July 1990. “Economic Indicators of Resource Scarcity: A Critical Essay.” *Journal of Environmental Economics and Management* 19:19-25.

Office of Energy Markets and End Use. October 1996. *Privatization and the Globalization of Energy Markets*. Washington, DC: U.S. Department of Energy, Energy Information Administration, Report DOE/EIA-609(96).

OPEC. 2006. *The Organization of the Petroleum Exporting Countries (OPEC) Brief History*. Available at http://www.opec.org/aboutus/history/history.htm (access date: 8/6/06).

O'Toole, Laurence J. and Kenneth J. Meier. 2004. "Parkinson's Law and the New Public Management? Contracting Determinants and Service-Quality Consequences in Public Education." *Public Administration Review* 64(3): 342-352

Palmer, Jay. November 27, 1978. "The Rising Risks of Regulation." *Time.*

Palmer, Karen; Oates, Wallace E; Portney, Paul R. 1995. "Tightening Environmental Standards: The Benefit-Cost or the No-Cost Paradigm?" *Journal of Economic Perspectives* 9(4):119-32.

Parkinson, C. Northcote. 1957. Parkinson's Law. Cambridge and Massachusetts: The Riverside Press.

Parkinson, C. Northcote. November 1955. "Parkinson's Law." *The Economist.*

Pemex. 2006. *2005 Annual Report. Mexico*, DF: Direccion Corporativa de Finanzas. Available at http://www.pemex.com/index.cfm?action=content&sectionID=11&catID=149&subcatID=2711 (access date: 8/6/2006).

Porter, Michael E; van der Linde, Claas. 1995. "Toward a New Conception of the Environment-Competitiveness Relationship." *Journal of Economic Perspectives* 9(4):97-118.

Rodrik, Dani. 1996. "Understand Economic Policy Reform." *Journal of Economic Literature* 34(1): 9-41.

Schneider, Friedrich and Collin C. Williams. 2013. "The Shadow Economy." The Institute of Economic Affairs. Available at http://www.iea.org.uk/publications/research/the-shadow-economy (accessed on 10/29/2013).

Solow, Robert M. May 1974. "The Economics of Resources or the Resources for Economics." *American Economic Review* 64(2):1-14.

Stein, Arthur A. 1984. "The Hegemon's Dilemma: Great Britain, the United States, and the International Economic" *International Organization* 38(2): 355-86

Stern David I. 2004. "The Rise and Fall of the Environmental Kuznets Curve." *World Development*. 32(8): 1419-1439.

Stigler, George J. 1971. "The Theory of Economic Regulation." *Bell Journal of Economics and Management Science*, 3: 3-18.

Tax Justice Network. 2005. “Tax, tax havens and the extractive industries.” Available from < http://www.taxjustice.net/cms/front_content.php?client=1&lang=1&parent=91&subid=91&idcat=105&idart=116> Accessed 22 September 2012.

Unger, Jonathan and Anita Chan. 1995. “China, Corporatism, and the East Asian Model.” *The Australian Journal of Chinese Affairs* 33: 29-53.

Verret, J.W. January 14, 2009. “Government Ownership and Shareholders Rights.” Capitol Hill Series, *Mercatus Center*. Available at http://mercatus.org/events/understanding-financial-crisis-ii (access date: 02/19/2010).